

Appendix I

Bird and Bat Conservation Strategy

Bird and Bat Conservation Strategy

for the Bowman Wind Project

Prepared for Bowman Wind, LLC
March 18, 2021

List of Contributors

Company	Key Contributors	Contact Information
Western EcoSystems Technology, Inc. 415 W. 17 th Street, Suite 200 Cheyenne, Wyoming 82001 307-634-1756	Kimberly Bailey Kristen Chodachek Sofia Agudelo Chad LeBeau	kbailey@west-inc.com kchodachek@west-inc.com sagudelo@west-inc.com cwlebeau@west-inc.com
Bowman Wind, LLC		

TABLE OF CONTENTS

1.0	INTRODUCTION	1
1.1	Purpose of the Bird and Bat Conservation Strategy	1
1.2	Key Avian and Bat Laws, Regulations, Authorizations	3
1.2.1	Migratory Bird Treaty Act (MBTA)	3
1.2.2	Bald and Golden Eagle Protection Act (BGEPA)	3
1.2.3	Endangered Species Act (ESA)	3
1.2.4	State of North Dakota	4
1.3	Facility Description	4
1.4	Environmental Setting and Habitat	6
1.5	Background and Consultation History	8
2.0	SITE CHARACTERIZATION SURVEYS (TIERS 1, 2, AND 3)	11
2.1	Preliminary Site Evaluation and Characterization (Tiers 1 and 2)	11
2.1.1	Tier 1	11
2.1.2	Tier 2	12
2.2	Tier 3 Surveys Completed to Date	15
2.2.1	Birds	16
2.2.1.1	Avian Use Surveys	16
	2017 – 2018	19
	2018 – 2019	19
2.2.1.2	Raptor Nest Surveys and Follow-up Monitoring	20
	2018	20
	2019	22
2.2.1.3	Prairie Grouse Lek Monitoring Surveys	24
	2018	24
	2019	24
	2019/2020 (North Dakota Game and Fish Department)	24
2.2.2	Bats	27
2.2.2.1	Northern Long-eared Bat Habitat Assessment	27
2.2.2.2	Bat Acoustic Monitoring Surveys	27
2.2.3	Grassland Assessment	30
2.2.3.1	2018	30
2.2.3.2	2020	30
2.2.4	Black-tailed Prairie Dog Colony Mapping	33
2.2.4.1	2018	33
2.2.4.2	2019	33

3.0	DISCUSSION AND IMPACT ANALYSIS	35
3.1	Birds	38
3.2	Bats	40
3.3	Grasslands	40
3.4	Measures to Offset and/or Compensate for Habitat-related Impacts	40
4.0	IMPACT AVOIDANCE AND MINIMIZATION MEASURES	41
4.1	Project Layout and Design	42
4.2	Construction	43
4.3	Operations	43
5.0	OPERATIONAL MONITORING AND WILDLIFE INCIDENT REPORTING	44
5.1	Fatality Monitoring	44
5.2	Wildlife Incident Reporting System	45
5.3	Native Grassland Revegetation Monitoring	45
6.0	ADAPTIVE MANAGEMENT	45
7.0	MITIGATION AND CONSERVATION DURING DECOMMISSIONING	47
8.0	REFERENCES	48

LIST OF TABLES

Table 1.1.	Land cover types, area, and percent (%) composition within the Bowman Wind Project, Bowman County, North Dakota.	6
Table 1.2.	Agency consultation history for the Bowman Wind Project, Bowman County, North Dakota	10
Table 2.1.	Birds of particular concern by habitat type and season, with potential to occur within the 2017 Bowman Wind Project boundary.	13
Table 2.2.	Evaluation and characterization of the Bowman Wind Project: Responses to questions posed in Tier 1 and Tier 2 of the 2012 US Fish and Wildlife Service <i>Land-based Wind Energy Guidelines</i>	13
Table 2.3.	Avian, bat and habitat monitoring and survey efforts conducted for the Bowman Wind Project.	16
Table 3.1.	Predicted impacts of the Bowman Wind Project, Bowman County, North Dakota: Responses to questions posed in Tier 3 of the 2012 US Fish and Wildlife Service <i>Land-based Wind Energy Guidelines</i>	35

Table 3.2. Final layout 059 grassland mapping updated based on the Western EcoSystems Technology, Inc. (WEST) field assessment used for the avian-impact offset method to estimate offsets for displaced breeding grassland birds. (Results in this table include 85 total primary and spare turbine locations. The final project layout will total 74 2.82-megawatt turbine locations.)	41
Table 6.1. Triggers and responses in the Bowman Wind Project Adaptive Management Strategy	46

LIST OF FIGURES

Figure 1.1. Location of the Bowman Wind Project in Bowman County, North Dakota.....	2
Figure 1.2. Project infrastructure of the Bowman Wind Project, in Bowman County, North Dakota.....	5
Figure 1.3. Land cover at the Bowman Wind Project, Bowman County, North Dakota.	7
Figure 1.4. Original Assessment Area and Project boundaries for the Bowman Wind Project, Bowman County, North Dakota.	9
Figure 2.1. Location of fixed-point avian use survey locations and associated 800-meter radius plots for avian use surveys completed from August 7, 2017 – July 22, 2018, at the Bowman Wind Project, Bowman County, North Dakota.....	17
Figure 2.2. Location of fixed-point avian use survey locations and associated 800-meter radius plots for avian use surveys completed from August 23, 2018 – July 23, 2019, at the Bowman Wind Project, Bowman County, North Dakota.....	18
Figure 2.3. Location of eagle nests identified during the 2018 raptor nest surveys completed at the Bowman Wind Project in Bowman County, North Dakota, in March, June, and October 2018.....	21
Figure 2.4. Location of eagle nests identified during the 2019 raptor nest survey completed at the Bowman Wind Project in Bowman County, North Dakota, in March 2019.....	23
Figure 2.5. Greater sage-grouse and sharp-tailed grouse lek locations surveyed in April 2018 at the Bowman Wind Project, Bowman County, North Dakota.	25
Figure 2.6. Greater sage-grouse and sharp-tailed grouse lek locations surveyed in April 2019 at the Bowman Wind Project, Bowman County, North Dakota.	26
Figure 2.7. Forested habitat areas located within the Project boundary (2018) and associated 1,000-foot buffer at Bowman Wind Project, Bowman County, North Dakota.	28
Figure 2.8. Location of acoustic bat monitoring survey stations from July 8 – October 28, 2020, at the Bowman Wind Project, Bowman County, North Dakota.	29
Figure 2.9. SWCA Environmental Consultants Desktop Grassland Assessment results for 2018 at the Bowman Wind Project, Bowman County, North Dakota, in 2018.....	31

Figure 2.10. Western EcoSystems Technology, Inc. grassland sod types assessed during the Grassland Assessment completed May 13 – 14, 2020, May 27, 2020, and October 13 – 15, 2020, at the Bowman Wind Project, Bowman County, North Dakota.32

Figure 2.11. Black-tailed prairie dog colony locations for 2018 and 2019 at the Bowman Wind Project, Bowman County, North Dakota.34

LIST OF APPENDICES

Appendix A. Agency Meeting Summaries and Relevant Communication

Appendix B. Bird and Bat Studies Completed for the Bowman Wind Project, Bowman County, North Dakota

ACRONYMS AND ABBREVIATIONS

ac	acres
AMMs	Avoidance and Minimization Measures
APLIC	Avian Power Line Interaction Committee
Audubon	National Audubon Society
BBCS	Bird and Bat Conservation Strategy
BGEPA	Bald and Golden Eagle Protection Act
BMPs	Best Management Practices
Bowman Wind	Bowman Wind, LLC
CFR	Code of Federal Regulations
ECPG	Eagle Conservation Plan Guidance
EEI	Eagle Environmental, Inc.
ESA	Endangered Species Act
GPS	Global Positioning System
IBA	Important Bird Area
ID	Identification
IPaC	Information for Planning and Consultation
m	meter
MBTA	Migratory Bird Treaty Act
mi	mile(s)
min	minute(s)
MW	megawatt(s)
NAIP	National Agriculture Imagery Program
NDGFD	North Dakota Game and Fish Department
NLCD	National Land Cover Database
NLEB	northern long-eared bat
OAA	Original Assessment Area
O&M	Operations and Maintenance
Project	Bowman Wind Project
SCP	Species of Conservation Priority
SHFC	Species of Habitat Fragmentation Concern
SWAP	State Wildlife Action Plan
SWCA	SWCA Environmental Consultants
U.S.C.	US Code
USFWS	US Fish and Wildlife Service
USGS	US Geological Survey
WEG	Land-based Wind Energy Guidelines
WEST	Western EcoSystems Technology, Inc.
WIRS	Wildlife Incident Reporting System
WTGs	wind turbine generators

1.0 INTRODUCTION

1.1 Purpose of the Bird and Bat Conservation Strategy

Bowman Wind, LLC (Bowman Wind) is proposing the development of the Bowman Wind Project (Project) located in Bowman County, North Dakota (Figure 1.1). Consistent with the tiered approach presented in the US Fish and Wildlife Service (USFWS) *Land-Based Wind Energy Guidelines* (WEG; USFWS 2012) and the *Eagle Conservation Plan Guidance* (ECPG; USFWS 2013a), Bowman Wind has completed iterative desktop assessments and field surveys to evaluate risk in coordination with the USFWS and North Dakota Game and Fish Department (NDGFD). Results from these studies and recommendations from USFWS and NDGFD have been used to inform development of appropriate impact avoidance, minimization, monitoring, and adaptive management measures for the Project, including development of this Bird and Bat Conservation Strategy (BBCS).

The Bowman Wind BBCS follows USFWS Region 6 guidance for identifying and implementing actions to conserve birds and bats during project development, planning, construction, operation, maintenance, and decommissioning (USFWS 2020). The BBCS documents Bowman Wind's compliance with relevant wildlife laws and regulations, adherence to the processes outlined in the WEG and ECPG for developing, constructing, and operating wind energy projects, and to explain the analyses, studies, and reasoning that support progressing from one tier to the next in the tiered approach presented in the WEG. The Tier 4 monitoring program proposed in this BBCS has been designed to evaluate risk conclusions along with an Adaptive Management Plan to respond to findings, if necessary. This BBCS also documents the measures to be implemented during siting, construction, and operations that avoid and minimize impacts to federal-listed species and to sensitive species and habitats in North Dakota.

With respect to the Project site, a key concern identified by the agencies was potential impact to unbroken grasslands (i.e., native prairie grassland) and the potential displacement of grassland birds, as documented in Shaffer and Buhl (2016) at other wind project sites. Bowman Wind has met with the USFWS and NDGF to discuss a number of design measures incorporated into the turbine layout that avoid and minimize potential impacts to unbroken grasslands compared to previous layouts presented to the agencies. Ongoing Project layouts have incorporated avoidance of the direct placement of primary and spare turbine locations on unbroken grasslands.

To further offset the indirect impacts of displacement of grassland nesting birds per the Shaffer and Buhl (2016) study, Bowman Wind will implement the model [Identification of Potential Offset Locations for 6 Species of Grassland Birds] outlined in Shaffer et al. (2019). Based on the results of this model, Bowman Wind will implement additional conservation actions, including the acquisition and protection of additional habitat through the use of various conservation partnerships and funding opportunities. The intent from this process is to provide mitigation in a manner that is equivalent to the recommendations provided through use of the Shaffer et al. 2019 model.

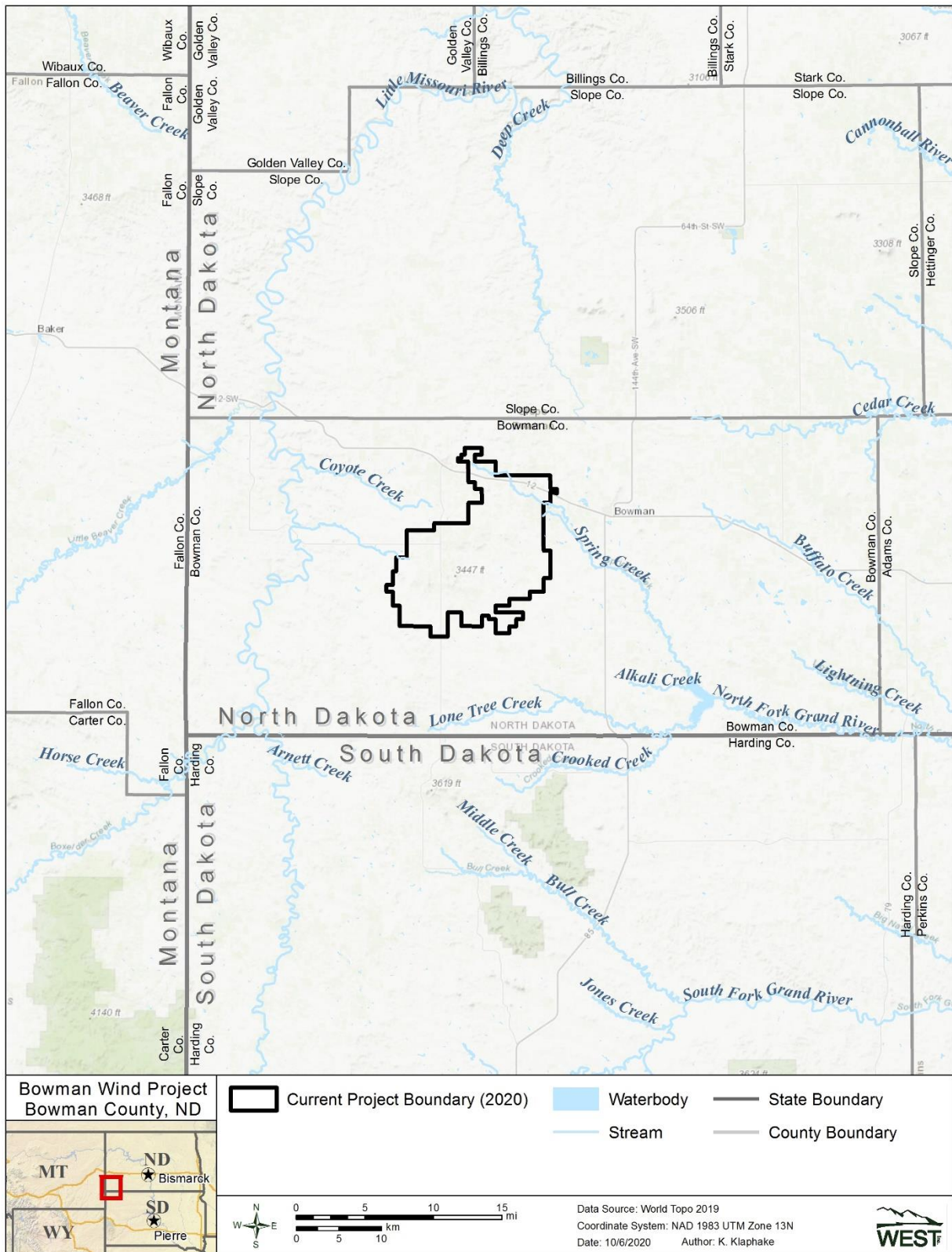


Figure 1.1. Location of the Bowman Wind Project in Bowman County, North Dakota.

1.2 Key Avian and Bat Laws, Regulations, Authorizations

This BBCS was developed to document compliance with applicable wildlife laws and regulations. The federal regulatory framework for protecting birds includes the Migratory Bird Treaty Act (MBTA; 1918), the Bald and Golden Eagle Protection Act (BGEPA) of 1940, Endangered Species Act of 1973, as amended (ESA), and Executive Order (EO) 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds* of 2001. The state of North Dakota does not have an endangered or threatened species list; however, North Dakota identifies and maintains a list of the 115 Species of Conservation Priority (SCP) in its State Wildlife Action Plan (SWAP; Dyke et al. 2015).

1.2.1 Migratory Bird Treaty Act (MBTA)

The MBTA is the cornerstone of migratory bird conservation and protection in the United States. The MBTA implements four treaties that provide for international protection of migratory birds. It is a strict liability statute, meaning that proof of intent, knowledge, or negligence is not an element of an MBTA violation. The statute's language is clear that actions resulting in a "taking" or possession (permanent or temporary) of a protected species, in the absence of a USFWS permit or regulatory authorization, are a violation. The MBTA states, "Unless and except as permitted by regulations ... it shall be unlawful at any time, by any means or in any manner, to pursue, hunt, take, capture, kill ... possess, offer for sale, sell ... purchase ... ship, export, import ... transport or cause to be transported... any migratory bird, any part, nest, or eggs of any such bird ..." 16 US Code (U.S.C.) 703. The word "take" is defined by regulation as "to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to pursue, hunt, shoot, wound, kill, trap, capture, or collect" 50 Code of Federal Regulations (CFR) 10.12. The USFWS maintains a list of all species protected by the MBTA at 50 CFR 10.13. This list includes over one thousand species of migratory birds, including eagles and other raptors, waterfowl, shorebirds, seabirds, wading birds, and passerines.

1.2.2 Bald and Golden Eagle Protection Act (BGEPA)

Under authority of the BGEPA, 16 U.S.C. 668–668d, bald eagles and golden eagles are afforded additional legal protection. The BGEPA prohibits the take, sale, purchase, barter, offer of sale, purchase, or barter, transport, export or import, at any time or in any manner of any bald or golden eagle, alive or dead, or any part, nest, or egg thereof, 16 U.S.C. 668. The BGEPA also defines take to include "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb," 16 U.S.C. 668c, and includes criminal and civil penalties for violating the statute. See 16 U.S.C. 668. The term "disturb" is defined as agitating or bothering an eagle to a degree that causes, or is likely to cause, injury to an eagle, or either a decrease in productivity or nest abandonment by substantially interfering with normal breeding, feeding, or sheltering behavior, 50 CFR 22.3.

1.2.3 Endangered Species Act (ESA)

The ESA directs the USFWS to identify and protect endangered and threatened species and their critical habitat, and to provide a means to conserve their ecosystems. Among its other provisions, the ESA requires the USFWS to assess civil and criminal penalties for violations of the Act or its regulations. Section 9 of the ESA prohibits take of federally-listed species. Take is defined as

“harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct” 16 U.S.C. 1532. The term “harm” includes significant habitat alteration which kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering, 50 CFR 17.3. Projects involving Federal lands, funding or authorizations will require consultation between the Federal agency and the USFWS, pursuant to Section 7 of the ESA. Projects without a Federal nexus should work directly with USFWS to avoid adversely impacting listed species and their critical habitats.

1.2.4 State of North Dakota

A species identified as an SCP is placed into one of three levels to prioritize conservation efforts. Level I species are either in decline and have a high conservation priority or North Dakota constitutes part of their core breeding range. Level II species have a moderate level of conservation priority, but a substantial level of non-State Wildlife Grant funding available. Level III species have a moderate level of conservation priority, but are peripheral or non-breeding in North Dakota.

1.3 Facility Description

The Project will include the construction and operation of up to a maximum 74 wind turbine generators (WTGs), ranging from 2.82 megawatts (MW) to 6.2 MW capacity, for a Project nameplate capacity of approximately 200 MW. In addition to the WTGs, the Project will include access roads, an underground electric collection system, a substation, a transmission line extending approximately 0.74 miles (mi) from the Project substation to an existing transmission line designed consistent with Avian Power-Line Interaction Committee (APLIC) 2012 guidance., an operations and maintenance (O&M) building, a temporary construction laydown area, and up to two permanent meteorological towers (Figure 1.2). Down lit lights at the substations would be illuminated only when maintenance workers are present. The two permanent, unguyed meteorological towers would be about 120 m (394 feet) in height. The turbines and met towers would be equipped with red flashing L-864 type Federal Aviation Administration (FAA) lights for aviation safety. Subject to FAA approval and commercial availability, the required FAA lights would be controlled with Aircraft Detection Lighting System (ADLS) and turned on only when the system's radar detects approaching aircraft.

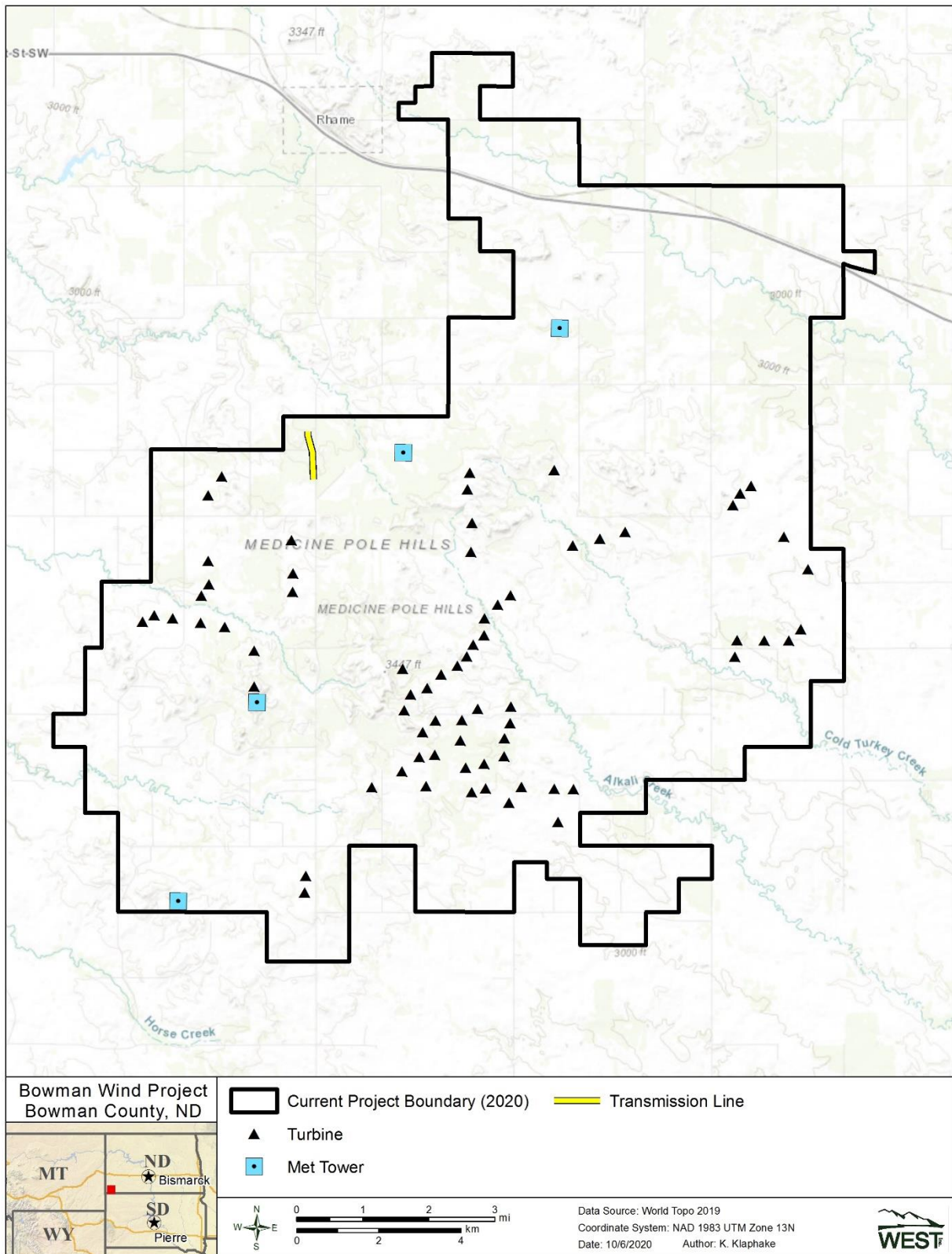


Figure 1.2. Project infrastructure of the Bowman Wind Project, in Bowman County, North Dakota.

*Layout is not yet final.

1.4 Environmental Setting and Habitat

The Project encompasses 61,325 acres (ac) in the Missouri Plateau Level IV Ecoregion within the Northwestern Great Plains Level III Ecoregion of North Dakota (US Environmental Protection Agency 2017). The Missouri Plateau ecoregion was largely unaffected by glaciation, retaining its original soils and complex stream drainage patterns that now support a mosaic of spring wheat (*Triticum* spp.), alfalfa (*Medicago sativa*), and grazing lands.

Two named streams are present within the Project and include portions of Spring Creek and Coyote Creek (Figure 1.1). The Project is approximately 10 mi east of the Little Missouri River (Figure 1.1). Elevations within the Project range from approximately 896–1,050 meters (m; US Geological Survey [USGS] 2019), with the greater topographic relief associated with the Medicine Pole Hills in the center of the Project (Figure 1.2).

According to the National Land Cover Database (NLCD; 2016), the dominant land cover type in the Project is shrub/scrub (43.8%), followed by herbaceous (31.9%), cultivated crops (19.7%); developed (2.1%), and hay/pasture (1.8%), the remaining land covers account for less than 0.5% of the Project, individually (Table 1.1, Figure 1.3).

Table 1.1. Land cover types, area, and percent (%) composition within the Bowman Wind Project, Bowman County, North Dakota.

Land Cover Type	Area (acres)	% Composition
Shrub/Scrub	26,877	43.8
Herbaceous	19,589	31.9
Cultivated Crops	12,073	19.7
Developed	1,266	2.1
Hay/Pasture	1,118	1.8
Emergent Herbaceous Wetlands	164	0.3
Open Water	106	0.2
Woody Wetlands	46	<0.1
Evergreen Forest	45	<0.1
Deciduous Forest	31	<0.1
Mixed Forest	7	<0.1
Barren Land	2	<0.1
Total¹	61,325	100

Source: National Land Cover Database 2016

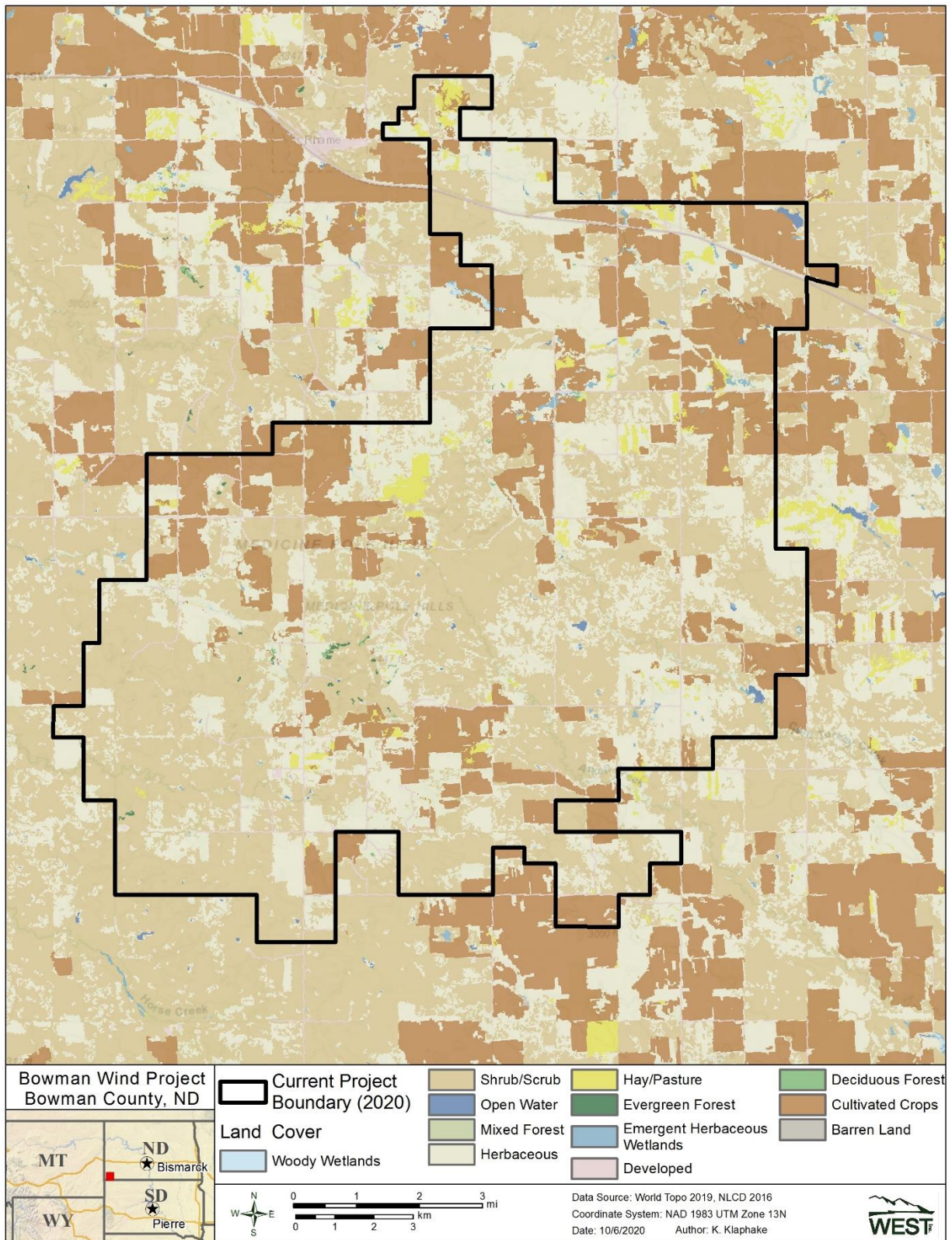


Figure 1.3. Land cover at the Bowman Wind Project, Bowman County, North Dakota.

1.5 Background and Consultation History

Bowman Wind initiated Project development January 2016 within an Original Assessment Area (OAA) that included portions of Bowman and Slope counties, North Dakota and Harding County, South Dakota (Figure 1.4). The OAA was refined based on the results of the Tier 1 review to focus within a 72,310 ac 2017 Project boundary. The Project boundary was revised in March 2018, April 2020, and August 2020 in an effort to reduce impacts to flora and fauna. The current and final Project boundary encompasses 61,325 ac (Figure 1.4).

Tier 1 and 2 studies were completed for the OAA and the 2017 Project Boundary. Tier 3 studies were initiated in August 2017 by Western EcoSystems Technology, Inc. (WEST), SWCA Environmental Consultants (SWCA), and Eagle Environmental, Inc. (EEI) throughout the Project area and completed in 2020. The spatial extent of the Tier 3 studies was adapted in response to the Project changes as they occurred in order to consistently capture and represent the Project boundary in its current state. The purpose of these studies was to characterize the avian, bat and vegetation communities, assess potential risks to wildlife, and inform Project siting.

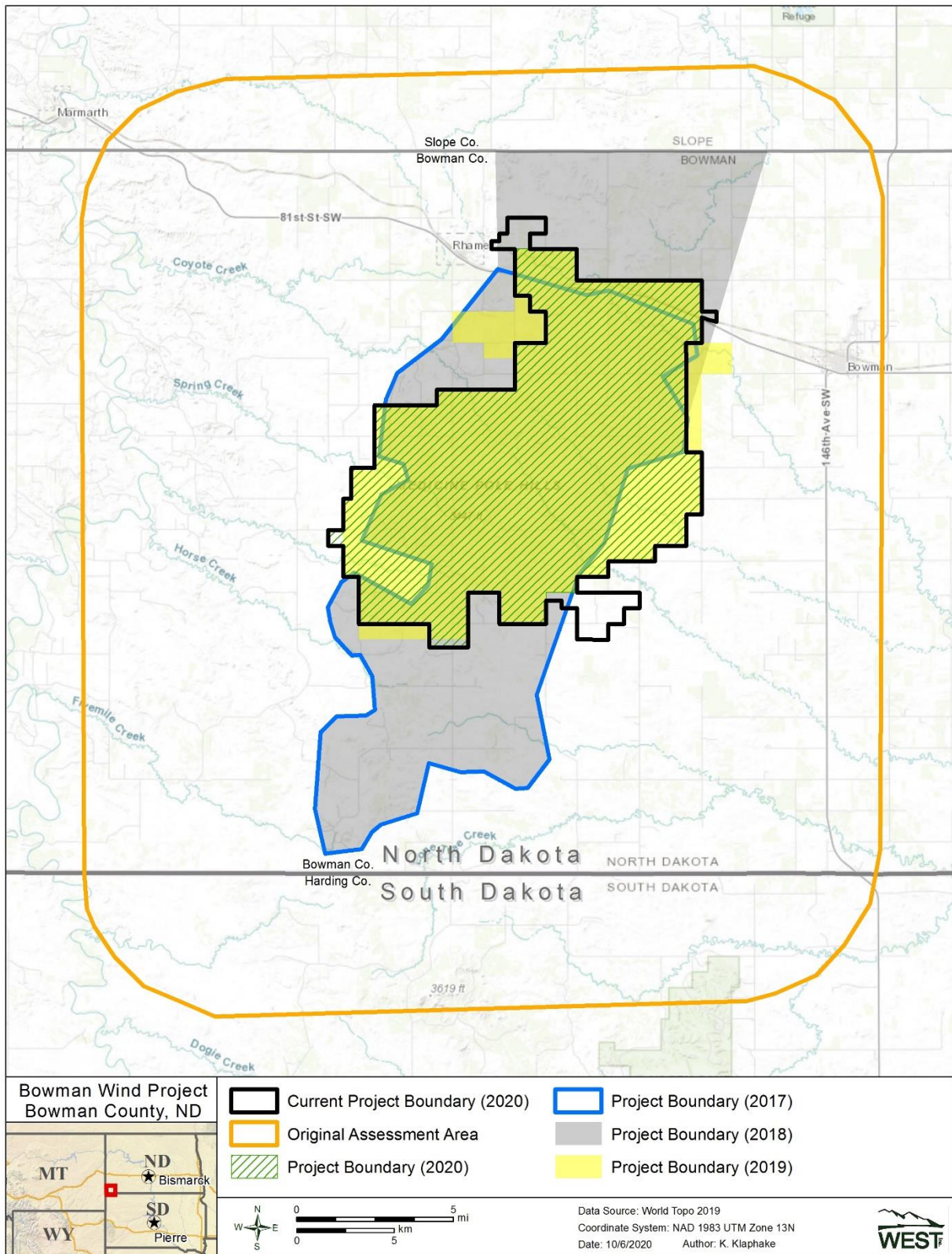


Figure 1.4. Original Assessment Area and Project boundaries for the Bowman Wind Project, Bowman County, North Dakota.

Consistent with recommendations in the WEG and ECPG for agency consultation, Bowman Wind has coordinated with USFWS and NDGFD regarding wildlife survey methods, data and results, and siting considerations related to wildlife, as illustrated in Table 1.2. Agency correspondence records can be found in Appendix A.

Table 1.2. Agency consultation history for the Bowman Wind Project, Bowman County, North Dakota.

Date	Subject
June 20, 2017	Bowman Wind, LLC (Bowman Wind) met with US Fish and Wildlife Service (USFWS) and North Dakota Game and Fish Department (NDGFD) to discuss Tiers 1 and 2 of the <i>Land-based Wind Energy Guidelines</i> (WEG) and Stage 1 <i>Eagle Conservation Plan Guidance</i> (ECPG) risk reviews for the Bowman Wind Project (Project) and discuss a Tier 3/Stage 2 survey plan.
January 30, 2018	Bowman Wind met with USFWS and NDGFD to provide a Project update and agree upon Tier 3 WEG/Stage 2 ECPG survey expectations.
July 5, 2018	Bowman Wind discussed bat surveys and northern long-eared bat risk at the Project with USFWS.
October 9, 2018	Bowman Wind met with USFWS to discuss changes to the Project area, review Tier 3 WEG/Stage 2 ECPG survey results and agree on next steps to ensure regulatory compliance.
October 24, 2018	Bowman Wind and USFWS discussed seeking an eagle take permit with Region 6 for the Bowman Wind Project.
May 28, 2020	Bowman Wind met with USFWS and NDGFD to discuss results of the Tier 3 WEG, Stage 2 ECPG survey results and discuss the NDPSC permit application.
June 19, 2020	Bowman Wind received a letter from NDGFD that expressed their concerns on native habitats and species, as well as on communications with the Agency.
July 10, 2020	Bowman Wind received a letter from NDGFD that addressed Tier 3 WEG study results provided by Bowman Wind.
July 31, 2020	Bowman Wind, USFWS, and NDGFD discussed the results of surveys completed to date and agreed upon the next steps to ensure regulatory compliance.
August 6, 2020	Bowman Wind sent the USFWS and NDGFD the narrative / methodology for the proposed (Shaffer – Loesch) model to estimate offsets for potential breeding grassland bird displacement effects.
September 22, 2020	Bowman Wind received a letter from the USFWS with recommendations for the Bird and Bat Conservation Strategy.
December 16, 2020	Bowman Wind, USFWS, and NDGFD discussed the results of layout 054 and the corresponding use of the Shaffer et al 2019 model that incorporated the updated unbroken grassland field data to calculate grassland bird displacement impacts and the corresponding voluntary offset mitigation acreage.
December 21, 2020	Bowman Wind sent the USFWS and NDGFD the updated layout 054 narrative / methodology for the proposed (Shaffer – Loesch) model and estimate of the voluntary offset acreage for potential breeding grassland bird displacement effects on unbroken native grasslands.

2.0 SITE CHARACTERIZATION SURVEYS (TIERS 1, 2, AND 3)

2.1 Preliminary Site Evaluation and Characterization (Tiers 1 and 2)

2.1.1 Tier 1

Tier 1 of the WEG calls for an initial screening of the broad geographic area in which a project is proposed. Such screening is useful for identifying regions where wind energy development poses significant risks to species of concern and their habitats, including the fragmentation of large-scale habitats and threats to regional populations of federal- or state-listed species, for screening a landscape or set of multiple potential sites to avoid those sites with the highest habitat values, and for beginning to determine if a single identified potential site poses serious risk to species of concern or their habitats (USFWS 2012).

As part of the preliminary site evaluation and consistent with Tier 1 of the WEG, a desktop review was completed to evaluate types of habitat within the OAA and identify areas with reduced potential for species of concern. In addition, preliminary agency input was requested from USFWS and NDGFD regarding any instances of federal- and state-listed animals and plants, natural communities, and other species of concern or significant habitats that could occur within the initial area of interest (Appendix A).

The Project area is fairly arid and the land cover within the OAA is primarily shrub/scrub with limited wetlands, waterbodies, riparian corridors, or forested areas (see Table 1.1). Field delineations completed for the Project found that 205 locations exhibited wetland or stream characteristics. Of the 205 delineated areas, 10 were classified as perennial streams; 115 were classified as intermittent streams; 25 were classified as ephemeral streams; and 54 were classified as wetlands, ponds, or impoundments. Overall, there are very few wetlands within the Project and the vast majority of the site contains intermittent streams with limited adjacent wetlands. The Project has been designed to avoid permanent impacts to delineated wetlands. Turbines and met towers will be constructed on higher ground within the Project Area to maximize the wind resource, and as such, will not permanently impact wetlands. Additionally, the preliminary design of access roads, the O&M facility and Project Substation are also designed to avoid permanent impacts on delineated wetlands.

Native grasslands are present (NLCD 2016) that may have the potential to support a variety of wildlife and plant species, including migratory birds, species of habitat fragmentation concern, and other species of concern. The OAA is within the Central Flyway for waterfowl and Central Americas flyway for migratory birds; however, it does not appear to have any topographic relief for funneling birds or unique attractants. The OAA has the typical rolling topography for the region with no significant ridges or rock outcrops; although the Medicine Pole Hills, Mud Buttes, and Sunset Butte offer greater topographic relief than the surrounding areas, which may attract raptors. The OAA is a generally dry site with few wetlands, with surface water features consisting of small ponds or impoundments, with minor drainages on site (USGS National Hydrography Dataset 2017, USFWS National Wetlands Inventory 2017). Within the OAA, important

conservation lands include Big Gumbo Audubon Important Bird Area (IBA) and Custer National Forest IBA, (National Audubon Society [Audubon] 2017), State Trust Lands, Bureau of Land Management areas, greater sage-grouse (*Centrocercus urophasianus*) Priority Areas of Conservation (PACs; USFWS 2014) and NDGFD priority sage-grouse habitat (Robinson 2014). No private conservation lands or other state and federal lands are found within the OAA.

2.1.2 Tier 2

Following the Tier 1 evaluation, the OAA was reduced to the 2017 Project boundary and a Tier 2 evaluation was conducted. While the Tier 2 evaluation was conducted using the 2017 Project boundary, the results are representative of the Current Project Boundary because the areas overlap substantially and because the type of assessment occurs at the landscape level. A discussion of minor differences between 2017 Project boundary and Current Project Boundary can be found in Section 3 - Discussion and Impact Analysis.

In accordance with Tier 2 of the WEG, a further review of readily available desktop information was completed to assess potential adverse effects to wildlife and their habitats. Data sources included data requests and personal communications with agencies, USFWS Information for Planning and Consultation (IPaC) website, NDGFD Native Grassland Conservation Areas, USGS Breeding Bird Survey, aerial imagery, and non-governmental organization websites (e.g., Audubon, American Wind Wildlife Institute Landscape Assessment Tool, eBird).

A review of federally listed species with the potential to occur within the 2017 Project boundary was completed using the USFWS IPaC system on May 5, 2017. Results of this search identified gray wolf (*Canis lupus*; endangered), northern long-eared bat (NLEB; *Myotis septentrionalis*; threatened), and whooping crane (*Grus americana*; endangered) as the only federally listed species for Bowman County. In addition, 47 bird species designated as Level I or Level II Species of Conservation Priority by NDGFD were listed in the NDGFD SWAP on May 5, 2017, as potentially occurring within the 2017 Project boundary (Dyke et al. 2015). Also, twenty-four species designated as birds of particular concern were listed in the USFWS IPaC report on May 5, 2017, as potentially occurring within the 2017 Project boundary (Table 2.1).

No designated critical habitats for federally-listed ESA species were identified through the IPaC review as potentially occurring within the 2017 Project boundary. However, greater sage-grouse PACs and areas NDGFD have identified as priority sage-grouse habitat were located within the 2017 Project boundary and the SWAP identifies nine primary Landscape Components and 21 Focus Areas. These Focus Areas represent an area of native vegetation or natural community rare to North Dakota. The NDGFD considers native prairie as a key habitat in North Dakota (Dyke et. al. 2015) and recommends avoiding or minimizing impacts to these areas due to their unique conservation value. Native grassland survey results are referenced below in Section 2.2.3.

Table 2.1. Birds of particular concern by habitat type and season, with potential to occur within the 2017 Bowman Wind Project boundary.

Grassland	Marsh/Waterbodies	Open Woodlands/Shrub	Forest
Baird's sparrow ¹ (b)	American bittern ¹ (b)	Brewer's sparrow (b)	Black-billed cuckoo ¹ (b)
Burrowing owl ¹ (b)*	Bald eagle ¹ (w)	Peregrine falcon (b)	
Dickcissel ¹ (b)	Hudsonian godwit (m)	Red-headed woodpecker ¹ (b)	
Ferruginous hawk ¹ (b)*	Long-billed curlew ¹ (b)	Loggerhead shrike ¹ (b)	
Golden eagle ¹ (yr)	Marbled godwit ¹ (b)		
Grasshopper sparrow ¹ (b)	Western grebe (b)		
Greater sage-grouse ¹ (yr)	Willow flycatcher (b)		
Prairie falcon ¹ (yr)			
Short-eared owl ¹ (yr)			
Sprague's pipit ¹ (b)			
Swainson's hawk ¹ (b)*			
Upland sandpiper ¹ (b)			

Source: US Fish and Wildlife Service (USFWS) Information for Planning and Consultation (IPaC) search of Project Boundary. (May 5, 2017). <https://ecos.fws.gov/ipac>.

b = breeding, w = wintering, yr = year-round, m = migrating

¹ Species also listed as Level I or Level II Species of Conservation Priority by the North Dakota Game and Fish Department (NDGFD)

* Species known to occur within Project based on NDGFD data provided on June 1, 2017.

Results of the Tier 1 and 2 studies are presented in Table 2.2. This information was reviewed with USFWS and NDGFD on June 20, 2017, and a Tier 3 study plan was recommended and agreed upon on January 30, 2018, by both agencies for Project implementation.

Table 2.2. Evaluation and characterization of the Bowman Wind Project: Responses to questions posed in Tier 1 and Tier 2 of the 2012 US Fish and Wildlife Service *Land-based Wind Energy Guidelines*.

Question	Response
Are known species of concern present on the proposed site, or is habitat (including designated critical habitat) present for these species?	The federally listed gray wolf (<i>Canis lupus</i>; endangered) is unlikely to occur in the Project area based on no known population in North Dakota. The Project area is outside of the federally listed whooping crane (<i>Grus americana</i>; endangered) migration corridor and is unlikely to occur. Northern long-eared bat (NLEB; <i>Myotis septentrionalis</i>; federally threatened), have potential to occur; however limited forested habitat occurs within the Project area. Whooping crane and NLEB are also North Dakota Game and Fish Department (NDGFD) Species of Conservation Priority (SCP). Twenty-four birds are listed as birds of particular concern (US Fish and Wildlife Service Information for Planning and Consultation) have potential to occur within the Project area (Table 2.1). Of these, 22 species have potential to breed within the Project area. Forty-seven SCP bird species have the potential to occur within the Project area (Dyke et al. 2015). Additionally, four bat species are listed as SCP: big brown bat (<i>Eptesicus fuscus</i>), little brown bat (<i>Myotis lucifugus</i>), northern long-eared bat (<i>Myotis septentrionalis</i>), and Townsend's big-eared bat (<i>Corynorhinus townsendii</i>).

Table 2.2. Evaluation and characterization of the Bowman Wind Project: Responses to questions posed in Tier 1 and Tier 2 of the 2012 US Fish and Wildlife Service *Land-based Wind Energy Guidelines*.

Question	Response
	Bald eagles (<i>Haliaeetus leucocephalus</i>) have potential to use the Project area; however, limited habitat is available. Only one bald eagle observation is on record with eBird (2020) within the Project area. No bald eagles have been observed during Breeding Bird Surveys (BBS; Pardieck et al. 2020) in the history of the Bowman BBS (1967 – 2016). Golden eagles (<i>Aquila chrysaetos</i>) will likely use the Project area; the Project avoids the primary breeding range for this species (North Dakota Geographic Information Systems 2017). One golden eagle observation has been recorded in the Project area (eBird 2020) and one golden eagle observation has been recorded in the history of the Bowman BBS route. Greater sage-grouse (<i>Centrocercus urophasianus</i>) and sharp-tailed grouse (<i>Tympanuchus phasianellus</i>) leks are known to occur within the Project area and NDGFD has identified priority sage-grouse habitat within the Project area (2014). No known bat hibernacula or maternity colonies are known to occur within the Project area. Suitable bat habitat is limited within the Project area.
Does the landscape contain areas where development is precluded by law or designated as sensitive according to scientifically credible information? Examples of designated areas include, but are not limited to, federally designated critical habitat, high-priority conservation areas for nongovernment organizations, or other local, state, regional, federal, tribal, or international categorizations.	The Project area does not include any areas where development is precluded by law. NDGFD designates native prairie and sage-grouse priority conservation areas as sensitive habitat; however, these areas are not precluded from development.
Are there plant communities of concern present or likely to be present at the site(s)?	Undisturbed native prairie is present in the Project area.
Are there known critical areas of congregation of species of concern, including, but not limited to, maternity roosts, hibernacula, staging areas, winter ranges, nesting sites, migration stopovers or corridors, leks, or other areas of seasonal importance?	Known sage-grouse and sharp-tailed grouse leks occur within the Original Assessment Area but no known critical areas of congregation including active sage-grouse leks occur within the Project area.

Table 2.2. Evaluation and characterization of the Bowman Wind Project: Responses to questions posed in Tier 1 and Tier 2 of the 2012 US Fish and Wildlife Service *Land-based Wind Energy Guidelines*.

Question	Response
Using best available scientific information, has the developer or relevant federal, state, tribal, and/or local agency identified the potential presence of a population of a species of habitat fragmentation concern (SHFC)?	Baird's sparrow (<i>Ammodramus bairdii</i>), grasshopper sparrow (<i>Ammodramus savannarum</i>), greater sage-grouse, Sprague's pipit (<i>Anthus spragueii</i>) and upland sandpiper (<i>Bartramia longicauda</i>) have the potential to occur in the Project area and are SHFC.
Which species of birds and bats, especially those known to be at risk by wind energy facilities, are likely to use the proposed site based on an assessment of site attributes?	Eagles, along with a variety of other raptor species are likely to occur within the Project area. Waterfowl, waterbirds, and passerines are also likely to occur, especially during migration, but generally have low risk profiles with wind energy facilities. Eight species of bats have potential to occur in the Project area: Townsend's big-eared bat (<i>Corynorhinus townsendii</i>), silver-haired bat (<i>Lasionycteris noctivagans</i>), hoary bat (<i>Lasiurus cinereus</i>), eastern red bat (<i>L. borealis</i>), little brown bat (<i>Myotis lucifugus</i>), big brown bat (<i>Eptesicus fuscus</i>), western small-footed bat (<i>M. ciliolabrum</i>), and NLEB. There is limited habitat for roosting and foraging, and no known caves or hibernacula exist in the Project area.
Is there a potential for significant adverse impacts to species of concern based on the answers to the questions above, and considering the design of the proposed project?	The potential for significant impacts to species of concern is low, based on available data. Although the Project area is likely to be used by eagles and has potential to be used by other sensitive bird and bat species, with the exception of grasslands, limited preferred habitat is available and is unlikely to support any concentration of species.

2.2 Tier 3 Surveys Completed to Date

Based on the results of the Tier 1 and 2 reviews and in coordination with USFWS and NDGFD input, Tier 3 surveys were designed and completed at the Project area and vicinity to understand wildlife usage, evaluate risk, and inform siting and operational protocols. The studies listed in Table 2.3 and discussed in the following sections were developed using various Project boundaries as Bowman Wind progressed through the WEG. A discussion of applicability of these survey results relative to the Current Project Boundary can be found in Section 3 - Discussion and Impact Analysis. Final reports that provide details on the methods and results are included in Appendix B.

Table 2.3. Avian, bat and habitat monitoring and survey efforts conducted for the Bowman Wind Project.

Study Type	Study Period	Reference
Avian Use Surveys	August 2017 – July 2018	LeBeau et al. 2020b
Avian Use Surveys	August 2018 – July 2019	LeBeau et al. 2020a
Raptor Nest Survey and Monitoring	March, June 2018	SWCA Environmental Consultants (SWCA) 2018b
Prairie Grouse Lek Monitoring	April 2018	SWCA 2018c
Prairie Dog Colony Mapping	June 2018, March 2019	SWCA 2018d, Eagle Environmental, Inc. (EEI) 2019a
Native Grassland Assessment	August 2018	SWCA 2018a
Raptor Nest Check Survey	October 2018	Chodachek 2019b
Raptor Nest Survey	March, May 2019	EEI 2019b
Prairie Grouse Lek Monitoring	April 2019	Chodachek 2019a
Northern Long-eared Bat Habitat Assessment	September 2019	Chodachek and Bishop-Boros 2019
Native Grassland Assessment	May 2020 and October 2020	Chodachek and LeBeau 2020
Bat Acoustic Monitoring	July 2020 – October 2020	Bishop-Boros and Chodachek 2020

2.2.1 Birds

2.2.1.1 Avian Use Surveys

Fixed-point avian use surveys to quantify avian use of the Project area were completed from August 2017 to July 2019 (LeBeau et al. 2020a; LeBeau et al. 2020b; Appendix B). The objective of these surveys was to evaluate species composition and seasonal and spatial use of the Project area by birds, with a particular focus on eagles and species of concern. Survey methods were developed in accordance with recommendations outlined in the WEG (USFWS 2012), Appendix C(1)(a) of the ECPG (USFWS 2013), December 2016 Final Eagle Rule (USFWS 2016) and recommendations from USFWS and the NDGFD. Data presented below was collected in the Current Project Boundary. Figures 2.1 and 2.2 provide an overview of the points inside the Current Project Boundary that were included in the analysis and outside of the boundary that were excluded from the analysis.

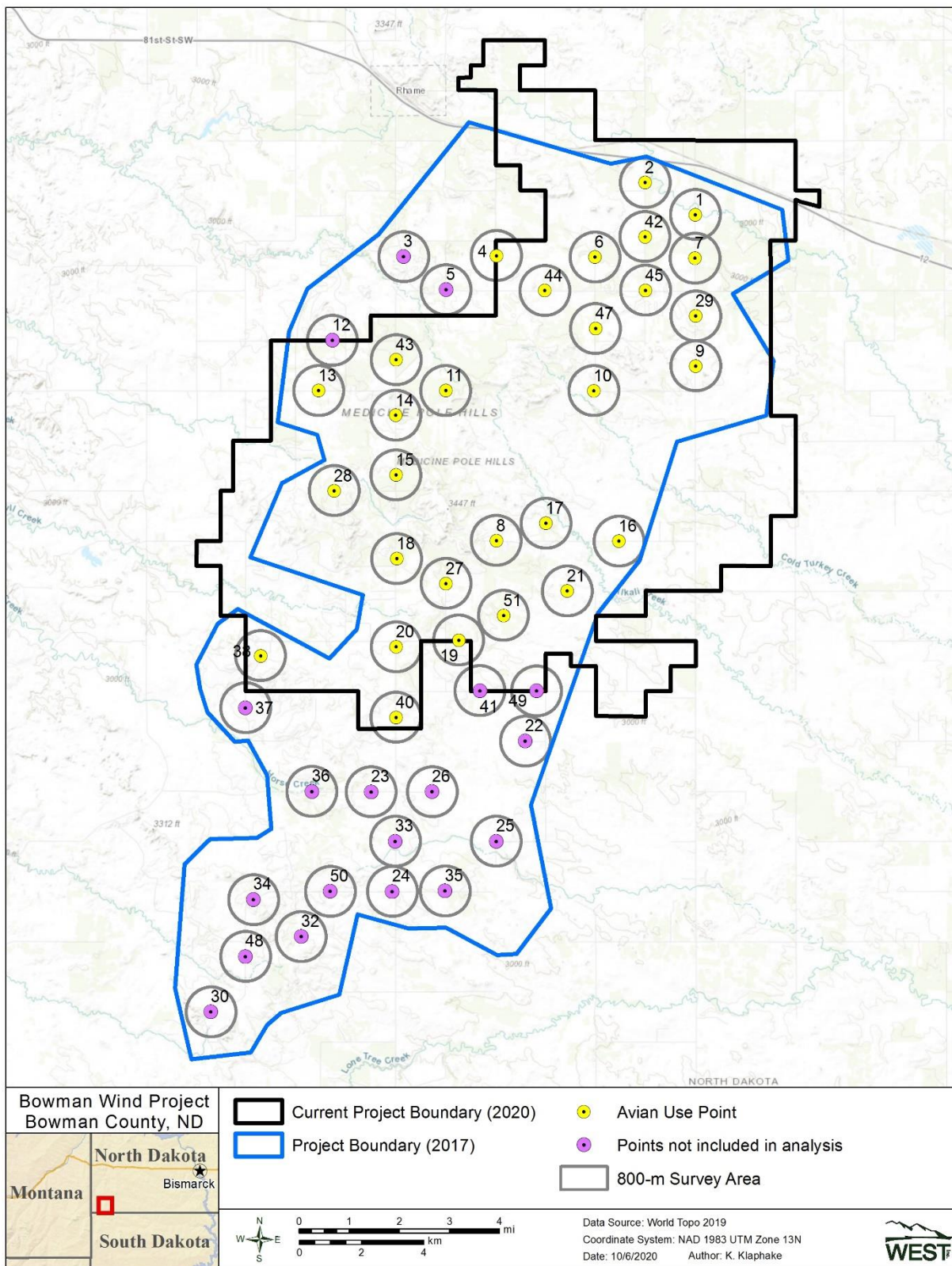


Figure 2.1. Location of fixed-point avian use survey locations and associated 800-meter radius plots for avian use surveys completed from August 7, 2017 – July 22, 2018, at the Bowman Wind Project, Bowman County, North Dakota.

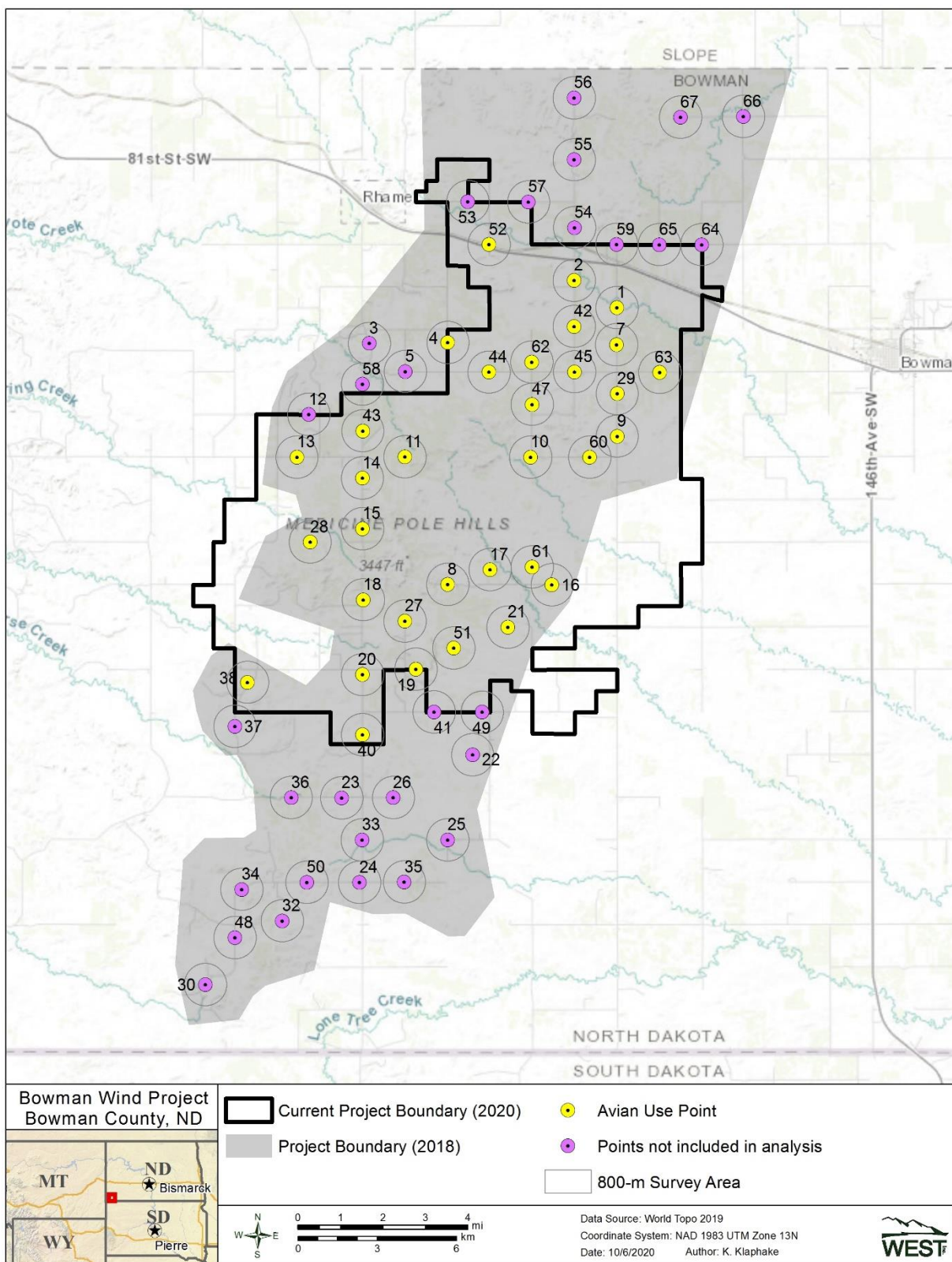


Figure 2.2. Location of fixed-point avian use survey locations and associated 800-meter radius plots for avian use surveys completed from August 23, 2018 – July 23, 2019, at the Bowman Wind Project, Bowman County, North Dakota.

2017 – 2018

Monthly surveys were completed from August 7, 2017, to July 22, 2018, at 29 points established throughout the 2017 Project boundary (Figure 2.1). Surveys consisted of 10-minute (min) counts of small birds only within a 100-m radius plot, followed by 60-min counts of large birds (including eagles) within 800 m. The 60-min count was further divided into 20-min surveys of large birds (including eagles) and the remaining 40-min surveys for eagles only. WEST completed an analysis of avian use data collected over the 12-month period by SWCA to present results for the Current Project Boundary (LeBeau et al. 2020b).

No federally listed threatened or endangered species were observed during avian use surveys. Fifteen bald eagle observations and 72 golden eagle observations, were recorded during surveys. In addition, five species of concern (ferruginous hawk [*Buteo regalis*], Swainson's hawk [*B. swainsoni*], chestnut-collared longspur [*Calcarius ornatus*], Brewer's sparrow [*Spizella breweri*], and lark bunting [*Calamospiza melanocorys*]) were recorded during surveys.

Thirteen unique large bird species and 29 unique small bird species were recorded during surveys. The most commonly observed large bird was Canada goose (*Branta canadensis*; 80.0% of large bird observations). Nine identified diurnal raptor species were observed during surveys, accounting for 18.5% of large bird species recorded. Swainson's hawk (26 observations) and northern harrier (*Circus hudsonius*; 28 observations) were the most common non-eagle raptor species observed. The most commonly observed small birds were horned lark (*Eremophila alpestris*; 39.7%), western meadowlark (*Sturnella neglecta*; 15.3%), and Lapland longspur (*Calcarius lapponicus*; 10.2%).

2018 – 2019

A second year of avian use surveys were completed monthly from August 23, 2018, to July 23, 2019, at 33 points established throughout the 2018 Project boundary (Figure 2.2). Surveys consisted of 5-min counts of small birds only within a 100-m radius plot, followed by 60-min counts recording large birds (including eagles) within 800 m. The 60-min count was further divided into 20-min surveys of large birds (including eagles) and the remaining 40-min surveys for eagles only. Year 2 data was updated to only present results within the Current Project Boundary.

No federally listed threatened or endangered species were observed during avian use surveys. Fifteen bald eagle observations, 47 golden eagle observations, and two unidentified eagle observations were recorded during use surveys and incidentally. Ten bald eagle observations were recorded during surveys. Forty-three golden eagle observations were recorded during surveys. Two unidentified eagle observations were recorded during surveys, resulting in three risk min. In addition, eight bird species of concern (ferruginous hawk, marbled godwit [*Limosa fedoa*], Swainson's hawk, Wilson's phalarope [*Phalaropus tricolor*], Baird's sparrow [*Ammodramus bairdii*], chestnut-collared longspur, grasshopper sparrow [*A. savannarum*], and lark bunting) were recorded during surveys or incidentally.

Thirty-seven large bird species and 38 small bird species were recorded during surveys. The most commonly observed large bird was Canada goose (45.0% of large bird observations). Nine

identified diurnal raptor species were observed during surveys, accounting for 10% of large bird observations recorded. Northern harrier (61 observations), red-tailed hawk (30), and Swainson's hawk (28) were the most common non-eagle raptor species observed. The most commonly observed small birds were horned lark (25.0% of observations), western meadowlark (19.9%), and red-winged blackbird (*Agelaius phoeniceus*; 14.2%).

2.2.1.2 Raptor Nest Surveys and Follow-up Monitoring

The primary objective of the surveys was to document nesting bald and golden eagles within the 2018 and 2019 Project boundary and respective 10-mi buffer. Additionally, the aerial survey effort included surveys for all raptor nests within the 2018 and 2019 Project boundaries and respective 1-mi buffer. The details of the survey methods and results are found in Appendix B (SWCA 2018b; Chodachek 2018; EEI 2019a). Summarized survey results of the 2018 and 2019 surveys are below.

2018

Aerial raptor nest surveys were completed by SWCA on March 9, 11, and 21, 2018, from a fixed-wing aircraft (SWCA 2018a; Appendix B) and completed in accordance with the ECPG survey protocol. Forty-five non-eagle raptor nests were observed within the 2018 Project boundary and 1-mi buffer, of which 42 (four were occupied and 38 were unoccupied) were within the 2018 Project boundary.

No bald eagle nests were recorded during surveys. Eleven golden eagle nests were located within the 10-mi buffer, four of which were occupied and seven unoccupied (Figure 2.3). The nearest occupied golden eagle nest (SD6) was 5.5 mi south of the 2018 Project boundary in South Dakota, while the three other occupied nests (US21, 11, and 53) are greater than 9.0 mi from the 2018 Project boundary. An additional 14 large stick nests of undetermined occupancy with potential for use by an eagle were recorded during the survey (two within the 2018 Project boundary and 12 are within the 10-mi buffer; Figure 2.3).

Follow-up monitoring for three large stick nests (31, 32, and 52; Figure 2.3) located within the 2018 Project boundary was completed June 22 and 24, 2018, and October 15, 2018 (Appendix B). Based on the follow-up surveys, Nest 31 did not have features consistent with an eagle nest and as such was not classified as an eagle nest, Nest 32 was determined to not be a nest, but rather matted down vegetation, and Nest 52 was confirmed unoccupied during the June nest check and inaccessible during the October nest check (SWCA 2018a; Chodachek 2019b; Appendix B).

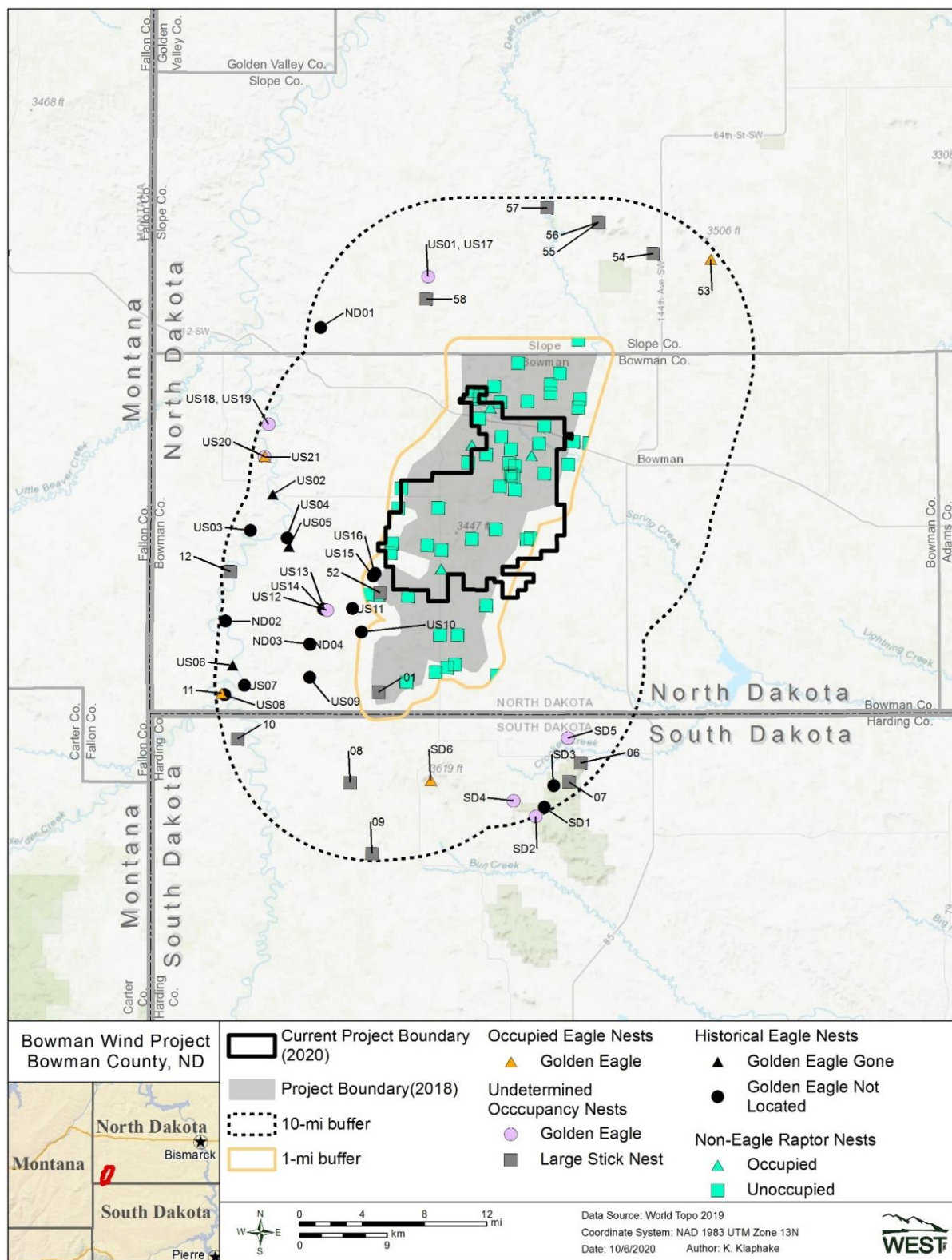


Figure 2.3. Location of eagle nests identified during the 2018 raptor nest surveys completed at the Bowman Wind Project in Bowman County, North Dakota, in March, June, and October 2018.

2019

EEL completed an aerial raptor nest survey from a Robinson R44 helicopter on March 26 and March 27, 2019, following the recommended ECPG survey protocol (EEL 2019). Nest status and terminology was consistent with the methods used during the 2018 eagle nests surveys.

Thirty-five non-eagle raptor nests were recorded within the 2019 Project boundary and 1-mi buffer during surveys (Figure 2.4). Nine of the 35 non-eagle raptor nests were occupied and 26 nests were unoccupied. Three of the unoccupied non-eagle raptor nests were large stick nests of undetermined occupancy with potential for use by an eagle, although more likely to be *Buteo* nests. Six of the nests were occupied by great horned owls (*Bubo virginianus*) and three were occupied by ferruginous hawks (*Buteo regalis*).

No occupied eagle nests were recorded in the 2019 Project boundary. Two occupied golden eagle nests and one occupied bald eagle nest were recorded within the 10-mi buffer of the 2019 Project boundary during surveys (Figure 2.4). The nearest occupied golden eagle nest (86) and bald eagle nest (81) are located 8.2 mi and 9.1 mi, respectively, west of the 2019 Project boundary. An additional four large stick nests (one within the one-mi buffer to the SW of the Project and three within the 10-mi buffer [to the southwest, west, and north of the Project]) of undetermined occupancy were identified by EEL as having the potential for use by an eagle (Figure 2.4). Of the remaining 17 historical golden eagle nest locations provided by agencies, eight were considered undetermined occupancy and six nests were not located, one was gone and two were missed (Figure 2.4).

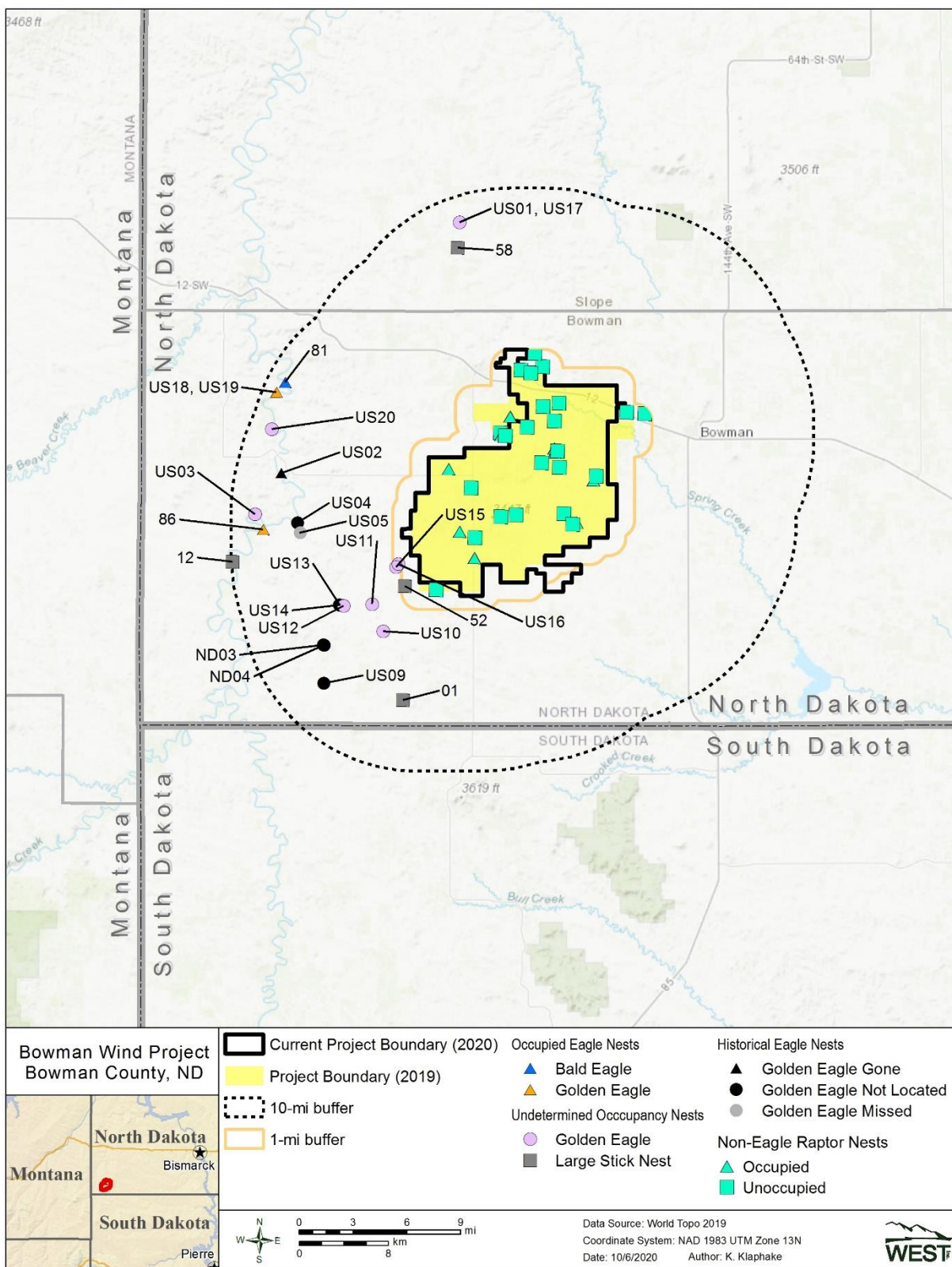


Figure 2.4. Location of eagle nests identified during the 2019 raptor nest survey completed at the Bowman Wind Project in Bowman County, North Dakota, in March 2019.

2.2.1.3 Prairie Grouse Lek Monitoring Surveys

Ground-based grouse lek monitoring surveys were completed to document greater sage-grouse and sharp-tailed grouse (*Tympanuchus phasianellus*) lek activity at known lek locations within the 2017 Project boundary and 2018 Project boundary and associated 1-mi buffers (SWCA 2018c; Chodachek 2018a; Appendix B). Prior to the survey, NDGFD historical lek data was reviewed to determine if any greater sage-grouse and sharp-tailed grouse leks were located within the associated Project boundary and 1.0-mi buffer. Six historical greater sage-grouse and three historical sharp-tailed grouse leks were monitored in spring 2018 and 2019. Surveys followed NDGFD monitoring survey protocol; each lek was surveyed twice, separated by a minimum of seven days. Monitoring surveys were completed from a vehicle from public roads only, with the observer located at an optimal viewing location to observe each lek (between 0.09 – 0.70 mi from lek locations).

Greater sage-grouse lek surveys were conducted by the NDGFD in the spring of 2019 and 2020. Data from these surveys was provided by the NDGFD on August 31, 2020.

2018

Lek surveys were completed on April 11, 2018, and April 23-24, 2018. Lekking activity was recorded at one greater sage-grouse lek (Identification [ID] 25085) and two sharp-tailed grouse leks (ID 23640 and 25129; Figure 2.5). One male and two female greater sage-grouse were visually observed at lek ID 25085. Five male and two male sharp-tailed grouse were heard calling at lek IDs 23640 and 25129, respectively. No activity was recorded at sharp-tailed grouse lek ID 25152 or at greater sage-grouse lek IDs 25530/23681, 25067, 25086, or 25087 (Figure 2.5).

2019

Lek surveys were completed April 2-12, 2019, and April 12-24, 2019. Lekking activity was recorded at sharp-tailed grouse lek ID 23640 on April 11, 2019, where two males were visually observed displaying and sharp-tailed lek ID 25129 on April 24, 2019, where two males were heard calling (Figure 2.6). No grouse lekking activity was recorded at Lek IDs 25530/23681, 25067, 25085, 25086, 25087, or 25152 (Figure 2.6).

2019/2020 (North Dakota Game and Fish Department)

Based on information provided by NDGFD (Kolar 2020), greater sage-grouse lek surveys were completed in April 2019 and April 2020 near the Project. Lekking activity was recorded in 2019 and 2020 at lek ID 25530/23681 (Kolar 2020), which is outside of the Project boundary. A total of three males were visually observed displaying during each survey year. Additionally, the NDGFD stated that greater sage-grouse hen and chicks have been observed in the vicinity of the lek area recently and were likely bred at this lek due to the lack of other known greater sage-grouse leks in the area. Lek ID 25085, approximately eight mi southwest of the Project, was recorded as active. Lek IDs 25067 and 25087 were inactive during surveys conducted in 2019 and 2020 (Kolar 2020).

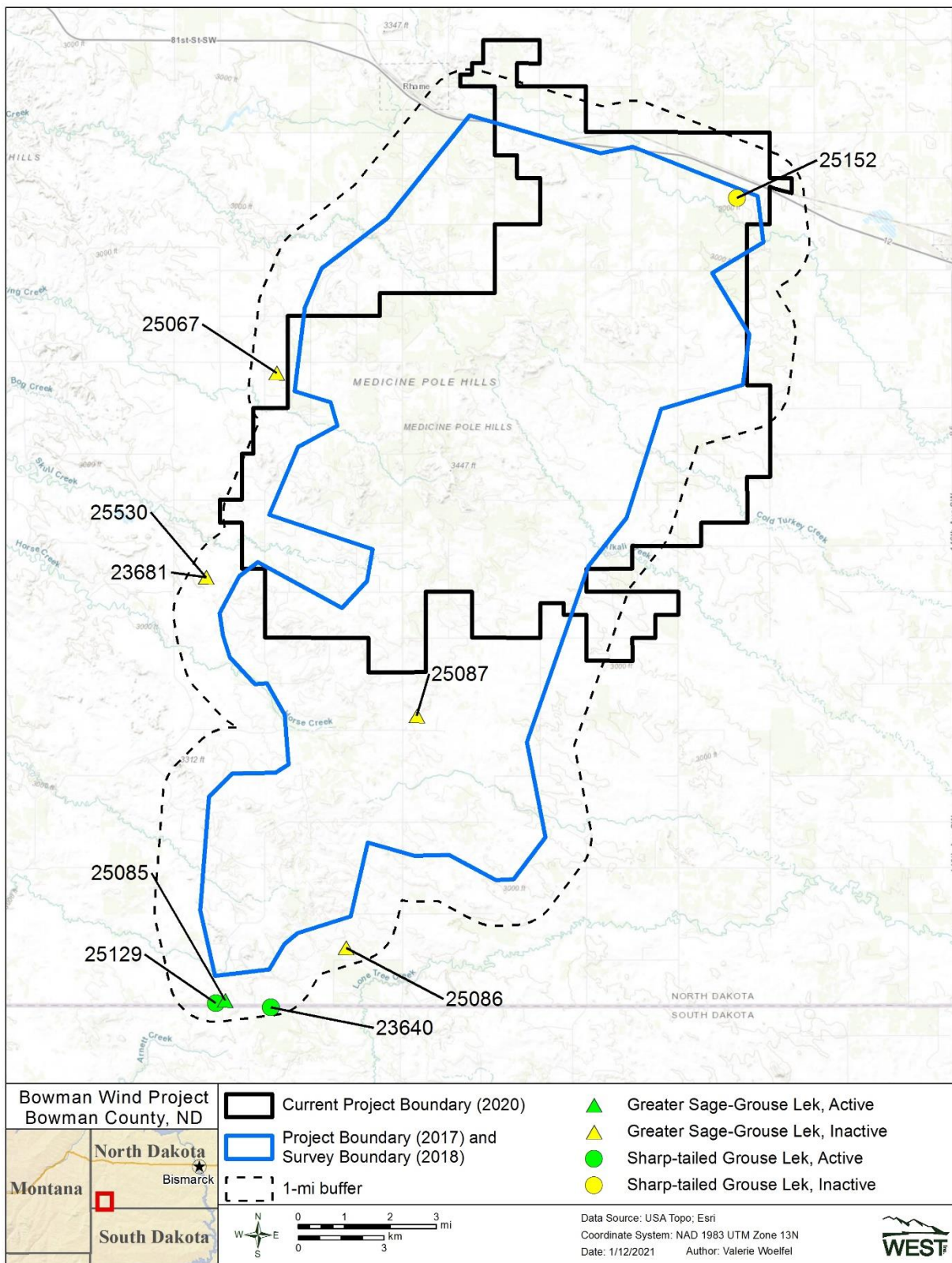


Figure 2.5. Greater sage-grouse and sharp-tailed grouse lek locations surveyed in April 2018 at the Bowman Wind Project, Bowman County, North Dakota.

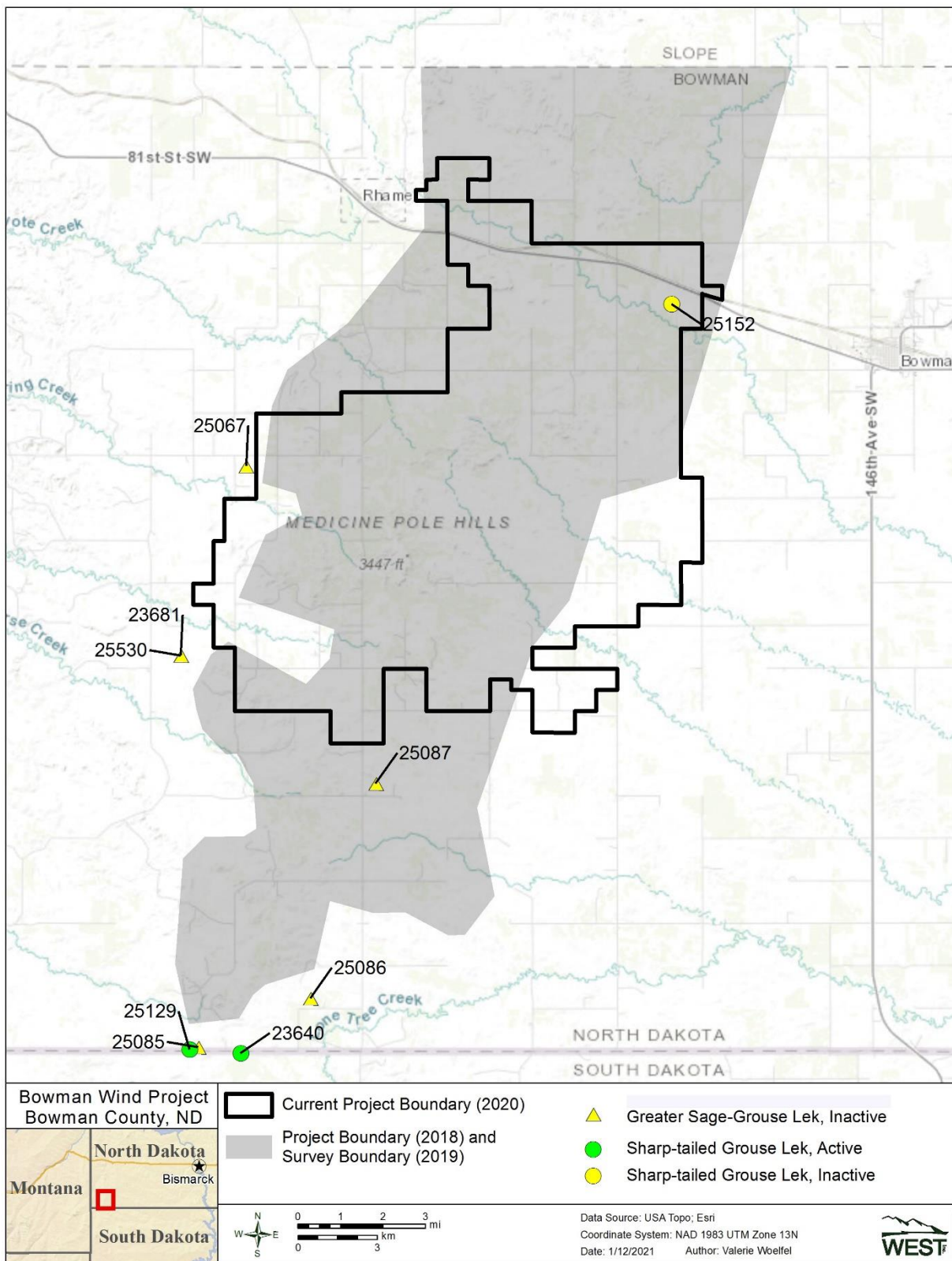


Figure 2.6. Greater sage-grouse and sharp-tailed grouse lek locations surveyed in April 2019 at the Bowman Wind Project, Bowman County, North Dakota.

2.2.2 Bats

2.2.2.1 Northern Long-eared Bat Habitat Assessment

A Phase I Bat Habitat Desktop Assessment for the federally threatened NLEB was completed to identify potentially suitable NLEB summer habitat (roosting and foraging; Chodachek and Bishop-Boros 2019; Appendix B). The desktop assessment was completed in accordance with the recommendations provided by the USFWS *Range-Wide Indiana Bat Survey Guidelines* (USFWS 2019), which also applies to NLEB.

The desktop review of potentially suitable NLEB summer habitat within the 2018 Project boundary and 1,000-ft buffer was completed by reviewing the NLCD (2016) and delineating potential suitable habitat types (i.e., deciduous forest, evergreen forest, mixed forest, and woody wetlands) using Esri Software (ArcGIS 10.3.1). The habitat delineation was cross-checked and edited based on the most recent publicly available aerial imagery from the National Agriculture Imagery Program (NAIP; US Department of Agriculture NAIP 2018).

A total of 171 ac of forested habitat were identified during the desktop review; however, the largest woodlot or forest patch was only 9.3 ac and, therefore, deemed unsuitable for NLEB summer habitat (Figure 2.7). Additionally, NLCD identified 754.0 ac of woody wetlands and four of these patches were determined to be greater than 15 ac. However, upon review of the most updated aerial photography, two of the four woody wetlands were cropland and the other two were ditches with a few trees that were unsuitable for NLEB.

2.2.2.2 Bat Acoustic Monitoring Surveys

The objective of the bat acoustic monitoring surveys was to provide a characterization of the activity levels and seasonality of use of the Current Project Boundary by bats, which conforms to a specific recommendation contained within the WEG. WEST completed bat acoustic monitoring surveys from July 8, 2020 – October 28, 2020, using two ground based SM3 detectors (Bishop-Boros and Chodachek 2020; Figure 2.8; Appendix B). Each SM3 detector was placed at a meteorological tower in cropland or grassland habitat, the dominant land cover type within the Current Project Boundary and representative of likely future turbine locations. Each SM3 detector was placed near the ground at 5 ft above ground level. Batteries and compact flash cards were changed every two weeks.

A total of 976 bat passes were recorded during 216 detector nights for a combine mean ($\pm$ standard error) of 4.43 ± 0.62 bat passes per detector night. A total of 33.4% of bat passes were classified as low frequency (e.g., big brown bats, hoary bats, and silver-haired bats) and 66.6% of bat passes were classified as high frequency (e.g., eastern red bat and *Myotis* bats). Bat activity (bat passes per detector night) recorded within the Current Project Boundary was relatively low compared to other projects in the Midwest that have completed similar studies of bat activity.

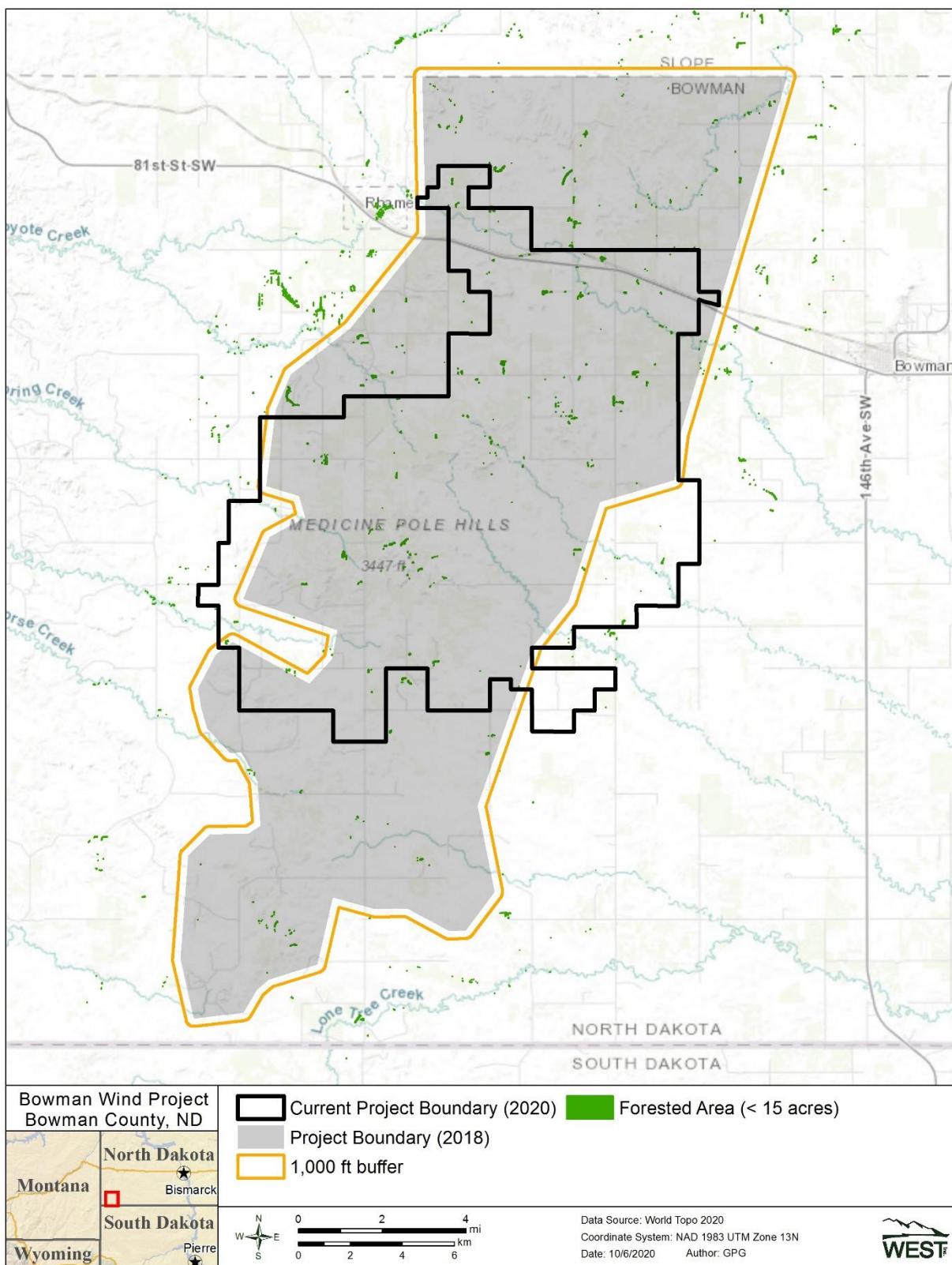


Figure 2.7. Forested habitat areas located within the Project boundary (2018) and associated 1,000-foot buffer at Bowman Wind Project, Bowman County, North Dakota.

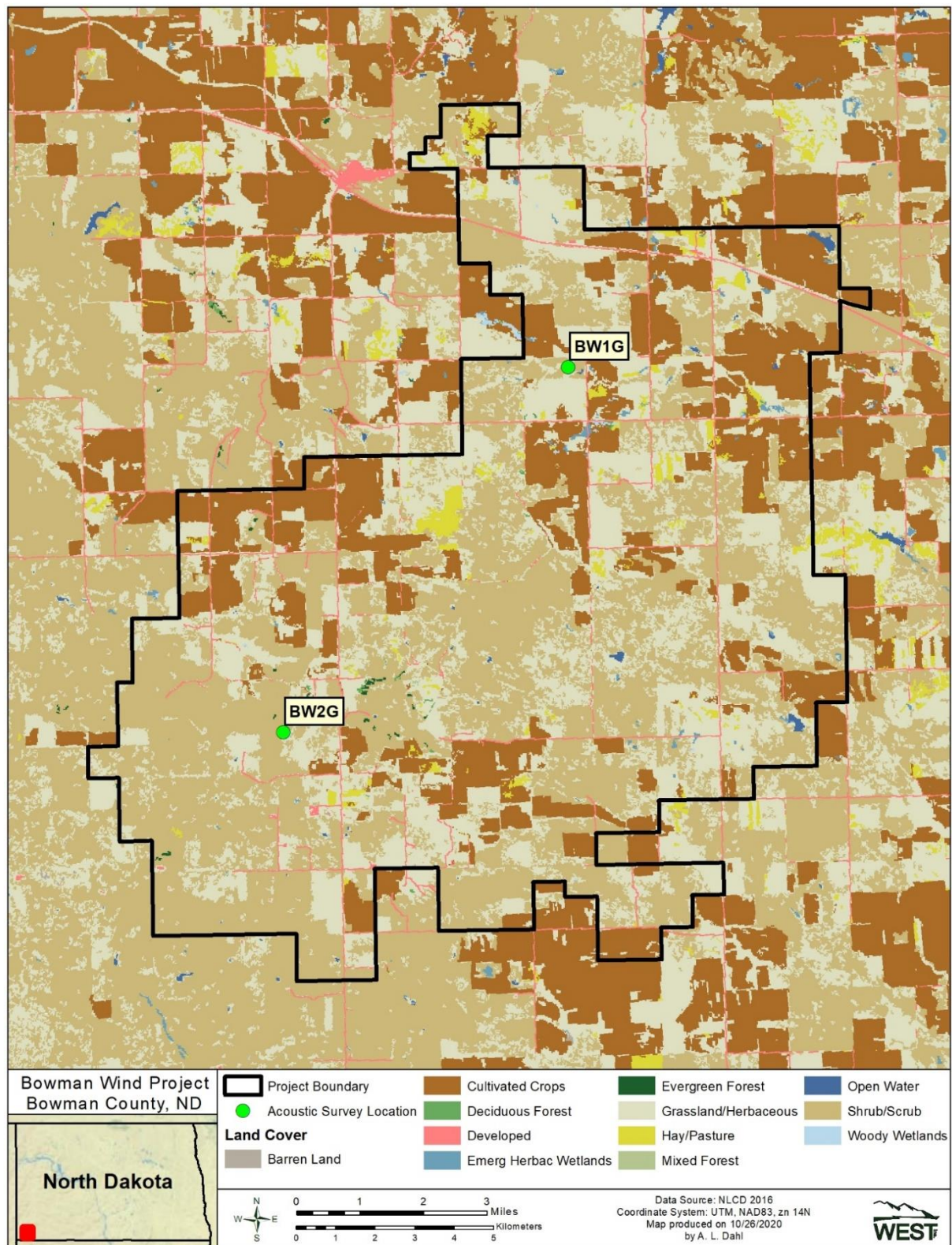


Figure 2.8. Location of acoustic bat monitoring survey stations from July 8 – October 28, 2020, at the Bowman Wind Project, Bowman County, North Dakota.

2.2.3 Grassland Assessment

A grassland assessment was conducted to identify unbroken native prairie (i.e., shows no evidence of soil disturbance) or previously broken grasslands (i.e., soil has been disturbed in some fashion) to help inform siting within the proposed development areas.

2.2.3.1 2018

A desktop assessment identified unbroken grassland habitats that were greater than 160 ac in size within the 2018 Project boundary (SWCA 2018a; Appendix B). The desktop review included a review of current publicly available datasets (e.g., aerial photography, existing land cover data) and datasets provided by Bowman Wind. The assessment concluded approximately 50.0% of the area assessed consisted of unbroken (i.e., not previously tilled/disturbed) grasslands, with 90.0% of these unbroken grasslands occurring in large, contiguous parcels (Figure 2.9).

2.2.3.2 2020

The 2020 grassland assessment was a two-step process that included a desktop review and a field assessment of grassland habitat within a 400-meter buffer of proposed turbines completed within the Current Project Boundary (Chodachek and LeBeau 2020). The desktop review included a review of current publicly available datasets (e.g., aerial photography, existing land cover data) and NDGFD Native Habitat Layer using Esri software (ArcGIS 10.7). A digital data layer classifying polygons as unbroken or broken grasslands was created and used in the field assessment. Field surveys were completed May 20-21, 2020, May 27, 2020, and October 13-15, 2020. Grasslands were visually assessed from public roads and on foot where access was permitted. Areas that differed from the desktop review were delineated using a tablet with ArcCollector and sod types were identified as unbroken native prairie or previously broken grassland. Approximately 51.7% (4,427 ac [1,792 ha]) of the 8,561 ac (3,464 ha) of the assessment area was classified as potential grassland, with 2,365 ac (957 ha) assessed as unbroken native prairie and 2,058 ac (833 ha) assessed as previously broken grassland (Figure 2.10). A small percentage (<0.07%) of grasslands identified during the desktop review were not included in the field survey (Figure 2.10).

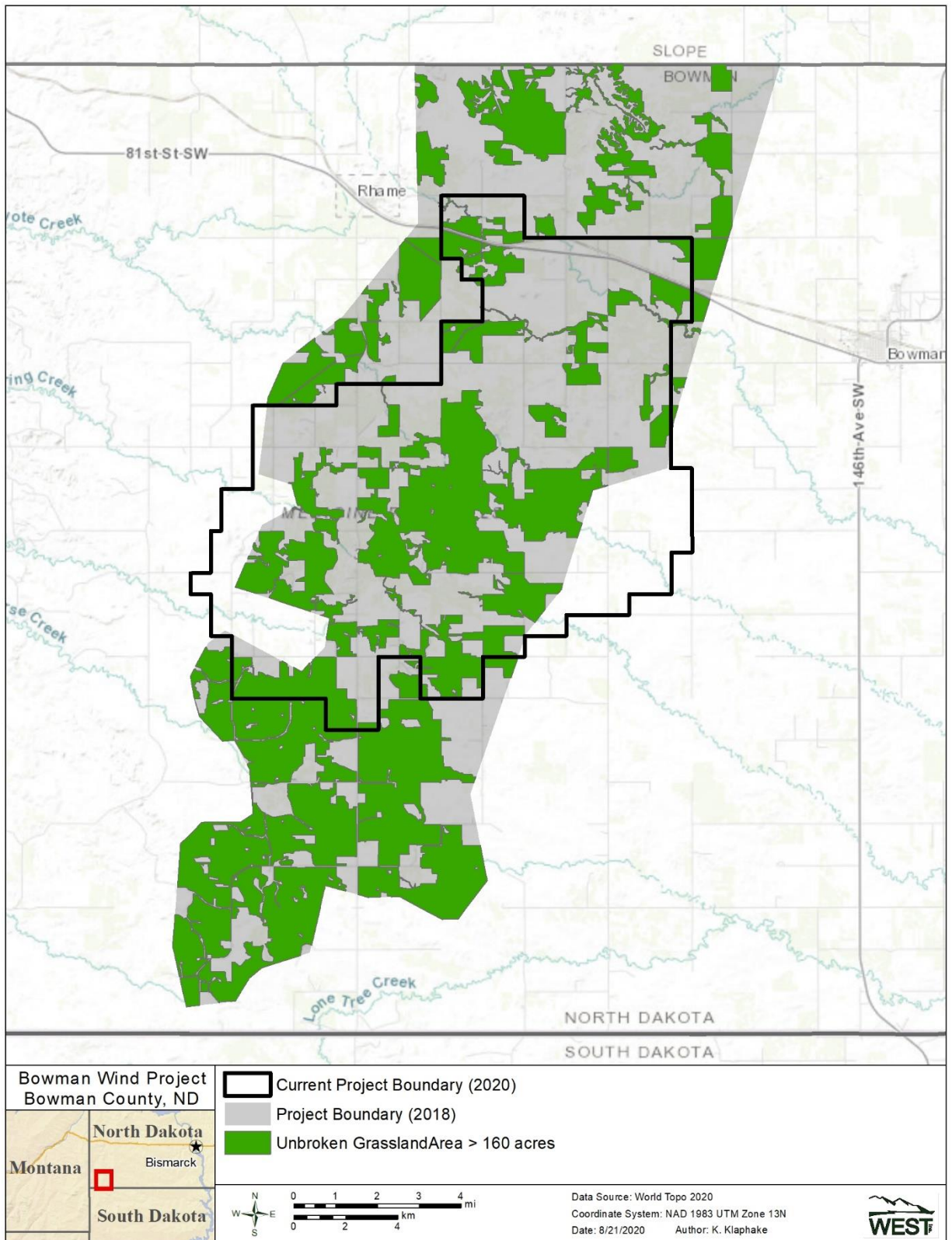


Figure 2.9. SWCA Environmental Consultants Desktop Grassland Assessment results for 2018 at the Bowman Wind Project, Bowman County, North Dakota, in 2018.

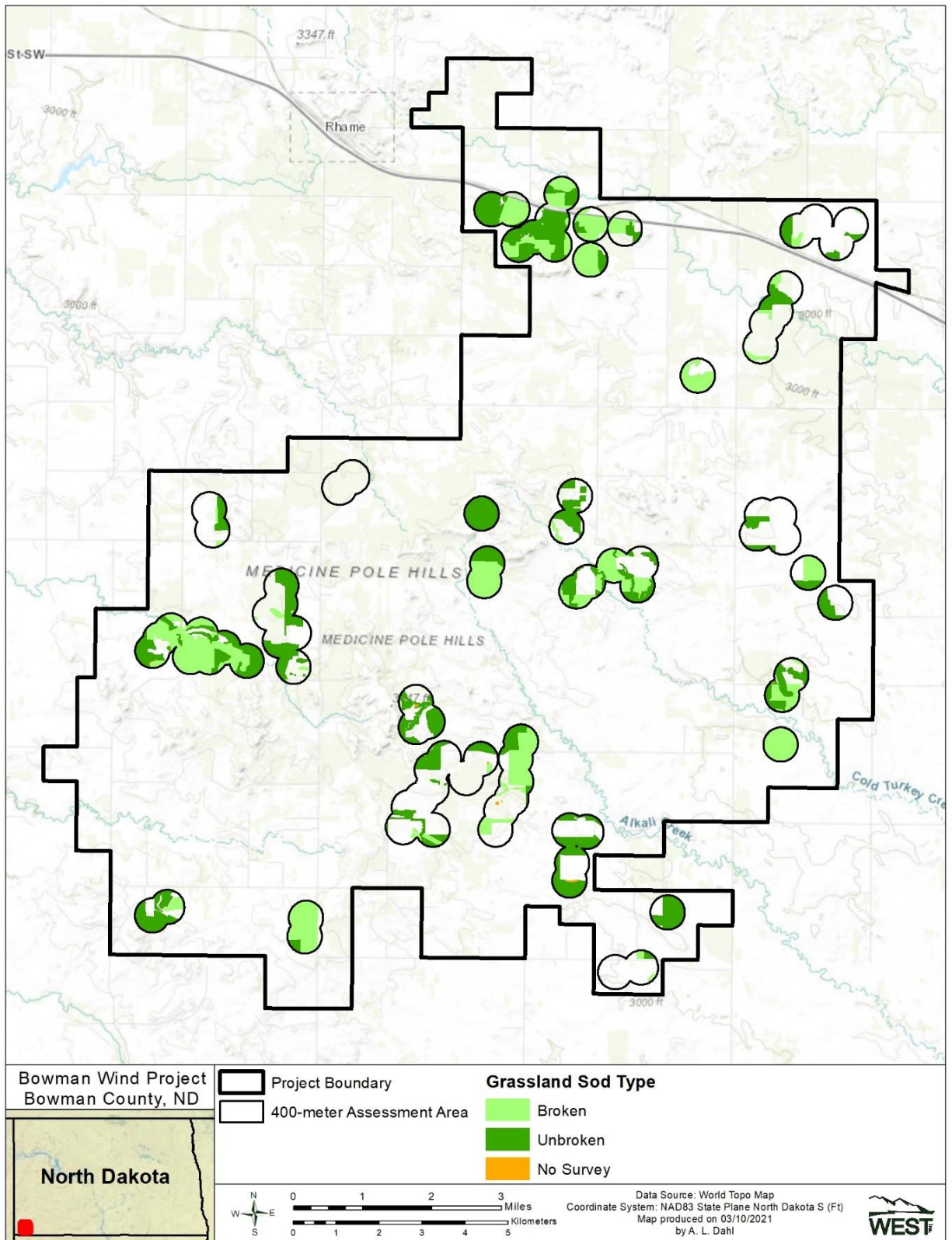


Figure 2.10. Western EcoSystems Technology, Inc. grassland sod types assessed during the Grassland Assessment completed May 13 – 14, 2020, May 27, 2020, and October 13 – 15, 2020, at the Bowman Wind Project, Bowman County, North Dakota.

2.2.4 Black-tailed Prairie Dog Colony Mapping

Black-tailed prairie dogs (*Cynomys ludovicianus*) are a potential prey resource for eagles. As such, black-tailed prairie dog colonies were mapped within the 2017 Project boundary from the ground in June 2018 (SWCA 2018d; Appendix B) and were recorded when incidentally observed within the 2019 Project boundary during aerial raptor nest surveys in March 2019 (EEI 2019b).

2.2.4.1 2018

SWCA completed ground-based mapping surveys from accessible roads and two-tracks within the 2017 Project boundary on June 19 and 21, 2019. When accessible on foot, black-tailed prairie dog colonies were mapped by walking the perimeter of the town and recording locations on a Global Positioning System (GPS) unit. If the colony was not accessible on foot, the biologist mapped the estimated boundaries using aerial photos, topographic maps, and ground features. Data recorded included activity status when possible.

Three active colonies (e.g., colonies with burrows showing fresh signs of use; colonies A, B, and C) were identified within the 2017 Project boundary (Figure 2.11). Colonies ranged in size from 2.7 ac to 112.5 ac. Colony C was the largest at 112.5 ac and was located in the southern portion of the 2017 Project boundary.

2.2.4.2 2019

Prairie dog colonies observed incidentally during aerial raptor nest surveys were recorded on March 27, 2019 (EEI 2019b). The center of the prairie dog colony was recorded with a GPS unit and colonies were estimated using aerial photos, topographic maps, and ground features. Data recorded included activity status when possible.

Seven colonies were identified within the 2019 Project boundary and vicinity (Figure 2.11). Within the 2019 Project boundary, colonies A and B were active and colonies E, F, and G were considered undetermined occupancy; while colonies C and D, both located outside the 2019 Project boundary were active (Figure 2.11). Colonies ranged in size from 3.7 ac to 112.5 ac. Colony C, the largest active colony with an area of 112.5 ac was located outside of the 2019 Project boundary approximately 1 mi south of the 2019 Project boundary Figure 2.12).

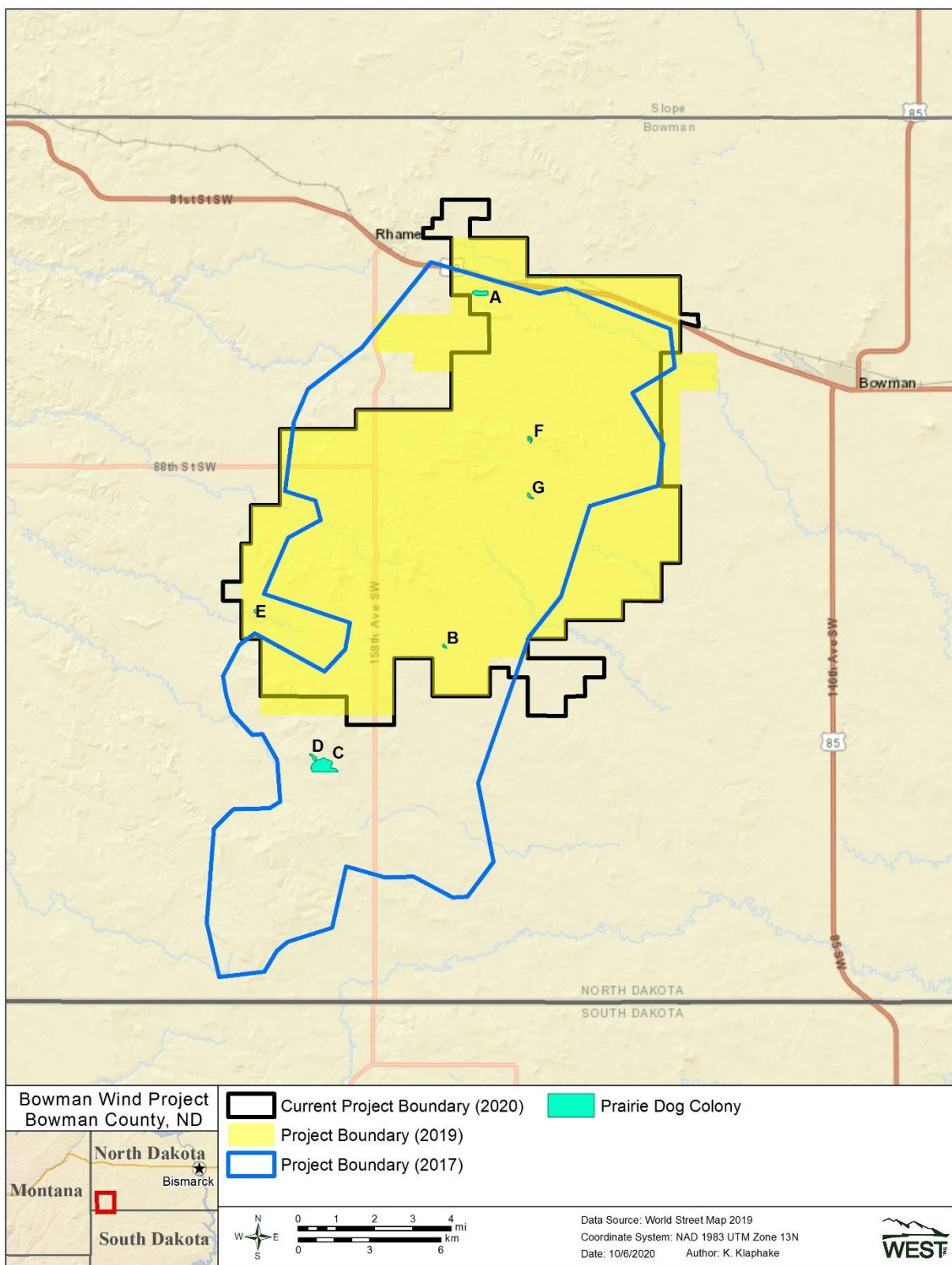


Figure 2.11. Black-tailed prairie dog colony locations for 2018 and 2019 at the Bowman Wind Project, Bowman County, North Dakota.

3.0 DISCUSSION AND IMPACT ANALYSIS

Following the WEG Tiered process, Bowman Wind's initial screening of the broad geographic area determined areas where development may pose significant risks to species of concern and refined the development area to avoid such areas. The Tier 2 evaluation reviewed readily available desktop resources to assess potential adverse effects to wildlife and their habitats within the refined area. Part of that review was to determine potential occurrence of species of concern within the Project area. This review was conducted in 2017 and given that the Project boundary was reduced in size and potential changes in species status, a further review of IPaC was completed August 21, 2020, within the Current Project Boundary (Appendix C). The 2020 IPaC search results no longer included gray wolf as a species with potential to occur within the Project. The number of birds of particular concern with the potential to occur was reduced to four (chestnut-collared longspur [*Calcarius ornatus*], lark bunting [*Calamospiza melanocorys*], long-billed curlew [*Numenius americanus*], and marbled godwit [*Limosa fedoa*]), further demonstrating Bowman Wind's commitment to following the WEG (USFWS 2020). No changes were associated with the NDGFD Species of Conservation Priority, which was last updated in 2015. This section addresses Tier 3 surveys in the context of the current and final Project boundary. A summary of predicted impacts is shown in Table 3.1.

Table 3.1. Predicted impacts of the Bowman Wind Project, Bowman County, North Dakota: Responses to questions posed in Tier 3 of the 2012 US Fish and Wildlife Service *Land-based Wind Energy Guidelines*.

Question	Response
Do field studies indicate that species of concern are present on or likely to use the proposed site?	Field studies indicate species of concern are present and will likely use the Project (SWCA Environmental Consultants [SWCA] 2018b, 2018c, 2018d; Eagle Environmental, Inc. 2019a; LeBeau et al. 2020a, 2020b; Chodachek 2019a, 2019b, Chodachek 2020). Eleven bird species of concern (i.e., North Dakota Game and Fish Department [NDGFD] Species of Conservation Priority [SCP], US Fish and Wildlife Service [USFWS] Information for Planning and Consultation [IPaC], and USFWS Species of Habitat Fragmentation Concern [SHFC]), including four raptors (bald eagle, golden eagle, ferruginous hawk, and Swainson's hawk), four passerines (Baird's sparrow, chestnut-collared longspur, grasshopper sparrow, and lark bunting), two shorebirds (marbled godwit and Wilson's phalarope), and one gamebird (sharp-tailed grouse) were recorded during avian use, raptor nest, and grouse lek surveys. Siting of turbines and other infrastructure can minimize impacts to many of these species. The Project is within the range of northern long-eared bat (NLEB); however, no known hibernacula or breeding habitat exists within the Project. Inactive sage-grouse leks occur within close proximity to the Project; however, no activity was observed at these locations during the 2018 and 2019 lek surveys. During the 2019/2020 NDFGD surveys, one active lek (25530/23861) was recorded approximately 0.75 mi south of the Project and one active lek (males attending lek in the last 5-years) was recorded more than seven miles (mi) southwest of the Project. Leks 25067 and 25087 were inactive during surveys conducted in 2019 and 2020 (Kolar 2020) No sage-grouse were observed during avian use surveys. The lack of observations suggest the likelihood of use of the Project to be low.

Table 3.1. Predicted impacts of the Bowman Wind Project, Bowman County, North Dakota: Responses to questions posed in Tier 3 of the 2012 US Fish and Wildlife Service *Land-based Wind Energy Guidelines*.

Question	Response
Do field studies indicate the potential for significant adverse impacts on affected populations of SHFC?	Several SHFC and grassland-adapted species were documented during Tier 3 surveys; therefore, there is potential for these species to use the Project. To the extent feasible, the proposed turbine layout and construction plan focuses on developing previously disturbed lands (i.e., cultivated cropland) to minimize impacts to grasslands that SHFC species rely upon. Species of habitat fragmentation concern may potentially be at risk if habitat is further fragmented.
What is the distribution, relative abundance, behavior, and site use of species of concern identified in Tiers 1 or 2, and to what extent do these factors expose these species to risk from the proposed wind energy project?	Data collected for the Project mostly indicate development of the Current Project Boundary is unlikely to trigger substantial impacts to small or large bird populations, including raptors or species of concern (USFWS IPaC, USFWS SHFC, and NDGFD SCP – see below for species included). To the extent possible Bowman Wind will minimize potential impacts to these species by siting turbines, roads, and other infrastructure in previously disturbed lands (i.e., cultivated cropland) outside of undisturbed native prairie. Species of concern, ferruginous hawk and Swainson's hawk, were observed in the Project. The Project contains preferred habitat (shrub/scrub and grasslands); for both species; although, preferred nesting habitat is limited. Historic records indicate these species of concern have nested in and around the Project; however, impacts to raptor species in general, are likely to be low based on the relatively low number of observations and stable populations in the region. Chestnut-collared longspur, lark bunting, grasshopper sparrow, and Baird's sparrow are shrub/scrub and grassland species of concern that are likely to breed in the Project. Impacts to these species of concern may be minimized by limiting surface disturbance to any existing, intact grassland habitats. Species of concern marbled godwit and Wilson's phalarope were only recorded during summer, indicating they were potentially nesting in the Project. In general, impacts to these shorebird species are likely to be low based on the relatively low number of observations and very limited amount of open water (0.2%) within the Project. Bald and golden eagles were observed throughout the Project, with neither species being concentrated in a particular portion of the Project. Prairie dog colonies (a common prey source of eagles) do exist in and around the Project. No bald or golden eagle nests were observed within the Project; however, nests for both species have been observed within ten miles of the Project. The majority of small and large bird observations were common and geographically abundant species. Populations of these widespread species are unlikely to be affected by collision related mortality associated with the Project.

Table 3.1. Predicted impacts of the Bowman Wind Project, Bowman County, North Dakota: Responses to questions posed in Tier 3 of the 2012 US Fish and Wildlife Service *Land-based Wind Energy Guidelines*.

Question	Response
	None of the historical prairie grouse leks within the Project were active in 2018 and 2019. Although sharp-tailed grouse is not a species of concern as defined in Tier 1 and Tier 2, it is considered a USFWS SHFC. Two of the monitored sharp-tailed grouse leks were active during the surveys; both leks were located over seven mi southwest of the Current Project Boundary. It is likely sharp-tailed grouse will use unfragmented grassland habitats within the Project to satisfy their life requirements as documented during avian use surveys. Impacts to sharp-tailed grouse may be minimized by limiting surface disturbance to any existing, intact grassland habitats. Greater sage-grouse were not observed within the Project during avian use surveys. The limited available habitat and lack of breeding activity at known leks, the Project's location on the eastern edge of their range, existing level of fragmentation within the Project, and lack of observations within the Project indicate that sage-grouse are not likely to occur within the Project. The NLEB desktop habitat assessment found the assessment area contained limited isolated forested hedgerows, none of which were of sufficient size to constitute suitable NLEB summer habitat. Impacts to NLEB are unlikely due to the lack of forest cover within the Project, lack of nearby hibernaculum, lack of connectivity of small treed areas, and data from state-wide acoustic and mist-netting surveys. Bat activity (bat passes per detector night) recorded within the Current Project Boundary was relatively low compared to other wind projects in the Midwest that have completed similar studies of bat activity.
What are the potential risks of adverse impacts of the proposed wind energy project to individuals and local populations of species of concern and their habitats? (In the case of rare or endangered species, what are the possible impacts to such species and their habitats?)	Bowman Wind LLC is committed to minimizing impacts to wildlife, in particular for grasslands and grassland dependent species to the extent feasible. Turbines, roads, and other infrastructure are proposed to be sited in cultivated croplands and other disturbed areas. Impacts to flora and fauna should minimize both direct and indirect impacts to these species and their habitats. Bird and bat species are susceptible to collision impacts, but these impacts are not expected to adversely impact populations.

Table 3.1. Predicted impacts of the Bowman Wind Project, Bowman County, North Dakota: Responses to questions posed in Tier 3 of the 2012 US Fish and Wildlife Service *Land-based Wind Energy Guidelines*.

Question	Response
How can developers mitigate identified significant adverse impacts?	Avoid or minimize the disturbance to native grasslands or forested areas during construction and operation of the wind energy facility and associated infrastructure. The proposed design of the Project is such that development will primarily occur in cultivated croplands, thereby minimizing potential impacts to species of concern and grasslands. The best management practices will be developed based on results of the Tier 3 surveys, feedback from State and Federal agencies, and other regional wind energy studies. To offset indirect impacts or displacement of grassland nesting birds, Bowman Wind will implement the application of the model [Identification of Potential Offset Locations for 6 Species of Grassland Birds] outlined in Shaffer et al. (2019). The priority and goal will be to implement mitigation through averted loss per Shaffer et al. (2019) primary recommendation.
Are there studies that should be initiated at this stage that would be continued in post-construction?	No additional studies are needed.

3.1 Birds

No federally listed threatened or endangered bird species were observed during surveys. Eleven bird species of concern, including four raptors, four passerines, two shorebirds, and one gamebird were recorded during surveys.

Bald eagles were recorded using the Project during spring, fall, and winter, which suggests bald eagles are using the area for foraging and not for breeding. Bald eagle prey resources such as waterfowl and prairie dogs can be found within the Project and bald eagles will likely scavenge on livestock carcasses and wildlife carrion when available. Spatial use was similar over two years of surveys, which indicates the potential presence of a prey base, but the lack of major water features and preferred nesting habitat suggests that the Project is not likely to attract bald eagles in large numbers.

Golden eagles were recorded during all seasons, with the highest use during winter and fall, suggesting increased use of the Project during the migration periods and winter. The Project is located in an arid region dominated by shrub/scrub and herbaceous/cultivated grassland as the primary land cover, offering foraging opportunities, but limited nesting habitat for golden eagles. Although nesting habitat is limited within the Project, primary prey resources, including black-tailed prairie dogs, lagomorphs, and livestock (including sheep and cattle) are located within the Project. Golden eagle use was slightly more concentrated in the northern and central regions of the Project, which is likely due to the presence of prey (prairie dog colonies in northern region) and greater topographic relief of the Medicine Pole Hills in the central region providing foraging

opportunities. Based on the presence of foraging habitat and availability of potential prey resources, golden eagle use within the Project is likely to occur year-round, which is typical for this region. Suitable nesting habitat for golden eagles was present in isolated patches throughout the Project, which included trees, hillsides, and cliff faces. Historic and current records indicate golden eagles have nested within the Project or near the Project.

Bowman Wind is currently preparing an Eagle Conservation Plan to address potential risks to eagles. Consultation will be reinitiated with the USFWS Region 6 Migratory Bird group to voluntarily pursue an eagle take permit for the Project. See further discussion of eagle use of the Project and avoidance and minimization measures in the Bowman Wind Eagle Conservation Plan (Chodachek et al. 2020).

During spring, migratory waterfowl were the most often-observed large bird group, with Canada goose observed more frequently than any other waterfowl species. While migratory waterfowl are often present in large numbers on the Midwestern landscape, waterfowl fatalities at wind farms are relatively uncommon. In an analysis of 116 studies of bird mortality at over 70 facilities, waterfowl made up 2.7% of 4,975 fatalities found (Erickson et al. 2014). Canada goose is common, geographically abundant, and likely to be unaffected by collision related mortality associated with the Project. The most commonly observed small birds were horned lark and western meadowlark during two years of surveys. These species are typical of this region and are widespread and abundant.

No prairie grouse activity was documented within the Project at known lek sites. However, sharp-tailed grouse were observed during avian use surveys conducted within the Project suggesting potential suitable breeding and nesting habitat exists within the Project. Similar to other breeding birds that rely on intact native grasslands for nesting, potential impacts to unbroken native grasslands and grassland dependent species such as sharp-tailed grouse can be minimized through siting of turbines, roads, and other infrastructure in previously disturbed lands. The lack of greater sage-grouse observations and very limited breeding activity documented by the NDGFD at one known leks suggest it is unlikely that greater sage-grouse will use the project to satisfy their life requirements. If use of the Project were to occur it would be isolated to remaining intact sagebrush habitats within close proximity of leks. Infrastructure sited in sagebrush habitats within 4 mi of an active lek could displace greater sage-grouse that are using any potential suitable habitats within 0.75 mi of infrastructure (LeBeau et al. 2017a). In addition, siting wind energy infrastructure >0.93 mi from occupied/active leks and in a manner that does not bisect leks minimizes the potential for adverse impacts to greater sage-grouse breeding activity (LeBeau et al. 2017b).

Overall, the species composition, seasonal abundance, and spatial use patterns documented during surveys are considered typical for birds in this region. The majority of species observed are common and abundant within the region. It is not likely development of the Project will cause substantial impacts to small or large bird populations, including diurnal raptors and species of concern. Based on the data collected, use of the Project by eagles is consistent with geographical use in this region.

Results from Tier 1, 2, and 3 studies suggest with the implementation of the Avoidance and Minimization Measures (AMMs; Section 4.0), the Project is not likely to create substantial risk to birds.

3.2 Bats

The Project is within federally threatened NLEB range; however, the NLEB habitat assessment documented limited isolated forested hedgerows, none of sufficient size to constitute suitable NLEB summer habitat. Pasturelands, cropland, and undeveloped land, which contained no forested habitat, were discernible on aerial photographs and dominated almost the entirety of the Project.

Results from bat acoustic monitoring indicate that bat activity (bat passes per detector night) recorded within the Current Project Boundary was relatively low compared to other projects in the Midwest that have completed similar studies of bat activity.

3.3 Grasslands

Proposed turbines, roads, and other infrastructure are to be sited in disturbed lands (i.e., cultivated croplands and other disturbed areas) to the maximum extent practicable; thereby avoiding or minimizing the disturbance to native prairie grasslands during construction and operation of the Project. To offset indirect impacts or displacement of grassland nesting birds, Bowman Wind will implement the application of the model (Identification of Potential Offset Locations for 6 Species of Grassland Birds) as outlined in Shaffer et al. (2019).

3.4 Measures to Offset and/or Compensate for Habitat-related Impacts

With respect to the Project site, a key concern identified by the agencies was potential impact to unbroken grasslands (i.e., native prairie grassland) and the potential displacement of grassland birds, as documented in Shaffer and Buhl (2016) at other wind project sites. Bowman Wind met with the USFWS and NDGF on July 31, 2020, and December 16, 2020, to discuss a number of design measures incorporated into the turbine layout that avoid and minimize potential impacts to unbroken grasslands compared to the layout presented during the May 20, 2020, meeting with the agencies. Ongoing Project layouts have incorporated avoidance of the direct placement of primary and spare turbine locations on unbroken grasslands.

To further offset the indirect impacts of displacement of grassland nesting birds per the Shaffer and Buhl (2016) study, Bowman Wind will implement the model [Identification of Potential Offset Locations for 6 Species of Grassland Birds] outlined in Shaffer et al. (2019). Based on the results of this model, Bowman Wind will implement additional conservation actions, including the acquisition and protection of additional habitat through the use of various conservation partnerships and funding opportunities. The intent from this process is to provide mitigation in a manner that is equivalent to the recommendations provided through use of the Shaffer et al. 2019 model.

Table 3.2 shows the modeling results for the final Layout 059 with the current grassland data (Chodacheck and LeBeau 2020), as well as the Shaffer et al (2019) baseline / preset model assumptions of 300 m impact distance displacement, 53 percent displacement, and 1.9 pairs/ha pre-impact and offset densities.

Table 3.2. Final layout 059 grassland mapping updated based on the Western EcoSystems Technology, Inc. (WEST) field assessment used for the avian-impact offset method to estimate offsets for displaced breeding grassland birds. (Results in this table include 85 total primary and spare turbine locations. The final project layout will total 74 2.82-megawatt turbine locations.)

Parameter	Metric	Units	Source
Impact Distance	300	m	Shaffer and Buhl (2016)
Impact Area	537	ha	Derived from WEST Grassland Assessment
Pre-Impact Density	1.9	pairs/ha	Shaffer and Buhl (2016)
Percent Displacement	53	percent	Shaffer et al. (2019)
Offset Density	1.9	pairs/ha	Equal Value Habitat
Number Pairs in Impact Site	1020	pairs	--
Number Pairs Displaced	540	pairs	--
Offset Area	284	ha	--

Note: This table was replicated from Shaffer et al (2019) Appendix S1, Table S3, Example 2 calculation sheet.

ha = hectares, m = meters

Disturbance to unbroken grasslands has been and will continue to be avoided where possible. The following measures will also be implemented to offset impacts to unbroken native grassland that cannot be practically avoided.

- Disturbance to unbroken grasslands has been avoided where possible and has been discussed through three meetings with the USFWS and NDGFD.
- Bowman Wind will incorporate appropriate restoration efforts using approved native seed mixes (as appropriate and approved by the landowner) to restore temporary impact areas associated with construction activities.
- Any trees or shrubs removed during construction because they could not be avoided will be replaced per the North Dakota Public Service Commission regulations.

4.0 IMPACT AVOIDANCE AND MINIMIZATION MEASURES

This section discusses the avoidance and minimization measures (AMMs) that Bowman Wind has implemented, or plans to implement, to avoid and minimize potential impacts on birds and bats. For fatality monitoring measures, please see Section 5.1.

Bowman Wind has implemented the overarching policy of avoidance, minimization, and mitigation as part of developing the Project. In past discussions regarding the Project, the USFWS and NDGFD have outlined their preferences for avoidance and minimization of unbroken off of unbroken native prairie grasslands, where possible. Avoidance and minimization measures have included: relocating large portions of the Project to the north away from more sensitive landscapes, placing roads along edges of section lines to minimize further fragmentation, moving

turbines off of unbroken native prairie grasslands, and implementation of voluntary offsets using best available science to mitigate any remaining potential displacement to grassland birds. These AMMs were informed by results of pre-construction studies conducted for the Project (Sections 2.1, 2.2, 2.3, and 2.4) and coordination with USFWS and NDGFD.

4.1 Project Layout and Design

Bowman Wind has adopted the following industry-standard and agency informed best management practices (BMPs) to avoid, minimize, and reduce potential impacts to birds and bats during the planning and design stage of the Project:

- The Current Project Boundary has been sited to minimize disturbance to native grasslands.
- Tree clearing, in general, will be minimized by utilizing existing roads and minimizing the size of clearings needed around turbines, to the maximum extent practicable. This measure will minimize potential disturbance to bats and nesting birds as well as minimize conversion of natural areas to Project facilities (habitat loss).
- The electrical collection system will be placed underground to the extent practicable. The 0.74-mile transmission line will be built using APLIC standards to minimize collision risk and electrocution hazards for birds using the Current Project Boundary.
- The number and length of roads, power lines, fences, and other infrastructure will be minimized to the extent practicable. Permanent fencing will only be used around the substation and O&M building as necessary for security and human safety.
- Turbines will be sited as far away as practicable from any natural areas likely to have higher avian activity or diversity.
- Areas of disturbance have been minimized:
 - Infrastructure footprints associated with roads and other infrastructure have been minimized to the extent feasible
 - Area disturbed by pre-construction monitoring and testing activities and installations were minimized to the extent feasible
 - The length and number of access roads were minimized and existing roads will be used when and where feasible
- State-of-the-art facility design features are to be used:
 - To reduce the potential for avian electrocution and collision risk, low- and medium-voltage collector power lines associated with the Project are proposed to be buried to the extent practicable. In the event segments of the collector lines cannot be buried (e.g., existing cable, bedrock) and placed aboveground, structure and line design would be planned to minimize risk to area birds, as discussed below for the Project's transmission line

- The Project's aboveground transmission power lines from the Project substation to the interconnection substation shall be designed and constructed to minimize avian electrocution and collision risks, referencing guidelines outlined in the APLIC's *Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006* (APLIC 2006) and *Reducing Avian Collisions with Power Lines: The State of the Art in 2012*, (APLIC 2012) respectively. If guidelines do not apply or measures cannot be incorporated into the Project's line designs, these will be delineated and discussed in future revisions to this BBCS.

4.2 Construction

Bowman Wind will employ the following industry standard BMPs to reduce potential impacts to birds and bats during the construction stage of the Project:

- Wildlife friendly erosion measures will be used during construction to minimize entrapment and potential mortality of small animals and reptiles.
- All employees and contractors working on the site will receive worker awareness training for identifying and responding to encounters with sensitive biological resources, including avian and bat species and protected species. Training will include:
 - Reducing the potential for vehicle collision by adhering to posted speed limits, being alert for wildlife, and using additional caution in low visibility conditions
 - Confining construction vehicle activity to the limits of disturbance
 - Avoiding harassing or disturbing wildlife, particularly during reproductive seasons
 - Keeping any dogs on site on leashes to avoid the potential for dogs to harass wildlife within the Project
 - Storing food-related trash and waste in containers and removing the containers on a regular basis to reduce attractiveness of the Project to scavengers and prey species
 - Eliminating ponding water following construction to minimize on-site attractants to bats
 - Reviewing the Wildlife Incident Reporting System (WIRS) so the construction team understands the procedures for recording avian and bat species found within the Project area (Section 5.2).

4.3 Operations

Bowman Wind will adopt the following industry standard BMPs to reduce potential impacts to birds and bats during the operational stage of the Project:

- Lighting will be minimized, and/or downward projecting lights or motion sensor-activated lights will be installed as practicable to minimize attractants to birds/bats
- Lighting that does not escape the nacelle will be used, or nacelle lights will be turned off at night as practicable to minimize attractants to birds/bats

- Wildlife carrion and livestock carcasses in proximity to the turbines will be reported for removal as practicable. This measure reduces the attractiveness of the Project to avian scavengers and prey species
- All employees and contractors working on the site will receive worker awareness training for identifying and responding to encounters with sensitive biological resources, including avian and bat species and protected species. Training will include:
 - Reducing the potential for impacts to wildlife by turning off lighting, adhering to posted speed limits, managing food-related trash and waste appropriately
 - Identification of state- and federally listed species, as well as eagles, so this information can be relayed to the appropriate entity in a timely manner and operational adjustments implemented, if appropriate
 - Review of the WIRS so that the operations team understands the procedures for recording avian and bat species found in the Project.

5.0 OPERATIONAL MONITORING AND WILDLIFE INCIDENT REPORTING

5.1 Fatality Monitoring

Bowman Wind will conduct post-construction mortality monitoring surveys following construction for at least one year to assess and monitor for potential direct impacts to birds and bats, the details of which will be developed through coordination with the USFWS and NDGFD. The post-construction mortality monitoring study will address Tier 4 of the WEG and is consistent with Stage 3 of the ECPG. The recommended post-construction mortality monitoring protocol is as follows:

After the first year of monitoring is complete, a mortality analysis will be completed that evaluates species, number, location, and distance from the nearest turbine for each recovered bird or bat. At a minimum, the mortality analysis will consider the following:

- Number of annual bird and bat mortalities per turbine and per MW, and estimate of facility-wide fatality rates
- Comparison of mortality rates for birds and bats by season (if possible) to determine potential riskier periods
- Comparison to existing public data on bird and bat mortality at Projects with similar habitat types and study methodology

Post-construction monitoring results will be evaluated in coordination with the USFWS and NDGFD, and Bowman Wind may submit a new monitoring plan in the future to USFWS and NDGFD for review and input if new information suggests revisions are warranted.

Appropriate handling permits (i.e., Special Purpose Utility [SPUT] permit and a North Dakota Scientific Collection License) will be secured to ensure the lawful handling of any birds or bats

found or utilized (e.g., raptor carcasses used in bias trials) as part of the implementation of fatality monitoring.

5.2 Wildlife Incident Reporting System

If injured or deceased species protected under the federal ESA or BGEPA are discovered at the Project, Bowman Wind or its representatives will contact the USFWS North Dakota Field Office (701-250-4481) within one business day, or as soon as possible thereafter in the event of unique circumstances that would prevent such immediate contact. Any detected bird, bat, and other wildlife species carcasses will be reported regularly to the Project's environmental staff for the entire life of the project.

If species listed in the NDGFD SWAP are discovered at the Project, Bowman Wind or its representatives will contact the NDGFD within one business day, or as soon as possible thereafter in the event of unique circumstances that would prevent such immediate contact.

5.3 Native Grassland Revegetation Monitoring

Bowman Wind will implement a revegetation plan to re-establish native grasslands that merge with adjacent grassland communities. The general restoration monitoring protocol is described as follows. Prior to construction, those areas with native prairie grassland tracts that may be impacted within all proposed turbine locations and access routes will be identified. Any native grassland areas temporarily disturbed during construction will be revegetated and restored following construction activities. A selected native grassland seed mix that is derived from the Natural Resource Conservation Service recommendations and/or landowner guidance to assist with soil stabilization and minimize the introduction or spread of invasive plants. Bowman Wind will consider and implement additional protection measures or supplemental actions as required to treat any invasive or noxious weed infestations or areas that do not meet landowner objectives.

6.0 ADAPTIVE MANAGEMENT

The WEG describes adaptive management as the process of assessing various management actions and then designing and implementing the management action determined to be the most appropriate for the situation. The management action is then assessed through monitoring and evaluation to determine if the desired results are being met or if adjustments to the management action are warranted.

This BBCS will go into effect immediately upon Project operation to guide management measures for bird and bat species at the Project. The BBCS adaptive management and wildlife incident reporting plan will be effective immediately upon Project operation and for the life of the Project to ensure the adaptive management and reporting objectives for bird and bat species are met.

If mortality of federally listed species or significant impacts to other species of concern is demonstrated for the Project, Bowman Wind will coordinate with USFWS on appropriate adaptive management or other study measures.

The WIRS, or similar system utilized by the Project during O&M, will be used to monitor impacts to birds and bats over the life of the Project. Bird and bat carcasses will be reported regularly to the Project's environmental staff. If abnormal bird or bat mortality events occur at any point over the life of the Project, response actions will be triggered.

Bowman Wind will then investigate, based on the available data, the circumstances under which the event(s) occurred and the species affected. Bowman Wind will coordinate with the appropriate agencies regarding the conclusions of the investigation to determine if potential additional minimization or avoidance measures are necessary to reduce risk to acceptable levels.

Triggers and responses in the Project's adaptive management strategy are outlined in Table 6.1.

Table 6.1. Triggers and responses in the Bowman Wind Project Adaptive Management Strategy.

Trigger	Response
A qualified biologist positively identifies a carcass of an Endangered Species Act-listed species with take prohibitions applicable to the Project	• Notification of the US Fish and Wildlife Service (USFWS) within one business day, or as soon as possible thereafter in the event of unique circumstances that would prevent such immediate contact. • Investigation of the circumstances under which the event occurred, the species affected, and whether population-level impacts may be occurring. • Coordination with the USFWS to determine next steps.
A qualified biologist positively identifies an eagle carcass	• Notification of the USFWS within one business day, or as soon as possible thereafter in the event of unique circumstances that would prevent such immediate contact. • Investigation of the circumstances under which the event occurred, the species affected, and whether population-level impacts are suspected. • Re-evaluation of the Project's risk to eagles, to be summarized in a memo provided to the Project owner. Information considered will include: ○ Incidental observations of eagles at the Project ○ Bowman Wind, LLC reports of new eagle nest locations near the Project ○ Wildlife Information Reporting System (or similar) data. • Coordination with the USFWS to determine avoidance measures or to apply for an eagle programmatic take permit.
Discovery of a cluster (<u>at least</u> 5 carcasses) of bird or bat fatalities in space (i.e., at one turbine or other component of Project infrastructure) or time (i.e., found or estimated to have occurred on the same day)	• Completion of a root cause analysis and implementation of appropriate measures, or consultation with the USFWS to determine next steps or further study.
A qualified biologist positively identifies an eagle nest within the Project	• Notification of the USFWS and North Dakota Game and Fish Department within one business day or as soon as possible thereafter in the event of unique circumstances that would prevent such immediate contact.

7.0 MITIGATION AND CONSERVATION DURING DECOMMISSIONING

At the end of the operational life of the Project, Bowman Wind will reclaim disturbed areas in accordance with lease requirements with landowners. Decommissioning may include removing any and all aboveground equipment, including towers, concrete pads, anchors, guy wires, fences, fixtures, materials, buildings, structures, improvements, and personal property installed by the Project or the Project's affiliates. In addition, foundations to a depth of 1.5 m (or as specified by applicable regulations or Bowman Wind approved Decommissioning Plan) and equipment on the surface shall be removed and Bowman Wind will cover up all pit holes, trenches, or other borings or excavations (but not roads selected by the landowner) and restore the Project area to a clean condition reasonably similar to its original condition and land use.

The following decommissioning BMPs, as outlined in the WEG, will be implemented during the decommissioning process:

- Decommissioning methods will minimize new site disturbance and removal of native vegetation, to the greatest extent practicable.
- Foundations will be removed to a minimum of 1.5 m below surrounding grade (or as otherwise required by state regulation and the approved decommissioning plan) so subsurface structures do not substantially disrupt ground water movements. This depth (1.5 m) is typically adequate for agricultural lands.
- If topsoil is removed during decommissioning, it will be stockpiled and reused when restoring plant communities. Once decommissioning activity is complete, topsoil will be restored to assist in establishing and maintaining pre-construction conditions to the extent possible, consistent with landowner objectives.
- Surface water flows will be restored to pre-disturbance conditions consistent with storm water management objectives and requirements. This will include removal of stream crossings, roads, and pads.
- Overhead power lines no longer needed will be removed.
- After decommissioning, erosion control measures will be installed in all areas of disturbance where potential for erosion exists, consistent with storm water management objectives and requirements.
- Fencing will be removed unless the landowner wishes to utilize the fence.

8.0 REFERENCES

- Avian Power Line Interaction Committee (APLIC). 2006. Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006. Public Interest Energy Research Program (PIER) Final Project Report CEC-500-2006-022. Edison Electric Institute, APLIC, and the California Energy Commission. Washington D. C. and Sacramento, California. Available online: <https://www.nrc.gov/docs/ML1224/ML12243A391.pdf>
- Avian Power Line Interaction Committee (APLIC). 2012. Reducing Avian Collisions with Power Lines: The State of the Art in 2012. Edison Electric Institute and APLIC, Washington, D. C.
- Bishop-Boros, L. and K. Chodachek. 2020. Bat Acoustic Activity Survey for the Proposed Bowman Wind Project, Bowman County, North Dakota: July 8 – October 28, 2020. Prepared for Bowman Wind LLC. Prepared by Western EcoSystems Technology, Inc. (WEST), Laramie, Wyoming. November 17, 2020.
- Chodachek, K. 2019a. Prairie Grouse Lek Monitoring Surveys, Bowman Wind Project, Bowman County, North Dakota. Final Report: April 2019. Prepared for Bowman Wind, LLC, Charlottesville, Virginia. Prepared by Western EcoSystems Technology, Inc. (WEST), Bismarck, North Dakota. August 1, 2019.
- Chodachek, K. 2019b. Raptor Nest Check Surveys, Bowman Wind Project, Bowman County, North Dakota. Final Report. Prepared for Bowman Wind, LLC. Prepared by Western EcoSystems Technology, Inc. (WEST), Bismarck, North Dakota. September 5, 2019.
- Chodachek, K. and C. Bishop-Boros. 2019. Northern Long-eared Bat Habitat Assessment, Bowman Wind Project, Bowman County, North Dakota. Final Report. Prepared for Bowman Wind, LLC. Prepared by Western EcoSystems Technology, Inc. (WEST), Bismarck, North Dakota. September 9, 2019.
- Chodachek, K. and C. LeBeau. 2020. Grassland Assessment for the Proposed Bowman Wind Project, Bowman County, North Dakota. Draft Report: May and October 2020. Prepared for Bowman Wind, LLC. Charlottesville, Virginia. Prepared by Western EcoSystems Technology, Inc. (WEST), Bismarck, North Dakota. November 13, 2020.
- Dyke, S. R., S. K. Johnson, and P. T. Isakson. 2015. North Dakota State Wildlife Action Plan. North Dakota Game and Fish Department, Bismarck, North Dakota. Available online: <https://gf.nd.gov/wildlife/swap>
- Eagle Environmental, Inc. (EEI). 2019a. 2019 Raptor Nest Report, Bowman Wind, LLC, Bowman County, North Dakota. October 2019. Prepared for Bowman Wind, LLC, Charlottesville, Virginia. Prepared by Eagle Environmental, Inc, Santa Fe, New Mexico. October 21, 2019.
- Eagle Environmental, Inc. (EEI). 2019b. Prairie Dog Colony Mapping Report, Bowman Wind, LLC, Bowman County, North Dakota. October 2019. Prepared for Bowman Wind, LLC, Charlottesville, Virginia. Prepared by EEI, Santa Fe, New Mexico. October 21, 2019.
- eBird. 2017, 2020. eBird: An Online Database of Bird Distribution and Abundance. eBird, Cornell Lab of Ornithology, Ithaca, New York. Accessed May 25, 2020. Information online: <http://ebird.org/content/ebird/>

- Erickson, W., P. Rabie, K. Taylor, and K. Bay. 2014. Comparison of Avian Mortality Sources and Evaluation and Development of Compensatory Mitigation Options for Birds. Presented at the National Wind Coordinating Collaborative (NWCC), Wind Wildlife Research Meeting X, December 2-5, 2014, Broomfield, Colorado. Available online at: https://nationalwind.org/wp-content/uploads/2014/04/34_Erikson.pdf
- Esri. 2019a. World Imagery and Aerial Photos. (World Topo). ArcGIS Resource Center. Environmental Systems Research Institute (Esri), producers of ArcGIS software. Redlands, California. Information online: <https://www.arcgis.com/home/item.html?id=10df2279f9684e4a9f6a7f08febac2a9>
- Esri. 2019b. World Street Map. ArcGIS Resource Center. Environmental Systems Research Institute (Esri), producers of ArcGIS software, Redlands, California. Data accessed July 2019. Information online: <https://www.arcgis.com/home/item.html?id=10df2279f9684e4a9f6a7f08febac2a9>
- Esri. 2020. World Imagery and Aerial Photos. (World Topo). ArcGIS Resource Center. Environmental Systems Research Institute (Esri), producers of ArcGIS software. Redlands, California. Information online: <https://www.arcgis.com/home/item.html?id=10df2279f9684e4a9f6a7f08febac2a9>
- Kolar, Jesse. 2020. ND Greater Sage Grouse Management Plan and Lek Locations. Email. North Dakota Game and Fish Department. August 31, 2020.
- LeBeau, C., K. Chodachek, and K. Bailey. 2020a. Avian Use Survey for the Proposed Bowman Wind Project, Bowman County, North Dakota. Draft Report: August 23, 2018 – August 23, 2019. Prepared for Bowman Wind, LLC. Charlottesville, Virginia. Prepared by Western EcoSystems Technology, Inc. (WEST), Laramie, Wyoming. June 25, 2020.
- LeBeau, C., K. Chodachek, and K. Bailey. 2020b. Avian Use Survey for the Proposed Bowman Wind Project, Bowman County, North Dakota. Final Report: August 7, 2017 – July 22, 2018. Prepared for Bowman Wind, LLC. Charlottesville, Virginia. Prepared by Western EcoSystems Technology, Inc. (WEST), Laramie, Wyoming. June 25, 2020.
- National Audubon Society (Audubon). 2017. Important Bird Areas: North Dakota. Accessed June 13, 2017. Information online: <https://www.audubon.org/important-bird-areas/state/north-dakota>
- National Land Cover Database (NLCD). 2016. As cited includes:
- Yang, L., S. Jin, P. Danielson, C. Homer, L. Gass, S. M. Bender, A. Case, C. Costello, J. Dewitz, J. Fry, M. Funk, B. Granneman, G. C. Liknes, M. Rigge, and G. Xian. 2018. A New Generation of the United States National Land Cover Database: Requirements, Research Priorities, Design, and Implementation Strategies. ISPRS Journal of Photogrammetry and Remote Sensing 146: 108-123. doi: 10.1016/j.isprsjprs.2018.09.006.
- and
- Multi-Resolution Land Characteristics (MRLC). 2019. National Land Cover Database (NLCD) 2016. Multi-Resolution Land Characteristics (MRLC) Consortium. US Geological Survey (USGS) Earth Resources Observation and Science (EROS) Center, MRLC Project, Sioux Falls, South Dakota. May 10, 2019. Information online: <https://www.mrlc.gov/data>
- NatureServe. 2020. NatureServe Explorer. NatureServe Explorer: An online encyclopedia of life. Version 2.0. NatureServe, Arlington, Virginia. Updated March 2019. Accessed June 2020. Information online: <http://explorer.natureserve.org>
- North American Datum (NAD). 1983. NAD83 Geodetic Datum.

- North Dakota Geographic Information Systems (GIS). 2017. GIS Hub Data Portal. Datasets, North Dakota GIS Hub, State of North Dakota, Bismarck, North Dakota. Accessed June 13, 2017. Information online: <https://gishubdata.nd.gov/>
- Pardieck, K. L., D. Ziolkowski, Jr., M. Lutmerding, V. I. Aponte, and M.-A. R. Hudson. 2020. North American Breeding Bird Survey Dataset 1966 - 2019. US Geological Survey (USGS) data release. USGS Patuxent Wildlife Research Center, Beltsville, Maryland. doi: 10.5066/P9J6QUF6. Information online: <https://www.sciencebase.gov/catalog/item/5ea04e9a82cefae35a129d65>
- Robinson, A. C. 2014. Management Plan and Conservation Strategies for Greater Sage-grouse in North Dakota. North Dakota Game and Fish Department. Bismarck, North Dakota. Available online: https://gf.nd.gov/sites/default/files/publications/nd-sage-grouse-plan-2014_0.pdf
- SWCA Environmental Consultants (SWCA). 2018a. Bowman Wind Project Desktop Grassland Assessment Report, Bowman County, North Dakota. Prepared by SWCA, Bismarck, North Dakota. August 2018.
- SWCA Environmental Consultants (SWCA). 2018b. Eagle and Raptor Nest Survey Report. Bowman Wind Project. Bowman County, North Dakota. Prepared by SWCA. August 2018.
- SWCA Environmental Consultants (SWCA). 2018c. Grouse Lek Survey Report. Bowman Wind Project. Bowman County, North Dakota.
- SWCA Environmental Consultants (SWCA). 2018d. Prairie Dog Colony Survey Report. Bowman Wind Project, Bowman County, North Dakota. Prepared by SWCA Environmental Consultants, Bismarck, North Dakota. August 2018.
- Shaffer, J. A., and D. A. Buhl. 2016. Effects of Wind-energy Facilities on Grassland Bird Distributions. *Conservation Biology* 30:59-71.
- Shaffer, J. A., C. R. Loesch, and D. A. Buhl. 2019. Estimating Offsets for Avian Displacement Effects of Anthropogenic Impacts. *Ecological Applications* 29(8): e01983. doi: 10.1002/eap.1983.
- US Department of Agriculture (USDA). 2018. Imagery Programs - National Agriculture Imagery Program (NAIP). USDA, Farm Service Agency (FSA), Aerial Photography Field Office (APFO), Salt Lake City, Utah. Accessed December 2019. Information online: <https://www.fsa.usda.gov/programs-and-services/aerial-photography/imagery-programs/index>
- US Environmental Protection Agency (USEPA). 2017. Level III and Level IV Ecoregions of the Continental United States. Ecosystems Research, USEPA. Last updated June 18, 2020. Accessed July 2020. Information online: <https://www.epa.gov/eco-research/level-iii-and-iv-ecoregions-continental-united-states>
- US Fish and Wildlife Service (USFWS). 2012. Land-based Wind Energy Guidelines. March 23, 2012. 82 pp. Available online: http://www.fws.gov/cno/pdf/Energy/2012_Wind_Energy_Guidelines_final.pdf
- US Fish and Wildlife Service (USFWS). 2013a. Eagle Conservation Plan Guidance: Module 1 - Land-based Wind Energy, Version 2. US Department of the Interior, Fish and Wildlife Service, Division of Migratory Bird Management. April 2013. 103 pp. + frontmatter. Available online: <https://www.fws.gov/migratorybirds/pdf/management/eagleconservationplanguidance.pdf>
- US Fish and Wildlife Service (USFWS). 2013b. Species of Habitat Fragmentation Concern. North Dakota Field Office, Mountain-Prairie Region, USFWS. February 2013.
- US Fish and Wildlife Service (USFWS). 2014. Greater Sage-grouse and COT Populations. Information online: https://gf.nd.gov/sites/default/files/publications/nd-sage-grouse-plan-2014_0.pdf

- US Fish and Wildlife Service (USFWS). 2015a. U.S. Fish and Wildlife Service Protects Northern Long-eared Bat as Threatened under Endangered Species Act. Also Issues Interim Special Rule that Tailors Protections to Eliminate Unnecessary Restrictions and Provide Regulatory Flexibility for Landowners. April 1, 2015. USFWS Newsroom, Available online at: <http://www.fws.gov/midwest/news/778.html>
- US Fish and Wildlife Service (USFWS). 2016. Eagle Permits; Revisions to Regulations for Eagle Incidental Take and Take of Eagle Nests; Final Rule. 50 CFR 13 and 22. Department of the Interior Fish and Wildlife Service. 81 Federal Register (FR) 242: 91494-91554. December 16, 2016.
- US Fish and Wildlife Service (USFWS). 2017, 2020. Initial Project Scoping: IPaC – Information for Planning and Consultation. IPaC, Environmental Conservation Online System (ECOS), USFWS. Accessed July 24, 2020. Information online: <http://ecos.fws.gov/ipac/>
- US Fish and Wildlife Service (USFWS). 2019. Range-Wide Indiana Bat Survey Guidelines. USFWS Region 3, Bloomington, Indiana. April 2019. 63 pp. Available online: https://www.fws.gov/midwest/endangered/mammals/inba/surveys/pdf/2019_Rangewide_IBat_Survey_Guidelines.pdf
- US Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI). 2017. Wetlands. USFWS NWI Fort Snelling, Minnesota. Accessed June 13, 2017. Information online: <https://www.fws.gov/wetlands/>
- US Fish and Wildlife Service (USFWS). 2020. US Fish and Wildlife Service, Region 6, Mountain-Prairie Region. Outline for a Bird and Bat Conservation Strategy: Wind Energy Projects. Accessed December 21, 2020. <https://www.fws.gov/coloradoes/documents/Final%20R6%20BBCS%20Outline%20with%20annotation.pdf>
- US Geological Survey (USGS). 2017. National Hydrography Dataset (NHD). USGS NHD Extracts. Accessed July 2020. Information online: <http://nhd.usgs.gov/>
- US Geological Survey (USGS). 2019. 3D Elevation Program (3DEP). 3D elevation data from light detection and ranging (lidar) data: conterminous United States, Hawaii, and the US territories. USGS, Reston, Virginia. Accessed May 2019. Information online: <https://www.usgs.gov/core-science-systems/ngp/3dep>
- USA Topo. 2019. USA Topo Maps. US Geological Survey (USGS) topographical maps for the United States. ArcGIS. Environmental Systems Research Institute (Esri), producers of ArcGIS software. Redlands, California.

Appendix A. Agency Meeting Summaries and Relevant Communication

Jennie Geiger

From: Jennie Geiger
Sent: Monday, July 10, 2017 11:49 AM
To: Kevin_Shelley@fws.gov; John Schumacher (jdschumacher@nd.gov); 'emueller@nd.gov'
Cc: Dave Phillips (dave.phillips@apexcleanenergy.com); Mark Mauersberger (mark.mauersberger@apexcleanenergy.com); Nate Pedder
Subject: BUSINESS CONFIDENTIAL: Follow Up on Bowman Wind Meeting
Attachments: BOW_USFWS NDGF Meeting Summary and PPT_2017-07-10.pdf

Hi Kevin/John/Elisha -

Thank you for taking the time to meet with us last month to discuss our proposed Bowman Wind Project. Attached is a summary of topics discussed during the June 20, 2017 meeting, as well as the Powerpoint presentation (PPT) presented, for your review and consideration. If you could please confirm receipt due to the large file size I would appreciate it.

Also, as discussed during the meeting, we would like to set up a call to discuss lek survey protocols and additional collaboration opportunities. I will send out a doodle poll in the next few days to assist in finding a date/time that is convenient for everyone over the coming weeks.

Thanks,
Jennie

JENNIE GEIGER
Environmental Permitting Manager

Apex Clean Energy, Inc.
310 4th St. NE, Suite 200, Charlottesville, VA 22902
office: 434-260-6982 | cell: 720-320-9450 | fax: 434-220-3712
jennie.geiger@apexcleanenergy.com | www.apexcleanenergy.com



The contents of this e-mail and any attachments hereto are confidential and intended only for use by the addressee(s) named herein. The information may also be legally privileged. This transmission is sent in trust, for the sole purpose of delivery to the intended recipient. If you are not the intended recipient of this e-mail, any use reproduction or dissemination of this transmission is strictly prohibited. If you have received this e-mail in error, please notify me by replying to this message and permanently delete the original e-mail and its attachments, including any copies or printouts thereof.

BOWMAN WIND PROJECT - MEETING SUMMARY

Meeting Attendees: Kevin Shelley, USFWS
John Schumacher, NDGFD
Elisha Mueller, NDGFD
Jennie Geiger, Apex
Dave Phillips, Apex (by phone)
Mark Mauersberger, Apex (by phone)
Nate Pedder, Apex (by phone)

Notes Prepared by: Apex

Date: July 10, 2017

~~On June 20, 2017, Apex Clean Energy (Apex) met with the U.S. Fish and Wildlife Service (USFWS),~~ and North Dakota Game and Fish Department (NDGFD) to discuss the proposed Bowman Wind Project (Project) in Bowman County, North Dakota. The purpose of the meeting was to introduce the Project, discuss and receive input on Apex's Tier 1/Tier 2 and Stage 1 risk reviews completed in accordance with the USFWS Land-based Wind Energy Guidelines (2012) and Eagle Conservation Plan Guidance (ECPG; 2014), and agree on Tier 3 study plans to assess site-specific issues of concern. The following presents a summary of topics discussed and agreed upon next steps.

Apex presented an overview of the company, Project status, risk reviews, and proposed study plans for the Project using the attached Powerpoint (PPT) presentation. There was general agreement that the material presented in the PPT accurately evaluated and characterized the site in accordance with Tiers 1 and 2 and Stage 1 and supported progression to Tier 3/Stage 2 studies¹. Both agencies expressed their management goals of protecting and minimizing impacts to intact grasslands, and NDGFD noted the importance of considering Level I or Level II species of conservation priority (SCP) in the state Wildlife Action Plan.

Federal/State Listed Species: It was agreed that the Project is located outside the known range of the grey wolf and outside the whooping crane migration corridor, and that species-specific studies were not required to further evaluate risk from Project construction or operation to these species. USFWS confirmed that potential risk to northern long-eared bats could be managed by implementation of the measures presented on slide 19 to minimize risk to this species; however, they indicated few surveys have been conducted on this species to date and additional data would be appreciated.

Eagles: Both agencies agreed that risk to bald eagles is low at the site, but that potential risk to golden eagles warrants ECPG-level studies. It was agreed that the eagle survey plans outlined on slide 21 were appropriate. USFWS indicated that telemetry data from a multiple year tracking study of golden eagles in western ND may be available for review as well and is checking into the availability of the data.

¹ Two revisions were made to slide 14 in response to agency feedback: 1) the bullet indicating "overall low risk of impact to BOCC" was removed, and 2) BOCC species that are also listed as Level I or Level II species of conservation priority in the state Wildlife Action Plan were identified in the table.

Other Avian: It was agreed that sharp-tailed grouse (SCP Level II) and greater sage-grouse (SCP Level I) are likely to occur in or near the Project area and lek surveys are warranted. The scope and details of the surveys will be determined prior to the spring 2018 survey period in coordination with both USFWS and NDGFD in order to most effectively support agency initiatives for grouse conservation in the region.

Tier 3 Survey Plans: The following surveys were recommended and agreed upon for the project:

- Aerial raptor nest surveys out to 1 mile and eagle nest surveys in suitable habitat out to 10 miles, completed no later than leaf-on in spring 2018
- 1-2 yrs of ECPG level surveys (approximately 30% of the area evaluated with 800-m plots, 1x/mo)

Both agencies voiced interest in the Project's studies resulting in useful information for the agencies' regional conservation initiatives; therefore, additional discussions are planned to identify opportunities for collaboration.

Action Items:

- USFWS/NDGFD to look into attaining golden eagle telemetry data.
- Apex to schedule a follow-up call with USFWS and NDGFD regarding lek survey protocols and to discuss additional collaboration opportunities.

Ryan Henning

From: Ryan Henning
Sent: Friday, February 9, 2018 3:09 PM
To: 'sdyke@state.nd.us'; 'Kevin_Shelley@fws.gov'
Cc: Dave Phillips; Jennie Geiger; Mark Mauersberger
Subject: Business Confidential: Follow Up on Apex Bowman Wind Project- NDGFD USFWS Agency Meeting
Attachments: BOW_NDGF USFWS Agency Meeting Summary_2018-02-09.pdf

Good afternoon Steve and Kevin,

Thank you for meeting on January 30, 2018 to discuss the Bowman Wind Project. I have attached meeting notes outlining the topics discussed for your review and consideration.

We really appreciate your time and helpful input.

Regards,

-Ryan

RYAN HENNING
Sr. Permitting Manager

Apex Clean Energy, Inc.
310 4th St. NE, Suite 200, Charlottesville, VA 22902
cell: 303-807-2429 | fax: 434-220-3712
ryan.henning@apexcleanenergy.com | www.apexcleanenergy.com



This transmittal may be privileged or confidential. If you are not the intended recipient, please immediately notify us by e-mail and do not copy or retransmit.

Not printing this email saves energy and conserves resources.

BOWMAN WIND PROJECT - MEETING SUMMARY

Meeting Attendees: Kevin Shelley, USFWS
John Schumacher, NDGFD
Elisha Mueller, NDGFD
Josh Montgomery, NDGFD
Steve Dyke, NDGFD
RJ Gross, NDGFD
Ryan Henning, Apex Clean Energy
Jennie Geiger, Apex Clean Energy (by phone)

Notes Prepared by: Apex Clean Energy

Date: February 9, 2018

~~On June 20, 2017, Apex Clean Energy (Apex) met with the U.S. Fish and Wildlife Service (USFWS), and North Dakota Game and Fish Department (NDGFD) to discuss the Bowman Wind Project (Project) in Bowman County, North Dakota. The purpose of the meeting was to update the agencies on the status of the Project and to agree on specifics for the Tier 3 studies recommended by each agency. The following presents a summary of topics discussed and agreed upon next steps.~~

Eagles: USFWS confirmed that ECPG-level surveys to evaluate potential eagle use of the Project area and to identify nests within 10 miles were appropriate for the Project. USFWS requested that Apex set up a meeting after nest surveys are complete to discuss findings

Prairie Grouse: NDGFD indicated that they complete lek surveys for greater sage-grouse and sharp-tailed grouse in and around the Project area and are monitoring translocated greater sage-grouse in Bowman County. NDGFD offered to provide the most current historical and active lek location data to inform facility siting. It was agreed that Apex should supplement the annual NDFG lek surveys by surveying known leks (including historic lek sites) in or within 1 mile of the Project area. The lek surveys will occur from 0.5 hours before sunrise to 1 hour after sunrise, with 2 visits to each lek location between April 1 to May 15, where site access is available.

Other: It was agreed that prairie dog colonies should be mapped to inform siting of project features in response to potential prey concentrations. Apex will obtain data on existing prairie dog colonies from NDGFD, confirm boundaries and status of these colonies, and map additional colonies observed within the Project area.

NDFGD recommended that Apex delineate all areas of previously untilled (i.e., native prairie) grassland that are larger than 160 acres, using a combination of available data and field verification. The goal of this work is to inform siting of project facilities to avoid and minimize impacts to these tracts, and to enable quantification of impacts where necessary to inform potential mitigation strategies.

Final Tier 3 Survey Plan: The following surveys were recommended and agreed upon for the project:

- Aerial raptor nest surveys out to 1 mile and eagle nest surveys in suitable habitat out to 10 miles, completed no later than leaf-on in spring 2018
- 1 - 2 years of ECPG-level surveys (approximately 30% of the area evaluated with 800-m plots, 1x/month)
- Check historic and active leks within the Project area and 1-mile buffer. Surveys will occur from 0.5 hours before sunrise to 1 hour after sunrise and from April 1 – May 15.
- Mapping of intact grassland habitats > 160 acres in size

Action Items:

- NDGFD to provide existing lek and prairie dog data for the assessment areas.
- Apex to implement above survey plan and review results with the agencies once complete

From: [Ryan Henning](#)
To: ["Kevin Shelley"](#)
Subject: BOW - Bat Discussion Follow UP
Date: Thursday, July 5, 2018 3:44:07 PM
Attachments: [image001.png](#)

Hi Kevin,

Thanks for your time today discussing bat surveys, and specifically northern long-eared bat (NLEB) risk at the Project and the applicability of the 4d Rule. As discussed/agreed, no acoustic or mist netting work is recommended at this time to assess risk to bats, and the Project will complete an assessment of potentially suitable NLEB summer habitat to evaluate summer risk and identify areas that may warrant further management consideration. We will provide you with the results of the habitat assessment once complete for further discussion.

Talk to you soon.

-Ryan

RYAN HENNING
Sr. Permitting Manager

Apex Clean Energy, Inc.
310 4th St. NE, Suite 200, Charlottesville, VA 22902
cell: 303-807-2429 | fax: 434-220-3712
ryan.henning@apexcleanenergy.com | www.apexcleanenergy.com



This transmittal may be privileged or confidential. If you are not the intended recipient, please immediately notify us by e-mail and do not copy or re-transmit.

Not printing this email saves energy and conserves resources.

BOWMAN WIND PROJECT - MEETING SUMMARY

Meeting Attendees: Scott Larson, USFWS
Natalie Gates, USFWS
Ryan Henning, Apex Clean Energy
Dave Phillips, Apex Clean Energy

Notes Prepared by: Apex Clean Energy

Date: October 26, 2018

~~On October 9, 2018, Apex Clean Energy (Apex) met with the U.S. Fish and Wildlife Service~~
(USFWS) to discuss the proposed Bowman Wind Project (Project) in Bowman County, North Dakota. The purpose of the meeting was to update the agency on changes to the Project boundary since the June 2017 agency meeting, review Tier 3/Stage 2 survey results, and agree on next steps in accordance with the USFWS 2012 Land-Based Wind Energy Guidelines (WEG) and 2013 Eagle Conservation Plan Guidance (ECPG). The attached PowerPoint presentation was presented, and the following summarizes the meeting.

Federally-Listed Species: It was agreed that there were no new species listings since the last agency Project review in June 2017, that the three-species listed (whooping crane, northern long-eared bat, and gray wolf) are unlikely to occur in or be affected by the Project, and no further studies or management consideration are warranted.

Eagles: Based on the year 1 eagle use data and estimated modeled take, it was agreed that the project presents a fairly low risk to eagles and an Eagle Take Permit may be appropriate for the Project to consider. Therefore, a second year of ECPG-level avian use surveys was initiated in August 2018 to comply with the Eagle Rule requirements for permitting. It was agreed that developing an Eagle Conservation Plan using year 1 data was appropriate, and that updating it and an applicant prepared draft Environmental Assessment (EA) with the Year 2 results in August 2019 may provide the most efficient path forward to obtain incidental take authorization for potential take of bald and golden eagles during operations. USFWS recommended that Apex coordinate with the USFWS Region 6 Migratory Bird Office to develop an Eagle Conservation Plan and EA. The purpose of this approach is to develop an ECP and Draft EA that allows for agency coordination and a comprehensive permit application to be submitted August 2019 that meets the specifications of the Department of Interior August 6, 2018 Secretary of the Interior Memorandum that provided *Additional Direction for Implementing Secretary's Order 3355 Regarding Environmental Assessments*.

Lastly, it was agreed that the Project would avoid siting wind turbines within 500 feet of an active prairie dog colony to minimize risk to foraging raptors, including eagles.

Bats: Apex completed a NLEB suitable habitat assessment for the project. No suitable summer habitat occurs within the project and it was agreed that no further bat studies or impact avoidance measures are warranted.

Prairie Grouse Leks: To minimize impacts to prairie grouse, Apex agreed to repeat the lek survey in spring 2019 (or in the spring preceding construction) using the same methods as used in 2018 and avoid siting turbines within 0.25 mile of active sharp-tailed grouse leks and within 1 mile of active greater sage-grouse leks. In addition, Apex agreed to implement a timing stipulation of no construction activities from 3 hours before until 3 hours after sunrise within 1 mile of an active sharp-tailed grouse lek from April 1 to July 15; and within 2 miles of an active greater sage-grouse leks from March 15 to May 15.

Grasslands: It was acknowledged that minimizing impacts to unbroken (untilled) grasslands is not required by regulation, but that it potentially reduces fragmentation and indirect effects on grassland birds. Apex completed a desktop review of unbroken grasslands within the Project area. Ground verification and mapping is planned for late 2018 or early 2019. The results of the unbroken grassland assessment will be used to inform siting and minimize impacts.

Action Items:

- Apex to provide copies of raptor nest, prairie dog, and lek survey reports completed to date
- Apex to coordinate with USFWS on ECP and draft EA development
- Apex to complete grassland field verification to inform siting.

Ryan Henning

From: Ryan Henning
Sent: Friday, October 26, 2018 1:32 PM
To: 'kevin_kritz@fws.gov'
Cc: 'brian_w_smith@fws.gov'
Subject: Business Confidential: Follow Up on Bowman Wind Project
Attachments: BOW_USFWS Meeting Summary and PPT_2018-10-26.pdf

Hi Kevin,

Thanks for the call back on Wednesday. As we discussed, Apex Clean Energy is developing the Bowman Wind Project in Bowman County, North Dakota. The project is planned to be 200 megawatts (MWs) and would likely use either 62 @ 3.2 MW turbines or 52 @ 3.83 MW turbines. The project initiated agency coordination in June 2017 whereupon Tier 1&2 and Stage 1 assessments were reviewed with FWS and NDGFD and Tier 3 /Stage 2 studies were recommended and initiated. The project has completed a number of these surveys including the spring 2018 raptor and eagle nest survey and year 1 ECPG-level avian/eagle use surveys from Aug 2017 – Jul 2018. A 2nd year of ECPG-level study will be complete by July 2019, at which time we plan to submit our ECP, draft EA, and permit application, ideally for permit issuance on or before February 2020. Therefore, as discussed, we request that the Bowman Wind Project be added to your priority list of wind projects seeking an Eagle Take Permit with the Region 6 Migratory Bird staff so we can achieve this schedule. Please see the attached PPT and meeting summary from our recent FWS meeting, which details our eagle findings to date on slides 12, 14, and 15, and take estimates based on year 1 data on slide 16.

Please let me know if you have any questions or need additional information. I will plan to follow up with you shortly.

Regards,

-Ryan

RYAN HENNING
Sr. Permitting Manager

Apex Clean Energy, Inc.
310 4th St. NE, Suite 200, Charlottesville, VA 22902
cell: 303-807-2429 | fax: 434-220-3712
ryan.henning@apexcleanenergy.com | www.apexcleanenergy.com



This transmittal may be privileged or confidential. If you are not the intended recipient, please immediately notify us by e-mail and do not copy or retransmit.

Not printing this email saves energy and conserves resources.



"VARIETY IN HUNTING AND FISHING"

GOVERNOR Doug Burgum

DIRECTOR, Terry Steinwand
DEPUTY, Scott A. Peterson

NORTH DAKOTA GAME AND FISH DEPARTMENT

100 NORTH BISMARCK EXPRESSWAY BISMARCK, NORTH DAKOTA 58301-5055 PHONE 701-328.6300 FAX 701-328-6332

19 June 2020

Scott Jansen
Senior Development Manager
Apex Clean Energy
8665 Hudson Blvd North, Suite 110
Lake Elmo, MN 55042

Dear Mr. Thomas:

RE: Requesting Comments on an up to 200-megawatt Wind Farm in Bowman County, North Dakota

The North Dakota Game and Fish Department (Department) was first introduced to the Bowman Wind Farm in fall of 2018. In early coordination meetings, the Department expressed concerns on the negative impacts the project may have on native habitats, particularly, unbroken grasslands, as well as species of concern such as the Greater Sage-Grouse. Despite these concerns, there has been virtually no coordination during project development. It wasn't until receiving your letter, dated May 11, 2020, that the Department was solicited for official comments on the project boundary. However, only one week later, the Department received a near-final turbine layout (email correspondence, May 19, 2020). Further, it was not until after our meeting on May 28, 2020 that any pre-construction surveys were shared. In this letter, the Department will provide initial comments based on the project boundary and turbine locations only. Comments, questions, and/or concerns based on the wildlife reports will be provided once the Department has had sufficient time to review all documents. However, with an expectation to submit a permit application to the Public Service Commission in July 2020, these discussions and information-sharing should have taken place long ago.

First and foremost, the project landscape encompasses a significant amount of relatively undisturbed native habitats (Map A). Native prairie is the most endangered ecosystem in North Dakota and, as we are a grassland state, the majority of our native species are linked to, and dependent upon, prairie. Disturbance, fragmentation, and loss of native prairie have adversely impacted a wide variety of species and these negative impacts will only continue to compound as more development takes place on the landscape. The remaining tracts of unbroken prairie, regardless of size, are becoming more and more vital to many declining bird and pollinator species. This habitat supports 30 or more of the 115 Species of Conservation Priority identified in the North Dakota State Wildlife Action Plan (Dyke et. al 2015). For species of conservation priority, such as the Chestnut-collared Longspur with a trend of -4.3 (4.3% of the population is lost annually), Lark Bunting with a trend of -3.4, and Grasshopper Sparrow with a trend of -2.8 (Breeding Bird Survey trend data, U.S. Department of Interior), the loss and fragmentation of native prairie in the project area may further negatively impact these rapidly declining species (Maps B, C, and D).

Wetlands are another productive wildlife habitat in North Dakota, supporting 54 Species of Conservation Priority, as well as a considerable number of waterfowl, shorebirds and cranes throughout the year. Although wetlands within the project area are minimal, the resources they provide are still of value to many of our native species, especially in a landscape where these resources are so limited.

Finally, although the Department believes the best way to protect our species of conservation priority is by taking a habitat-focused approach, we would also like to reiterate the following species-specific concerns.

- Greater Sage-Grouse have been experiencing sharp declines nationwide, have a highly restricted geographic range in North Dakota, and have been shown to be negatively impacted by energy development, including wind development. For these reasons, the Department's first recommendation is to discontinue permitting energy development within the Priority Conservation Areas. Further, the Department also recommends no surface occupancy within 4 miles of an active sage-grouse lek (active is defined by being attended by >1 male Sage-grouse in the previous 5 years) (Map E).
- Nearly 31% of the global population of Sharp-tailed Grouse falls within North Dakota and declines to the state's population will likely lead to range-wide population declines. Sharp-tailed Grouse are a high-valued upland game bird, and because research indicated that prairie grouse may be adversely affected by energy development, it is important that lek surveys be conducted to understand the risk associated with development. The Department does not survey the entire state for lek activity; however, based on counts conducted in nearby areas, it can be estimated that there are approximately 0.5-1 Sharp-tailed Grouse leks per square mile in areas predominated by grassland habitats (Map F).
- The greatest density of Golden Eagle nests in the state lies along the Little Missouri River, west of the project boundary. Golden Eagles have also been

known to use the project area quite extensively (Map G). Further, as Bald Eagle numbers increase each year in North Dakota, it is possible that Bald Eagle nests may be found anywhere within the project boundary where large trees are present. Therefore, it is highly recommended that Apex work closely with the United States Fish and Wildlife Service to comply with federal law regarding both Golden and Bald Eagles.

- Bats are long-lived, reproduce slowly, and migrate long distances, making them particularly susceptible to wind development. Acoustic surveys should begin at a minimum two years pre-construction to assess the risk the project poses to local bat populations.
- Whooping Cranes are a federally listed endangered species that use a wide variety of shallow wetlands for roosting and foraging. Though risk may be low within this project boundary, the Department recommends Apex contact HAPET in Bismarck to request the Whooping Crane model of predicted use of landscapes.

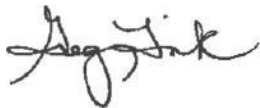
The Department has a number of resources available for the benefit of the developer and consultant, including maps and information on native habitats, priority areas, and sensitive species. Core native habitat layers are available via Esri REST Services <https://gf.nd.gov/maps/data> then selecting North Dakota Game and Fish Department Species Range and Habitats. In early 2020, the North American Migratory Bird Joint Ventures released a Potentially Undisturbed Lands report and GIS layer. Again, if project proponents had maintained better communication with the Department during project development, you would have been aware of these resources earlier on. Including the Department's stance on avoiding siting wind turbines and associated infrastructure on any size tract of unbroken grassland. It appears more than half of the turbines (from the near-final layout) will be sited on unbroken grassland which is both disappointing and disconcerting considering the efforts other wind proponents have recently made to avoid destroying this irreplaceable habitat. The Department also recommends working with the U.S. Fish and Wildlife Service, as any state guidelines or recommendations do not relieve the developer of its obligations to comply with any applicable federal regulations. It is to our knowledge that the Service provided comment on many of these issues in a 2019 letter.

As we continue to address the challenges of stemming the decline of our state's most sensitive species, we cannot endorse or consent to the disturbance, fragmentation, and loss of the remaining high value habitats essential to Species of Conservation Priority without recommending that suitable replacement or offsets be applied back onto the landscape. Ensuring these habitats remain on the landscape is the only way to stem the decline of these species and prevent further listings through the Endangered Species Act, which could impact both the state and its citizens by placing further restrictions on the development and management of both private and public land. The Department has stressed the importance of following the best available science in determining impacts and voluntary offsets. The best science addressing North Dakota resources are Loesch et al.

2013, Shaffer and Buhl 2016, and Shaffer et al. 2019 and these papers should be used to help guide Apex if it is decided that a voluntary offset package should be created.

As Apex moves forward with this project, the Department requests to remain informed. To accurately analyze the project and provide valuable feedback to the PSC, it is important that the Department receives all documents, including wildlife surveys, spatial data, and any voluntary offsets being proposed 100 days prior to the hearing date.

Sincerely,

A handwritten signature in black ink, appearing to read "Greg Link". The signature is fluid and cursive, with the first name "Greg" and last name "Link" clearly distinguishable.

Greg Link
Chief, Conservation and Communications Division

Cc: Drew Becker, US Fish and Wildlife Service
ND Public Service Commission
Bowman County Planning and Zoning

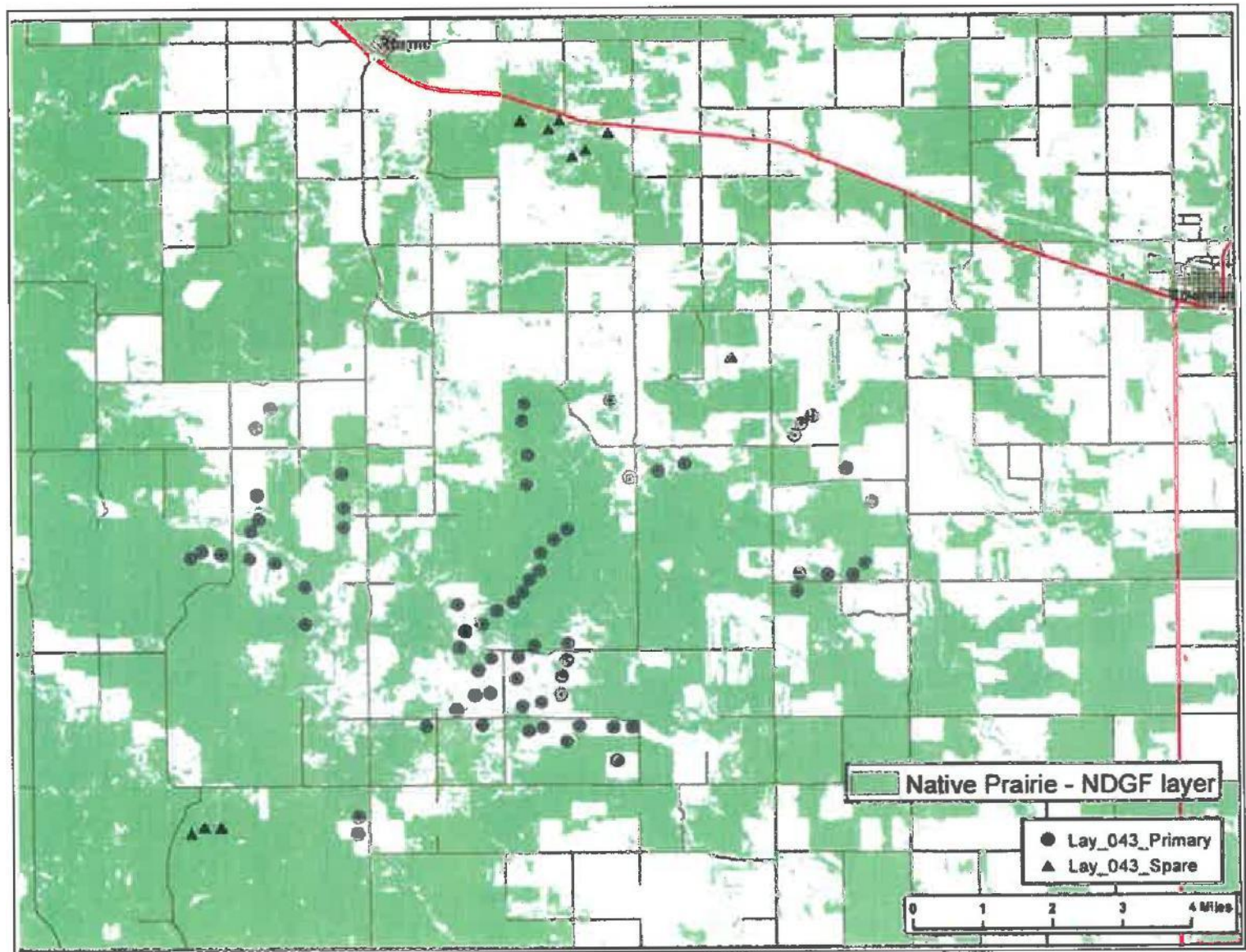
References:

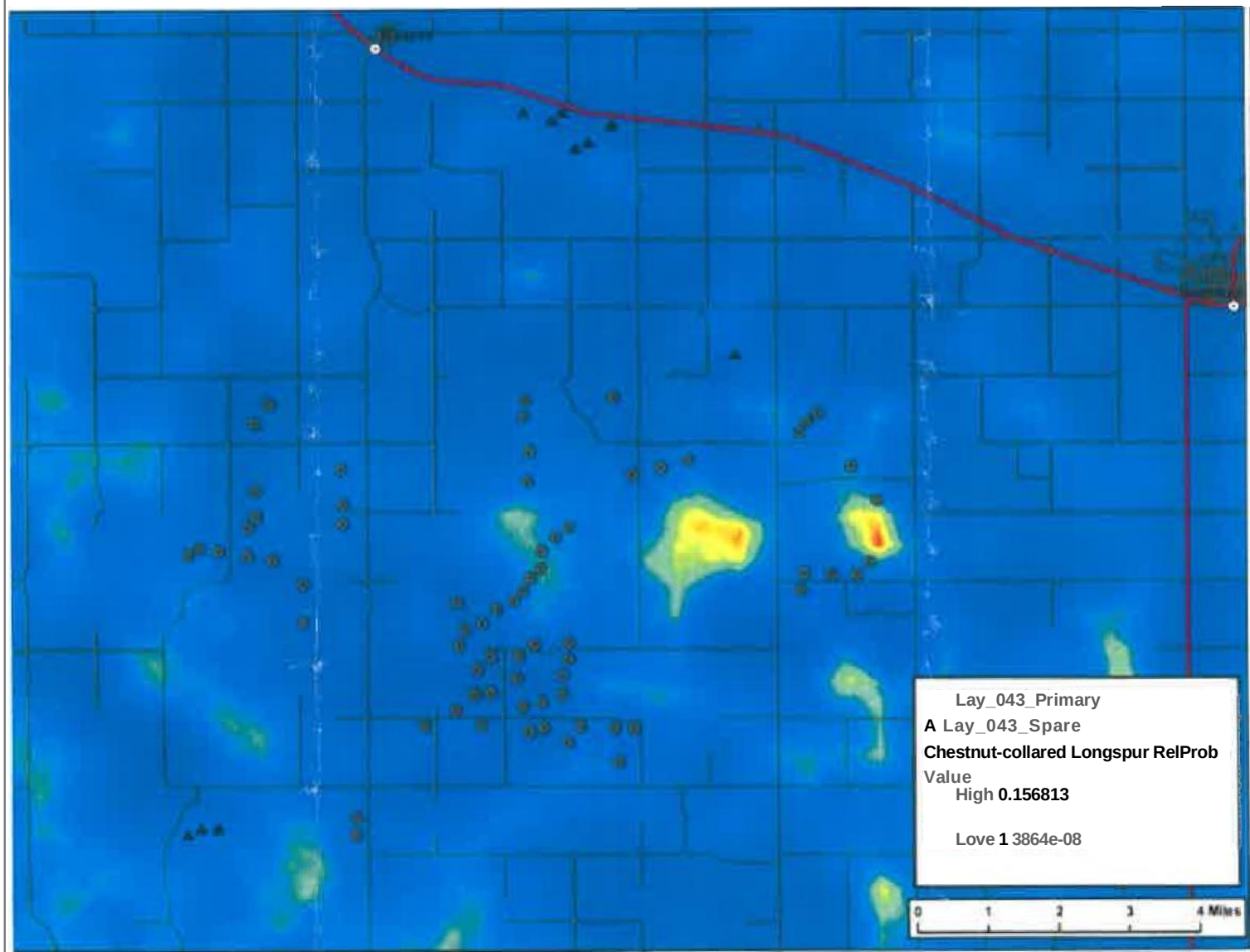
Dyke, S. R., S. K. Johnson, and P. T. 'saloon. 2015. North Dakota State Wildlife Action Plan. North Dakota Game and Fish Department, Bismarck, ND.

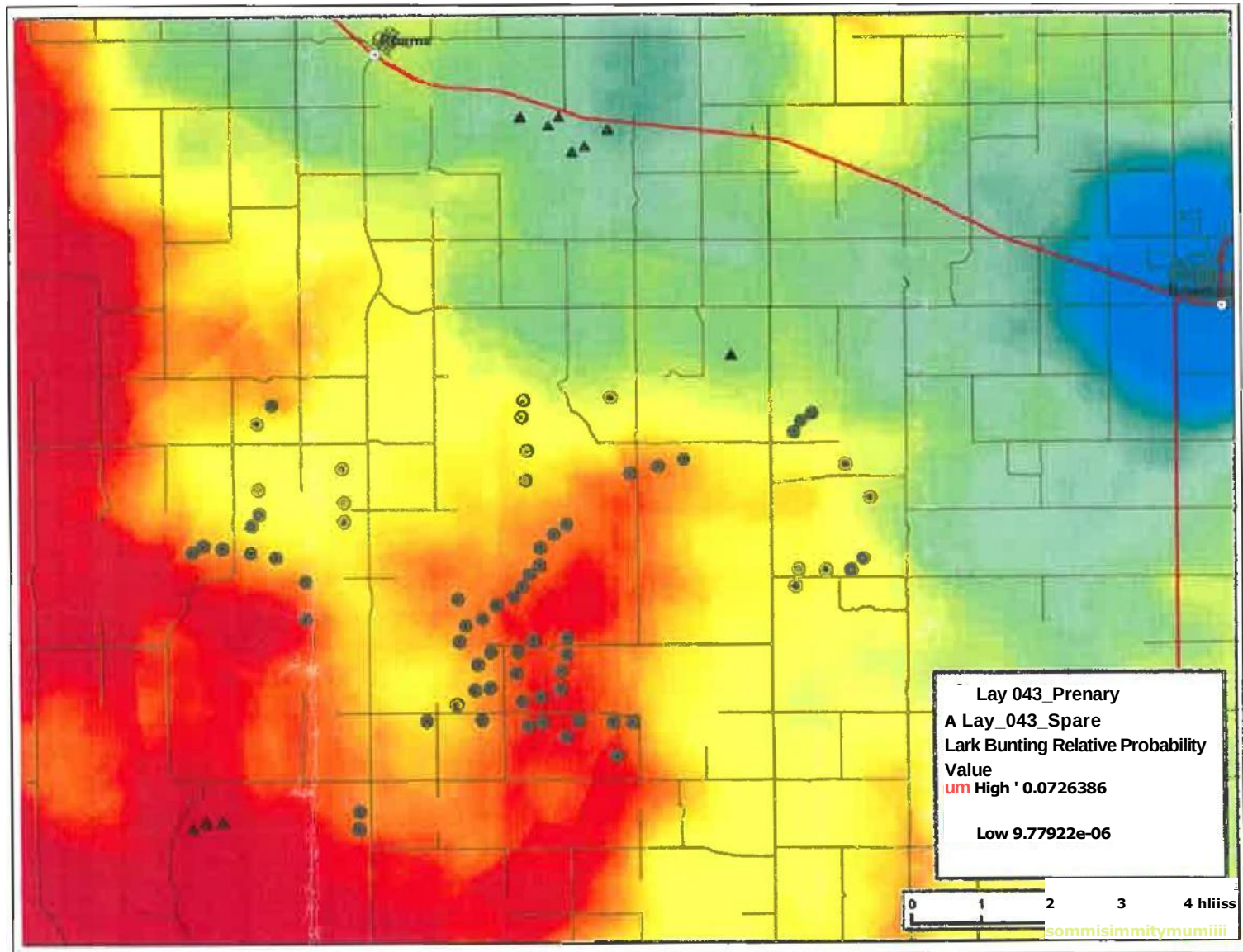
Loesch, C. R., J. A. Walker, R. E. Reynolds. J. S. Gleason, N. D. Niemuth, S. E. Stephens, and M.A. Erickson. 2013. Effect of wind energy development on breeding duck densities in the Prairie Pothole Region. *Journal of Wildlife Management* 77:587-598.

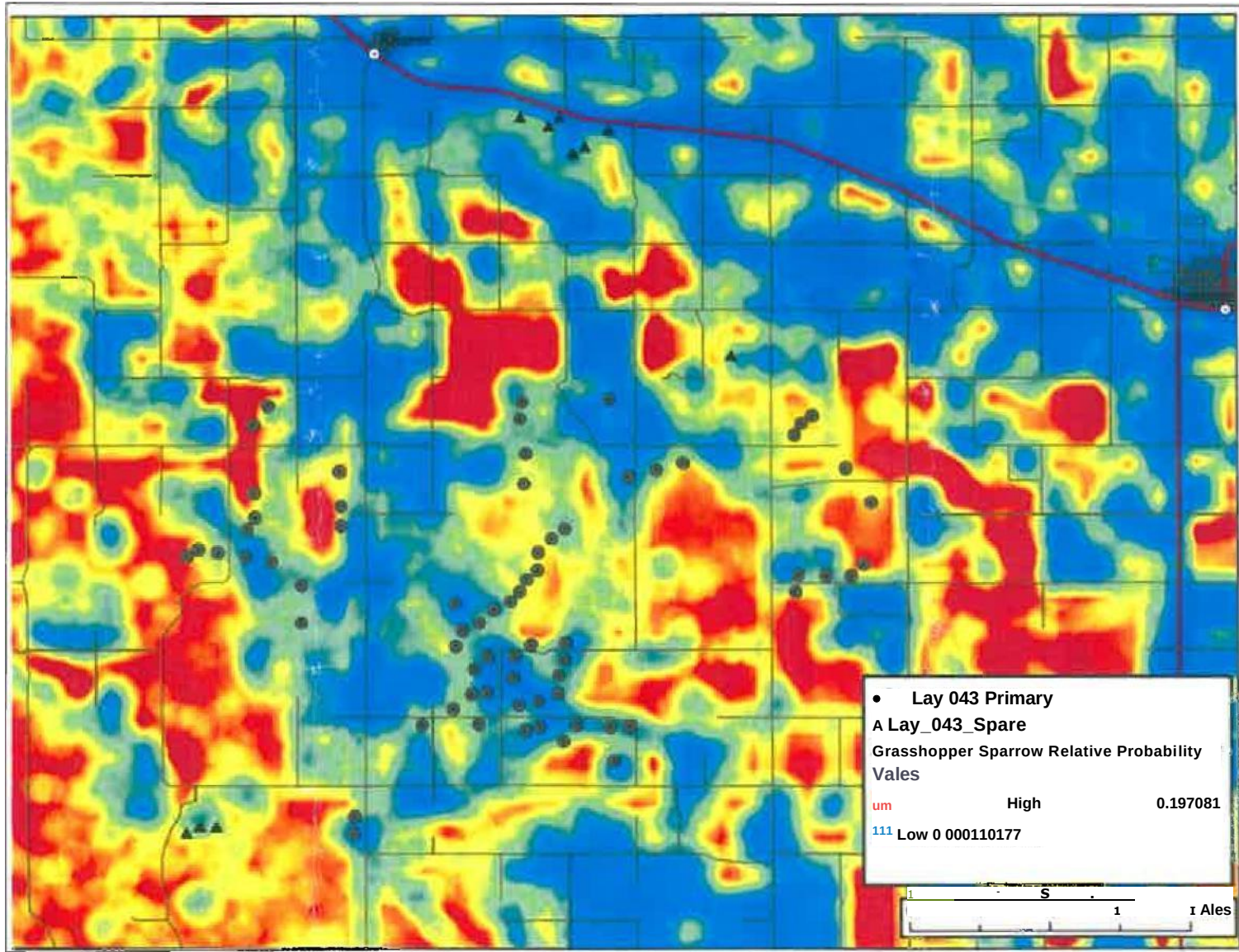
Shaffer, J. A., C. R. Loesch., D. A. Buhl. 2019. Estimating offsets for avian displacement effects of anthropogenic impacts. *Ecological Applications* 29(8): e01983. 10.1002/eap.1983

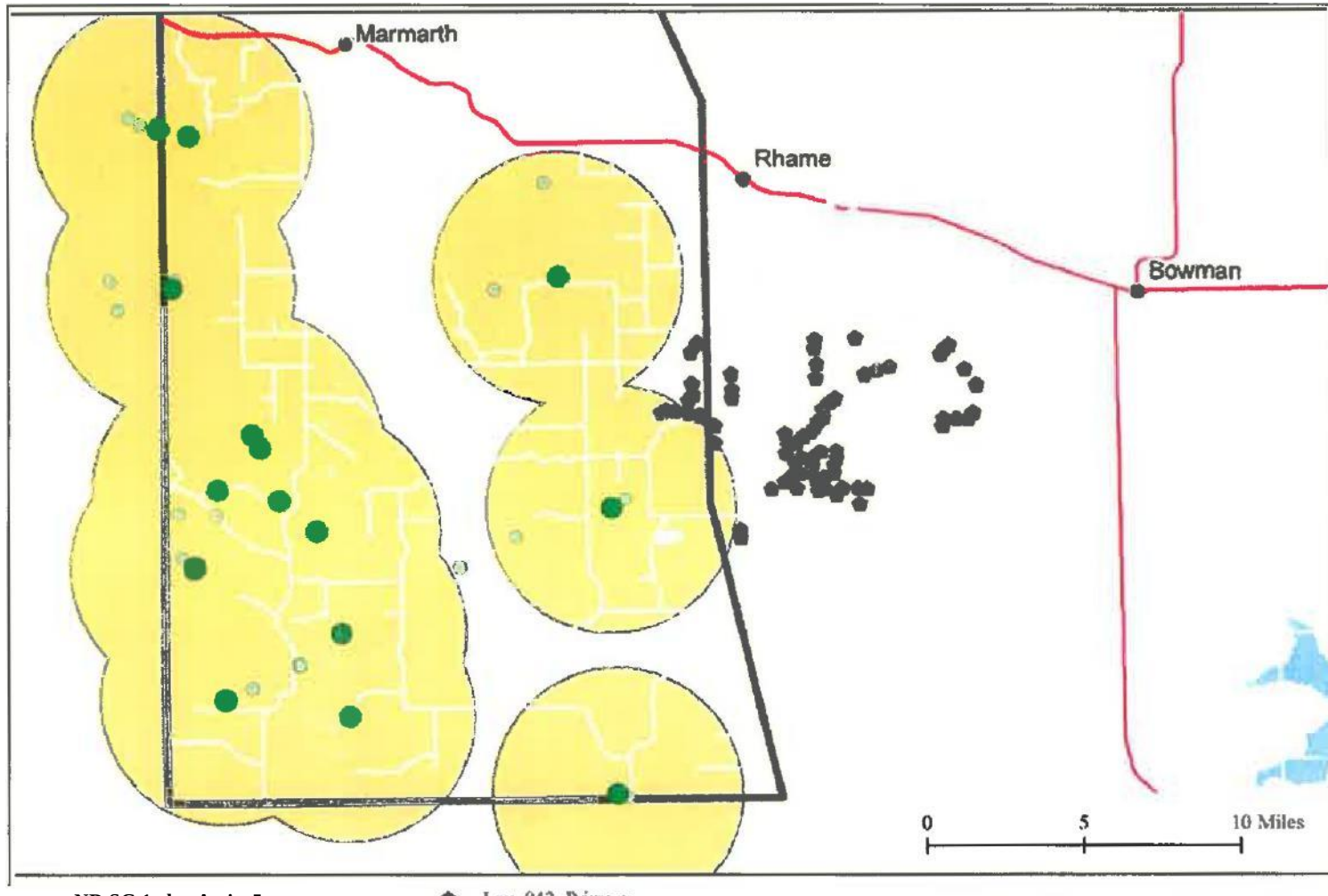
Shaffer, J. A. and D. A. Buhl. 2016. Effects of wind-energy facilities on grassland bird distributions. *Conservation Biology* 30:59-71.









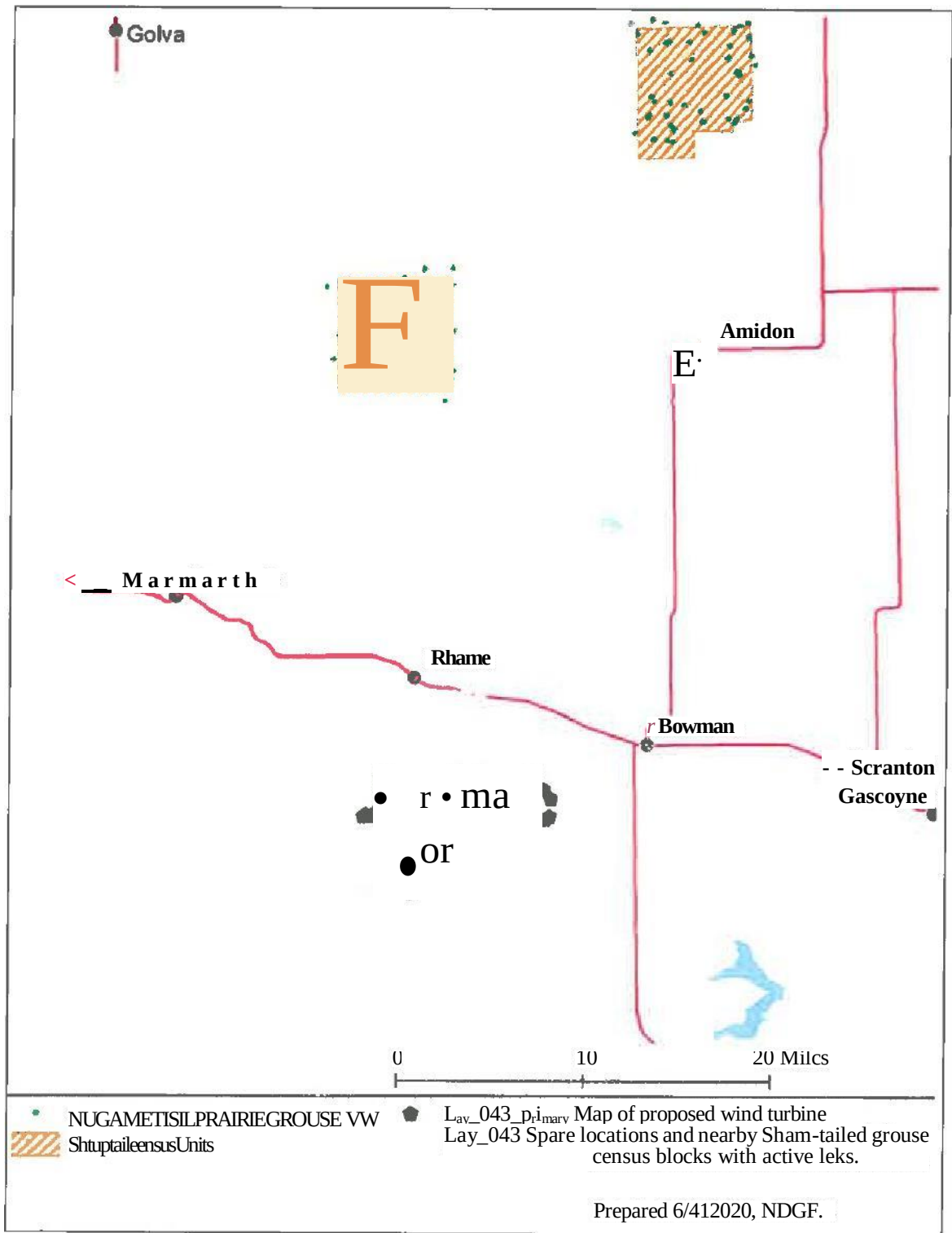


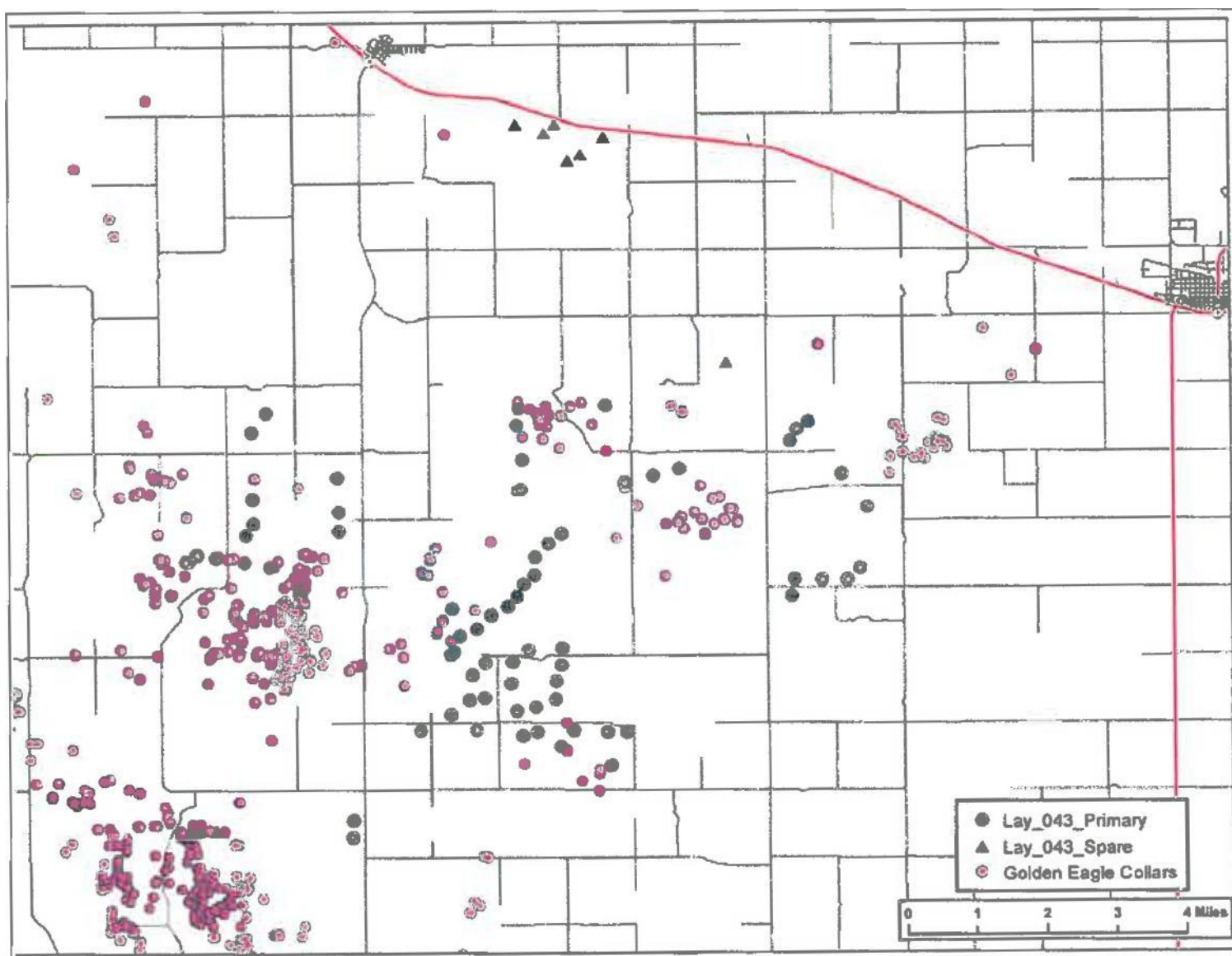
- c:3
- ND SG Leks_Active5-yr
 - C ND SG Leks_Active 10-yr
 - Sage Grouse Primary Conservation Area
 - 14 Mile Buffer of Occupied Leks (5yr)

• Lay_043_Primary
Lay_043_Spare

Map of proposed wind turbine locations and greater sage-grouse lek locations and primary conservation area. Prepared 6/4/2020. NDGF.

Map F





4
a)
c.)



United States Department of the Interior

FISH AND WILDLIFE SERVICE Mountain-Prairie Region



IN REPLY REFER TO:
06E15000-2020-B-0024
Bowman Wind Project

North Dakota Ecological Services
3425 Miriam Avenue
Bismarck, North Dakota 58501

September 22, 2020

Mr. Ryan Henning
Apex Clean Energy, Inc.
310 4th St. NE, Suite 200
Charlottesville, VA 22902

Dear Mr. Henning:

We received your August 6, 2020, narrative document that discusses the Bowman Wind Project's incorporation of the Shaffer et al (2019) offset model and the corresponding offset area calculation for the current layout. We commend your layout modifications that have reduced the number of turbines on native grasslands to two of 70 total turbines. It is our understanding that a Bird and Bat Conservation Strategy (BBCS) will be prepared which will finalize the application of the model to be included in the NDPSC permit application. We previously provided the FWS Region 6 recommended format for a BBCS and we will provide input on that document when we receive it. The BBCS framework will assist in determining if there is a need to develop other conservation plans such as an Eagle Conservation Plan or Habitat Conservation Plan. At this time, we recommend considering the following for inclusion in the BBCS:

- 1) Temporary impacts are not necessarily temporary. Native prairie is not easily restored and any acreages considered a temporary impact should be included and detailed in a restoration plan, as part of the BBCS, to be developed in collaboration with NDGF and the Service, and/or other resource managers with experience in prairie restoration. Monitoring should be included as part of this plan for a period of not less than 5 years to ensure that native vegetation becomes established.
- 2) As stated in the NDGF's June 19, 2020, letter, all intact grasslands, including those less than 160 acres, should be assessed and considered as part of the offset package. In the Grassland Assessment Report, SWCA indicated that only parcels of 160 acres or larger are of primary concern. We would like to reiterate the points made by the NDGF that the developer should avoid all intact grasslands, and not just those of 160 acres or larger.
- 3) As stated in our April 19, 2019 letter, the presence of prairie dog towns in this area is an indication of raptor use, including eagles. We recommend prairie dog town surveys and maps be included in the BBCS to inform a prey base analysis for eagles and other raptors.

Thank you for the opportunity to comment on this proposal. We look forward to providing input on the BBCS. If you have any additional questions or comments, please contact Heidi Riddle of my staff at (701) 355-8545 or via email at heidi_riddle@fws.gov, or contact me at (701) 355-8512 or drew_becker@fws.gov.

Sincerely, _____

Drew Becker
ND Ecological Services Supervisor

cc: Greg Link, North Dakota Game and Fish Department

|

**Appendix B. Bird and Bat Studies Completed for the Bowman Wind Project, Bowman
County, North Dakota**

**Avian Use Survey for the
Proposed Bowman Wind Project
Bowman County, North Dakota**

**Report
August 7, 2017 - July 22, 2018**

Prepared for:
Bowman Wind, LLC
310 4th Street Northeast, Suite 300
Charlottesville, Virginia

Prepared by:
Chad LeBeau, Kristen Chodachek, and Kimberly Bailey
Western EcoSystems Technology, Inc.
1610 Reynolds Street
Laramie, Wyoming 82070

June 25, 2020



Privileged and Confidential - Not For Distribution

• EXECUTIVE SUMMARY

Western EcoSystems Technology, Inc. completed an analysis of avian use data collected over a one-year period by SWCA Environmental Consultants (SWCA) for the proposed Bowman Wind Project (Project) located in Bowman County, North Dakota. The objective of surveys was to evaluate species composition and seasonal and spatial use of the Project by birds, with a particular focus on eagles and species of concern. Survey methods were developed to be in accordance with recommendations outlined in the US Fish and Wildlife Service (USFWS) 2012 *Final Land-Based Wind Energy Guidelines*, Appendix C(1)(a) of the USFWS 2013 *Eagle Conservation Plan Guidelines*, and recommendations from USFWS and the North Dakota Game and Fish Department.

SWCA completed monthly surveys from August 7, 2017 to July 22, 2018, at 29 points established throughout the Project. Surveys consisted of 10-minute (min) counts of small birds only within a 100-meter (m; 328-foot [ft]) radius plot, followed by 60 min counts of large birds (including eagles) within 800 m (2,625-ft). The 60 min count was further divided into 20 min surveys of large birds (including eagles) and the remaining 40 min surveys for eagles only.

No federally-listed threatened or endangered species were observed during avian use surveys. Fifteen bald eagle observations and 72 golden eagle observations, both protected under Bald and Golden Eagle Protection Act were recorded during surveys. In addition, five species of concern (ferruginous hawk, Swainson's hawk, chestnut-collared longspur, Brewer's sparrow, and lark bunting) were recorded during surveys.

Thirteen unique large bird species and 29 unique small bird species were recorded during surveys. The most commonly observed large bird was Canada goose (80.0% of large bird observations). Nine identified diurnal raptor species were observed during surveys, accounting for 18.5% of large bird species recorded. Swainson's hawk (26 observations) and northern harrier (28 observations) were the most common non-eagle raptor species observed. The most commonly observed small birds were horned lark (39.7% of observations), western meadowlark (15.3%), and Lapland longspur (10.2%).

Overall, the species composition, seasonal abundance, and spatial use patterns documented during surveys are considered typical for birds in this region. The majority of species observed are common and abundant within the region. It is not likely development of the Project will cause substantial impacts to small or large bird populations, including diurnal raptors and species of concern. Based on the data collected, use of the Project by eagles is consistent with geographical use in this region. Bald eagles were recorded only in winter and spring, suggesting primarily winter and migratory use by non-breeding eagles. Seasonal patterns of activity found during surveys suggest that the Project may receive increased use by golden eagles during the migration periods and winter, with the potential for year-round use.

PARTICIPANTS

Chad LeBeau	Senior Project Manager, Senior Reviewer
Kristen Chodachek	Project Manager, Reviewer
Mandy Kauffman	Lead Client Analyst
Diem Pham	Analyst
Kimberly Bailey	Report Reviewer
Katie Wynne	Technical Editor
Kristen Klaphake	GIS Technician
Michelle Chouinard	QAQC Technician
Carmen Boyd	Project Tracking and Data Manager

REPORT REFERENCE

LeBeau, C., K. Chodachek, and K. Bailey. 2020. Avian Use Survey for the Proposed Bowman Wind Project, Bowman County, North Dakota. Final Report: August 7, 2017 – July 22, 2018. Prepared for Bowman Wind, LLC. Charlottesville, Virginia. Prepared by Western EcoSystems Technology, Inc. (WEST), Laramie, Wyoming. June 25, 2020.

TABLE OF CONTENTS

EXECUTIVE SUMMARY	i
INTRODUCTION	1
PROJECT AREA	1
METHODS	4
Survey Design.....	4
Survey Methods	6
All Birds.....	6
Eagles	6
Data Management.....	7
Quality Assurance and Quality Control	7
Data Compilation and Storage.....	7
Statistical Analysis	7
Mean Use, Percent of Use, and Frequency of Occurrence	7
Flight Height.....	8
Spatial Use.....	8
Eagles	8
RESULTS	8
Species of Concern.....	9
Eagles	10
Mean Use.....	10
Activity Minutes	10
Spatial Use.....	15
Large Birds.....	17
Mean Use, Percent of Use, and Frequency of Occurrence	17
Flight Height.....	17
Spatial Use.....	18
Small Bird Use	20
Mean Use, Percent of Use, and Frequency of Occurrence	20
Spatial Use.....	20
DISCUSSION.....	22
Species of Concern.....	22
Eagles	23
Large Birds.....	23
Small Birds.....	24

REFERENCES	25
------------------	----

LIST OF TABLES

Table 1. Land cover types, area, and percent (%) composition within the proposed Bowman Wind Project, Bowman County, North Dakota, based on National Land Cover Database.....	4
Table 2. Summary of survey effort by number (#) of visits, surveys, and hours at the proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018.	9
Table 3. Species of concern by number (#) of groups (grps) and individual observations (obs) observed during the 70-minute avian use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018.....	9
Table 4. Summary of bald eagle activity minutes and observations within 800 meters of the observer recorded during the 60-minute avian use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018.....	10
Table 5. Summary of golden eagle activity minutes and observations within 800 meters of the observer recorded during the 60-minute avian use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018.	12
Table 6. Estimated flight height (meters [m]) characteristics (based on first activity and first flight height) by number (#) of groups (grps) and individual observations (obs) by large bird type and raptor subtype observed during the 20-minute large bird use surveys ² at the proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018.	18

LIST OF FIGURES

Figure 1. Location of the proposed Bowman Wind Project, Bowman County, North Dakota.....	2
Figure 2. Land cover types and coverage at the proposed Bowman Wind Project, Bowman County, North Dakota (Yang et al. 2018, Multi-Resolution Land Characteristics 2019).	3
Figure 3. Avian use survey points and plots at the proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018.	5
Figure 4. Estimated bald eagle risk (flying within 800 meters [2,625 feet] and below 200 meters [656 feet]) minutes per survey hour at the proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018.....	13
Figure 5. Estimated golden eagle risk (flying within 800 meters [2,625 feet] and below 200 meters [656 feet]) minutes per survey hour at the proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018.....	14

Figure 6. Estimated bald and golden eagle flight paths at the proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018.....	16
Figure 7. Large bird mean use (number of large birds/800-meter [2,625-foot] plot/20-minute survey) by point and bird type at the proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018.	19
Figure 8. Small bird mean use (number of small birds/100-meter [328-foot] plot/10-minute survey) by season and bird type at the proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018.	21
Figure 9. Small bird mean use (number of passerines/100-meter [328-foot] plot/10-minute survey) by point and bird type at the proposed Bowman Wind Project, Bowman County, North Dakota from December 13, 2018 – November 5, 2019.	22

LIST OF APPENDICES

Appendix A. Summary of Bird Species Observed during Fixed-Point Avian Use Surveys at the Proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018	
Appendix B. Mean Use, Percent of Use, and Frequency of Occurrence for Large Birds and Small Birds Observed during Fixed-Point Avian Use Surveys at the Proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018	
Appendix C. Overall Mean Use by Point for All Birds and Bird Types Observed during Fixed-Point Avian Use Surveys at the Proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018	

• INTRODUCTION

Bowman Wind, LLC (Bowman Wind) is proposing the development of the Bowman Wind Project (Project) located in Bowman County, North Dakota (Figure 1). To support the development of the Project, Bowman Wind contracted Western EcoSystems Technology, Inc. (WEST) to analyze data from a pre-construction avian use surveys completed by SWCA Environmental Consultants (SWCA) within the Project. The objective of surveys was to evaluate species composition and seasonal and spatial use of the Project by birds, with a particular focus on eagles and species of concern (defined as species afforded protection under the Endangered Species Act, Bald and Golden Eagle Protection Act, defined as Level I Species of Conservation Priority by the state of North Dakota [Dyke et al. 2015] or birds of particular concern identified by the USFWS Information for Planning and Consultation [IPaC] for Bowman County [USFWS 2020]).

• PROJECT AREA

The proposed Project encompasses 58,818 acres (ac; 23,803 hectares [ha]) in the Missouri Plateau Level IV Ecoregion within the Northwestern Great Plains Level III Ecoregion of North Dakota (US Environmental Protection Agency 2017). The Missouri Plateau ecoregion was largely unaffected by glaciation, retaining its original soils and complex stream drainage patterns which now support a mosaic of spring wheat (*Triticum* spp.), alfalfa (*Medicago sativa*), and grazing lands. The Project is approximately 10 miles east of the Little Missouri River (Figure 1). Elevations within the Project range from approximately 896 meters (m; 2,940 feet [ft]) to 1,050 m (3,445 ft; US Geological Survey [USGS] 2019).

According to the National Land Cover Database (Yang et al. 2018, Multi-Resolution Land Characteristics 2019), the dominant land cover type in the Project is shrub/scrub (43.9%), followed by herbaceous/grassland (32.0%), and cultivated crops (19.7%; Figure 2, Table 1). The remaining land covers account for less than 5% of the Project, individually (Figure 2, Table 1).

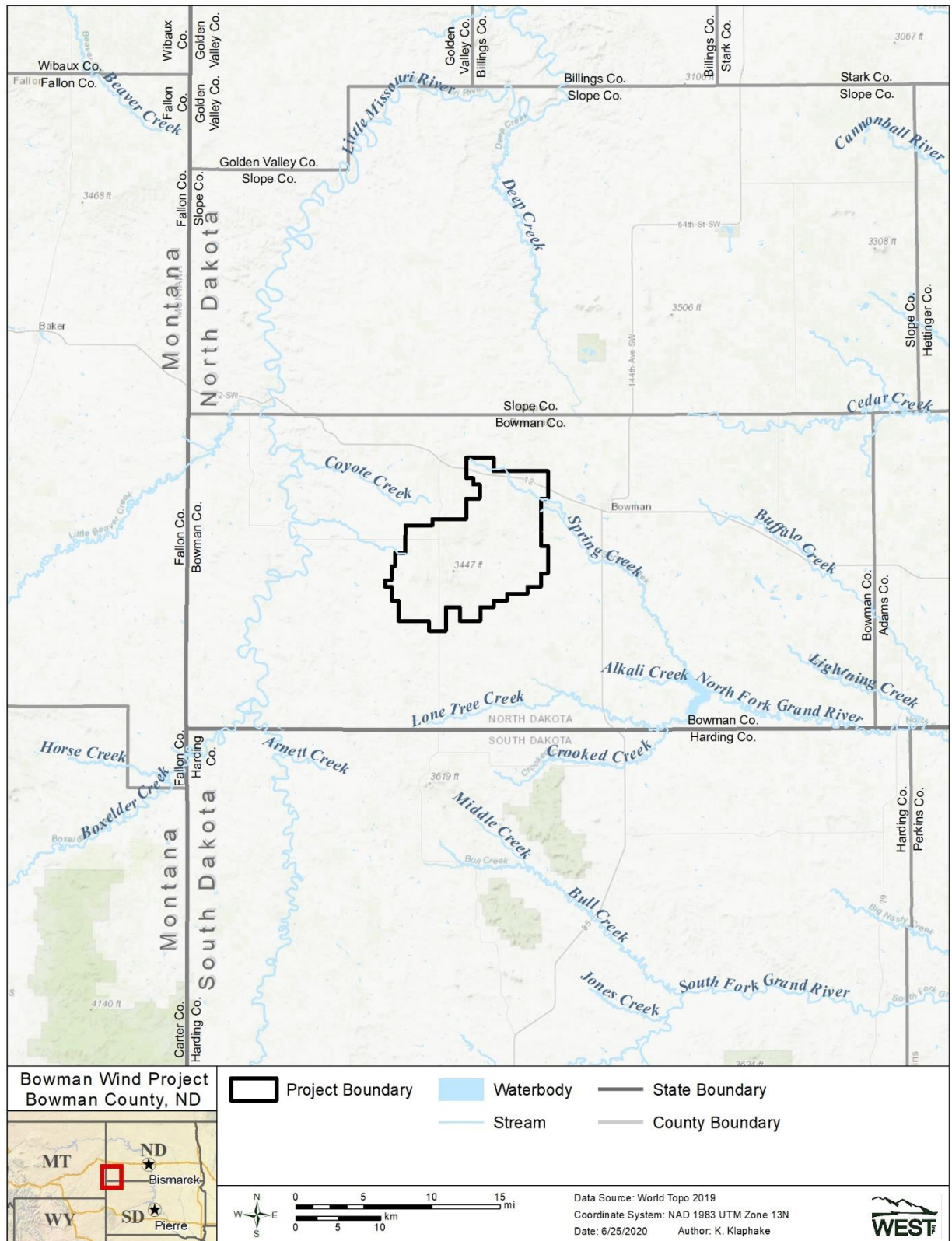


Figure 1. Location of the proposed Bowman Wind Project, Bowman County, North Dakota.

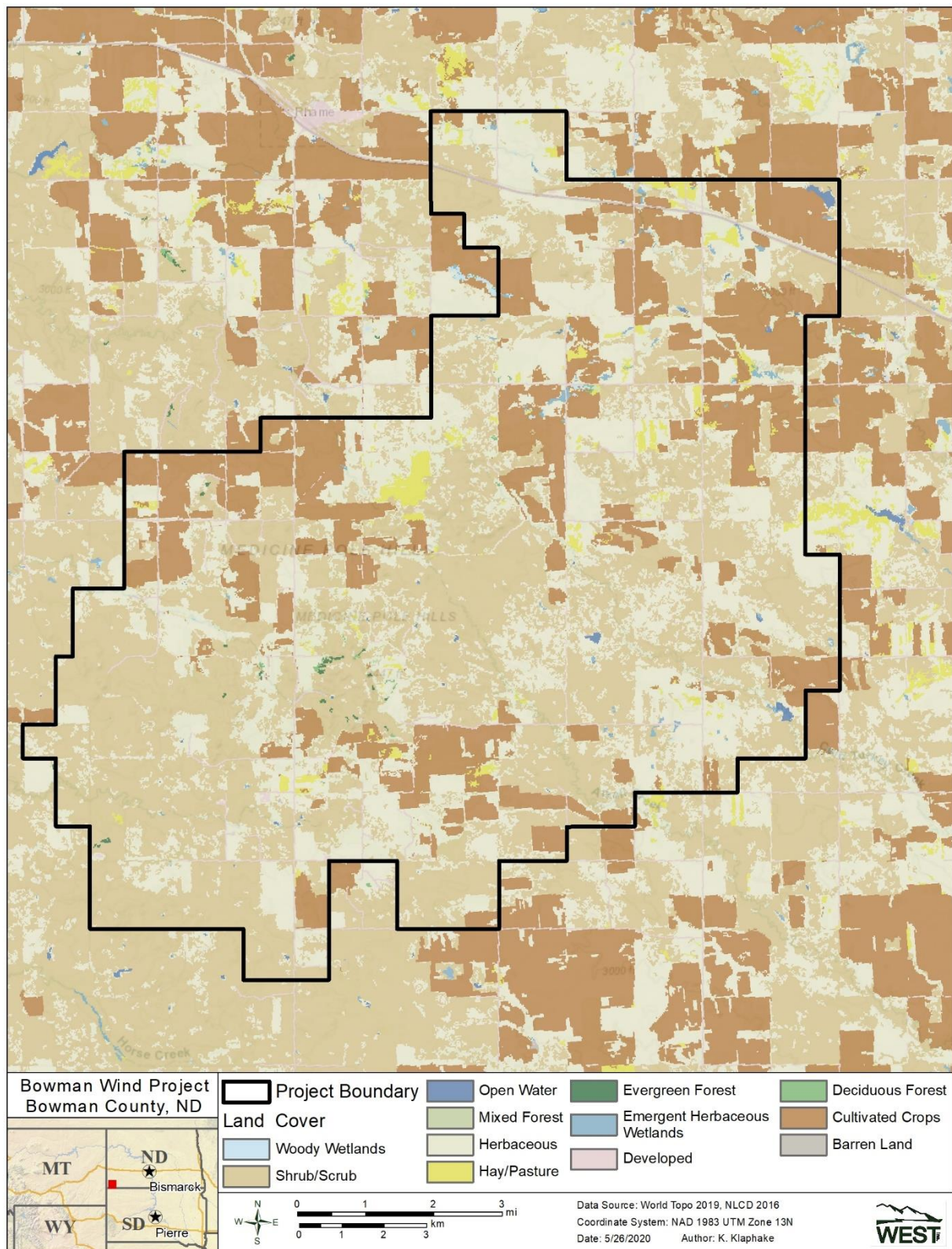


Figure 2. Land cover types and coverage at the proposed Bowman Wind Project, Bowman County, North Dakota (Yang et al. 2018, Multi-Resolution Land Characteristics 2019).

Table 1. Land cover types, area, and percent (%) composition within the proposed Bowman Wind Project, Bowman County, North Dakota, based on National Land Cover Database.

Land Cover Type	Area (acres)	Area (hectares)	% Composition
Shrub/Scrub	25,835	10,455	43.9
Herbaceous	18,817	7,615	32.0
Cultivated Crops	11,586	4,689	19.7
Developed	1,204	487	2.0
Hay/Pasture	977	396	1.7
Emergent Herbaceous Wetlands	164	66	0.3
Open Water	106	43	0.2
Woody Wetlands	45	18	0.1
Evergreen Forest	45	18	0.1
Deciduous Forest	30	12	0.1
Mixed Forest	7	3	<0.1
Barren Land	2	1	<0.1
Total¹	58,818	23,803	100

Sources: Yang et al. 2018, Multi-Resolution Land Characteristics 2019

¹ Sums of values may not add precisely to total value shown, due to rounding.

• METHODS

SWCA completed avian use surveys over a one-year period for the proposed Bowman Wind Project (Project) located in Bowman County, North Dakota. Survey methods were developed to be in accordance with recommendations outlined in the US Fish and Wildlife Service (USFWS) 2012 *Final Land-Based Wind Energy Guidelines*, Appendix C(1)(a) of the USFWS 2013 *Eagle Conservation Plan Guidelines* (ECPG), USFWS 2016 *Revisions to Regulations for Eagle Incidental Take and Take of Eagle Nests* (Final Eagle Rule) and recommendations from USFWS and the North Dakota Game and Fish Department. Methods described below, therefore, are common for all birds (i.e., large and small birds, eagles, and other species of concern) except as noted.

SWCA defined large birds as those of waterfowl size or larger and included waterfowl, herons, pelicans, diurnal raptors (i.e., accipiters, buteos, northern harrier, eagles, falcons, and other raptors), owls, and vultures. Small birds were defined as passerines.

• Survey Design

SWCA established 29 survey points throughout the Project using a spatially balanced sampling design (Figure 3). This sampling methodology captured the variability in habitat and vegetation conditions, topographic features, and potential turbine numbers and densities representing different components of the landscape within the Project. Each point was centered on a circular survey plot with an 800 m (2,625 ft) radius for large birds (including eagles) and 100 m (328 ft) radius for small birds (Reynolds et al. 1980, USFWS 2013, USFWS 2016).

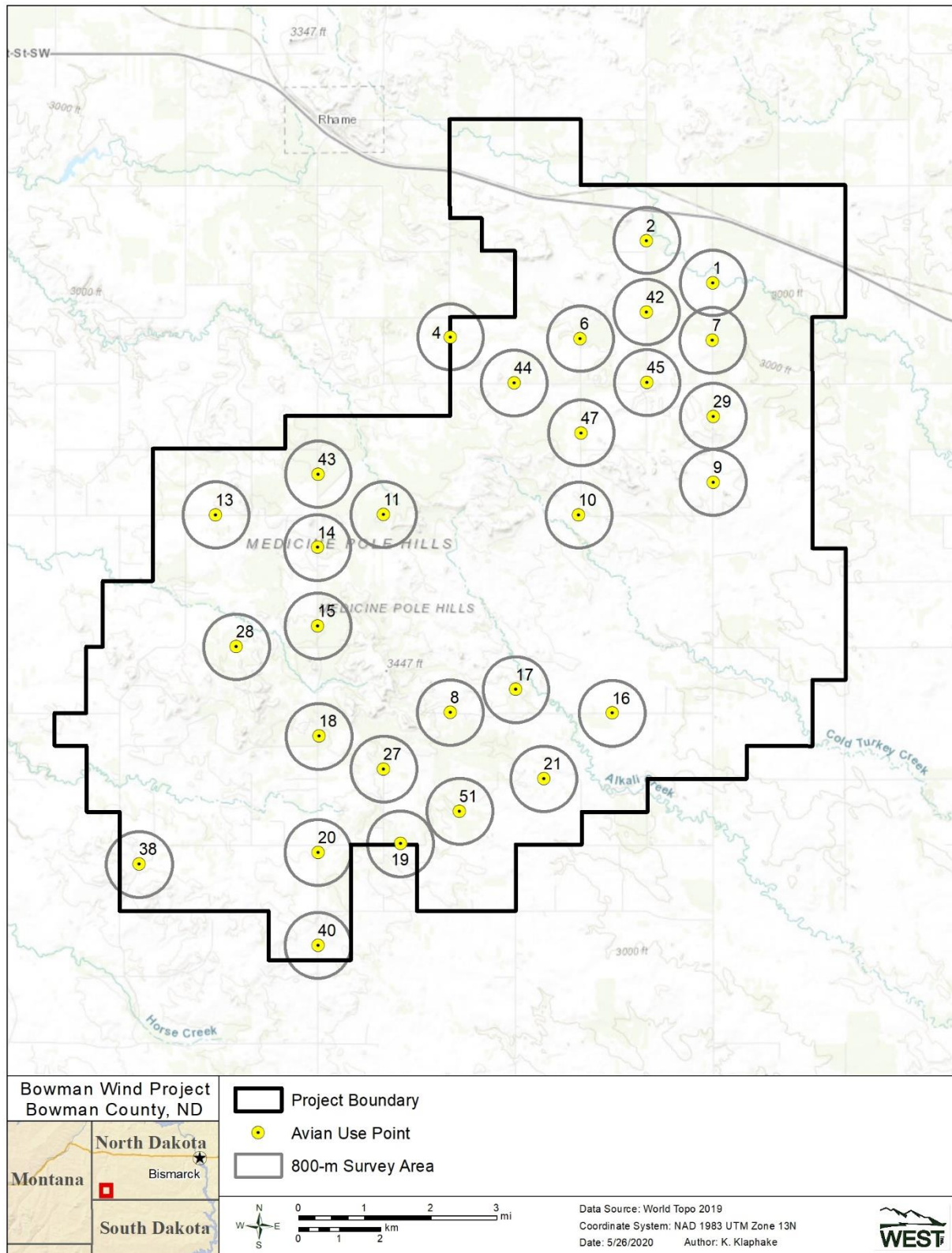


Figure 3. Avian use survey points and plots at the proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018.

SWCA conducted surveys once a month from August 7, 2017 to July 22, 2018. Seasons were defined as summer (June 1 – August 31), fall (September 1 – November 15), winter (November 16 – February 28), and spring (March 1 – May 31). Surveys were conducted to provide survey coverage across all daylight hours for each survey plot and the survey schedule was designed for spatial separation of survey plots to increase the likelihood of the independence of any observations.

- **Survey Methods**

- *All Birds*

Surveys at each point were conducted for a period of 70 minutes (min), with only small birds recorded during the first 10 min of the survey period out to a 100-m (328-ft) radius, followed by 60-min counts recording large birds (including eagles) out to an 800-m (2,625-ft) radius. The 60-min count was further divided into 20-min surveys of large birds (including eagles) and the remaining 40-min surveys for eagles only. The 20-min portion of the survey allowed for standardization and comparison of data with other wind energy facilities throughout the region, while the 60-min eagle counts allowed for more robust evaluation of bald eagle (*Haliaeetus leucocephalus*) and golden eagle (*Aquila chrysaetos*) use of the Project in accordance with the ECPG and 2016 Final Eagle Rule.

At each survey point, the date, start and end time of the survey period, and weather information (i.e., temperature, wind speed, wind direction, precipitation, and percent cloud cover) were recorded by SWCA. Additionally, SWCA recorded the following data for each individual or group of birds observed:

- Observation number
 - Species (or best possible identification)
 - Number of individuals
 - Sex and age class (if identifiable)
 - Estimated distance from observer
 - Estimated flight height above ground level (AGL) was recorded using the following ranges: 0-30 m (0-98 ft), 31-200 m (102-656 ft), and greater than 200 m (greater than 656 ft)
 - Flight direction (first observed) for large birds only
 - Habitat
 - Activity (e.g., flying, perched)
 - Observation type (visual or aural)
 - Estimated flight path of eagles
- *Eagles*

As stated above, 60-min eagle counts allow for more robust evaluation of bald and golden use of the site in accordance with the ECPG (USFWS 2013). SWCA surveyors recorded the following

metrics to characterize eagle use within the Project: age class (juvenile [first year], immature or sub-adult [second to fourth year], adult [at least fifth year]), eagle minutes, eagle risk minutes, and total minutes. Eagle minutes were defined as the number of minutes an eagle was observed flying within the identified flight height ranges either within or outside of the survey plot. Eagle risk minutes were defined as the number of minutes an eagle was estimated to be flying within the risk cylinder (area within 800 m of the observer and below 200 m AGL during the 60-min survey period). Total minutes were defined as the amount of time eagles were observed inside and outside the risk cylinder.

- **Data Management**

- *Quality Assurance and Quality Control*

WEST implemented quality assurance and quality control (QA/QC) measures during data entry, analysis, and report writing. Multiple reviews of the data were conducted as QA/QC measures.

- *Data Compilation and Storage*

A Microsoft® SQL database was utilized to store, organize, and retrieve survey data. Project data were keyed into the electronic database using a pre-defined format to facilitate subsequent QA/QC and data analysis.

- **Statistical Analysis**

A *visit* was defined as the required length of time, in days, to survey all of the plots once within the Project and could occur across multiple dates, but had to be completed in a single season (e.g., spring). If conditions prevented all plots from being surveyed during a visit, then a visit might not have constituted a complete survey of all plots. A *survey* was defined as a single 60 min, 20 min, or 10 min count of birds. In some cases, a count of bird observations may represent repeated observations of the same individual. Only observations within the 800-m or 100-m survey plot were included in data analysis.

- *Mean Use, Percent of Use, and Frequency of Occurrence*

Mean use was the average number of birds observed per plot per survey for large birds (including eagles) or small birds. Large bird (per 800-m plot per 20-min survey), eagle use (per 800-m plot per 60-min survey) and small bird use (per 100-m plot per 10-min survey) were calculated by 1) summing birds per plot per visit, 2) averaging number of birds over plots within a visit, and 3) averaging number of birds across visits within a season. Overall mean use was calculated as a weighted average of seasonal values by the number of days in each season. *Percent of use* was calculated as the percentage of large birds (including eagles) or small bird use that was attributable to a particular bird type or species. *Frequency of occurrence* was calculated as the percent of surveys in which a particular bird type or species was observed.

Mean use and frequency of occurrence describe different aspects of relative abundance, in that mean use is based on the number of birds (i.e., large groups can produce high estimates), whereas frequency of occurrence is based on the number of groups (i.e., it is not influenced by group size). Qualitative comparisons were made with these metrics among bird types, seasons,

and survey points to assist in understanding how birds are using the Project both temporally and spatially.

- *Flight Height*

Bird flight heights are important metrics to assess relative potential exposure to turbine blades and were used to calculate the percentage of eagles, large birds, and small birds observed flying within the rotor-swept height (RSH) of proposed turbines. A RSH of 25-200 m AGL was assumed for the purpose of the analysis. The mid-point of each flight height range was used to calculate the percentage of birds flying within the RSH and mean flight height.

- *Spatial Use*

Mean use was calculated by survey point for eagles, large birds, and small birds to make spatial comparisons among the survey points. Additionally, flight paths of eagles were mapped during large bird use surveys to qualitatively show flight path location compared to Project characteristics (e.g., topographic features) to identify if there were areas of concentration or consistent flight patterns within the Project.

- *Eagles*

Eagles observed during surveys were summarized to provide estimated flight heights (see *Flight Height*) and flight path maps (see *Spatial Use*). Data collected during each minute eagles were observed, were examined to count eagle risk minutes and total minutes. Eagle risk minutes per observation hour were reported by survey plot and month to enable spatial and temporal assessments of eagle risk minutes recorded in the Project. Data collected on perched eagles and those outside of survey plots were not considered eagle risk minutes; however, they were considered in the total eagle minutes. The flight paths of all eagles were mapped to qualitatively assess areas of eagle use within the Project.

- **RESULTS**

Overall, 333 eagle, large bird, and small bird surveys were completed resulting in approximately 333.0 hours of 60-min ECPG-level eagle use surveys, 111.0 hours of 20 min large bird surveys, and 55.5 hours of 10-min small bird surveys (Table 2). Thirteen species of large birds (including bald and golden eagles) and 29 species of small birds totaling 42 species of birds were observed or heard during the one-year of surveys (Appendices A1, A2, and A3). Survey results are summarized below, supplemented by the appendices, which present species-level detail on the following: scientific names and numbers of groups and observations seen during surveys (Appendices A1, A2, and A3), avian use, percent of use, and frequency of occurrence by season (Appendices B1, B2, and B3), and mean use by survey point (Appendices C1, C2, and C3).

Table 2. Summary of survey effort by number (#) of visits, surveys, and hours at the proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018.

Season ¹	Eagles			Large Birds			Small Birds		
	# Visits ²	# Surveys ³	Hours	# Visits ²	# Surveys ³	Hours	# Visits ²	# Surveys ³	Hours
Summer	3	86	86	3	86	28.7	3	86	14.3
Fall	3	83	83	3	83	27.7	3	84	14.0
Winter	3	85	85	3	85	28.3	3	85	14.2
Spring	3	79	79	3	79	26.3	3	78	13.0
Overall	12	333	333.0	12	333	111.0	12	333	55.5

¹ Season dates Summer (June 1 – August 31), Fall (September 1 – November 15), and Winter (November 16 – February 28), and Spring (March 1 – May 31).

² A visit was defined as surveying all of the survey plots once within the Project and could occur across multiple dates, but had to be completed in a single season.

³ A survey was defined as a single 60-minute, 20-minute, or 10-minute count of birds.

• Species of Concern

No federally-listed threatened or endangered species were observed during the surveys. Bald eagles (15 observations) and golden eagles (72 observations), both protected under BGEPA were observed during surveys (Table 3; Appendix A1). Four birds of particular concern and Level I Species of Conservation Priority (SCP; ferruginous hawk, Swainson's hawk, chestnut-collared longspur, and lark bunting) and one bird of particular concern (Brewer's sparrow) were recorded during surveys (Table 3; Appendices A2 and A3). Ferruginous hawk, Brewer's sparrow, and lark bunting were only recorded during summer, chestnut-colored longspur was observed in the spring and fall, and Swainson's hawk were observed in summer, fall, and spring (Table 3; Appendices A2 and A3).

Table 3. Species of concern by number (#) of groups (grps) and individual observations (obs) observed during the 70-minute avian use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018.

Species	Scientific Name	Status ^a	# of grps	# of obs
Large Birds				
bald eagle	<i>Haliaeetus leucocephalus</i>	BGEPA; IPaC	15	15
ferruginous hawk	<i>Buteo regalis</i>	LEVEL 1 SCP; IPaC	2	2
golden eagle	<i>Aquila chrysaetos</i>	BGEPA; IPaC	72	72
Swainson's hawk	<i>Buteo swainsoni</i>	LEVEL 1 SCP	20	26
Small Bird				
Brewer's sparrow	<i>Spizella breweri</i>	IPaC	7	26
chestnut-collared longspur	<i>Calcarius ornatus</i>	LEVEL 1 SCP; IPaC	15	53
lark bunting	<i>Calamospiza melanocorys</i>	LEVEL 1 SCP; IPaC	9	21
Total	7 species			

^a BGEPA = Bald and Golden Eagle Protection Act (1940); IPaC = bird of particular concern identified in the US Fish and Wildlife Service Information for Planning and Consultation report (2020); Level I SCP = Level I North Dakota Species of Conservation Priority (Dyke et al. 2015).

- *Eagles*
- Mean Use

Bald eagles were recorded during winter and spring, with consistent mean use between seasons (0.09 observations/800-m plot/60 min survey and 0.09, respectively; Appendix B1). Overall bald eagle mean use was 0.05 observations/800-m plot/60 min survey.

Golden eagles were recorded in fall, winter, and spring with mean use in spring (0.38), winter (0.33) and fall (0.15); no observations were recorded in summer (Appendix B1). Overall golden eagle use was 0.22 observations/800-m plot/60min survey.

- Activity Minutes

Fifteen bald eagle observations resulted in 38 bald eagle risk minutes out of 170 bald eagle minutes during 333 total survey hours (Table 4). Bald eagle risk minutes per survey hour ranged from 0 to 0.90 across months, with an overall value of 0.11 for the entire survey period (Table 4). Bald eagle risk minutes per survey hour were recorded at points 20 (0.25 minutes/800 m plot/60 min survey), 14 (0.42), 45 (0.58), 9 (0.92), and 1 (1.00; Figure 4). The northeastern corner of the Project where survey points occurred had a relatively slightly higher distribution of bald eagle risk minutes per survey hour (Figure 4).

Table 4. Summary of bald eagle activity minutes and observations within 800 meters of the observer recorded during the 60-minute avian use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018.

Month/Year	Bald Eagle Observations		Bald Eagle Minutes		Survey Hours	Bald Eagle Risk Minutes/Survey Hour
	Within Estimated Risk Cylinder ^a	Total ^b	Within Estimated Risk Cylinder ^a	Total ^b		
August 2017	0	0	0	0	28	0
September 2017	0	0	0	0	28	0
October 2017	0	0	0	0	34	0
November 2017	0	0	0	0	34	0
December 2017	0	0	0	0	15	0
January 2018	0	1	0	60	28	0
February 2018	7	7	26	26	29	0.90
March 2018	3	7	12	84	27	0.44
April 2018	0	0	0	0	23	0
May 2018	0	0	0	0	29	0
June 2018	0	0	0	0	29	0
July 2018	0	0	0	0	29	0
Total	10	15	38	170	333	0.11

^a Risk cylinder = area within 800 meters (m; 2,625 feet [ft]) of the observer and below 200 m (656 ft) flight height; minutes within risk cylinder = eagle risk minutes.

^b Total = minutes or observations inside and outside the risk cylinder, but still within 800 m of the survey point.

Seventy-two golden eagle observations resulted in 127 golden eagle risk minutes out of 614 golden eagle minutes during 333 total survey hours (Table 5). Golden eagle risk minutes per survey hour ranged from 0 to 1.78 across months (Table 5). The overall value for the entire survey period was 0.38 golden eagle risk minutes per survey hour (Table 5). Golden eagle risk minutes were recorded at 16 survey points throughout the Project ranging from 0.08 golden eagle risk

minutes per survey hour (point 20) to 1.67 (point 8; Figure 5). Slightly higher levels of golden eagle risk minutes per survey hour were recorded in the southern third of the Project where surveys were conducted (Figure 5).

Table 5. Summary of golden eagle activity minutes and observations within 800 meters of the observer recorded during the 60-minute avian use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018.

Month/Year	Golden Eagle Observations		Golden Eagle Minutes		Survey Hours	Golden Eagle Risk Minutes/Survey Hour
	Within Estimated Risk Cylinder ^a	Total ^b	Within Estimated Risk Cylinder ^a	Total ^b		
August 2017	0	0	0	0	28	0
September 2017	1	2	5	14	28	0.18
October 2017	7	11	26	85	34	0.76
November 2017	0	0	0	0	34	0
December 2017	0	0	0	0	15	0
January 2018	0	0	0	0	28	0
February 2018	16	29	46	221	29	1.59
March 2018	16	26	48	183	27	1.78
April 2018	1	4	2	111	23	0.09
May 2018	0	0	0	0	29	0
June 2018	0	0	0	0	29	0
July 2018	0	0	0	0	29	0
Total	41	72	127	614	333	0.38

^a Risk cylinder = area within 800 meters (m; 2,625 feet [ft]) of the observer and below 200 m (656 ft) flight height; minutes within risk cylinder = eagle risk minutes.

^b Total = minutes or observations inside and outside the risk cylinder, but still within 800 m of the survey point.

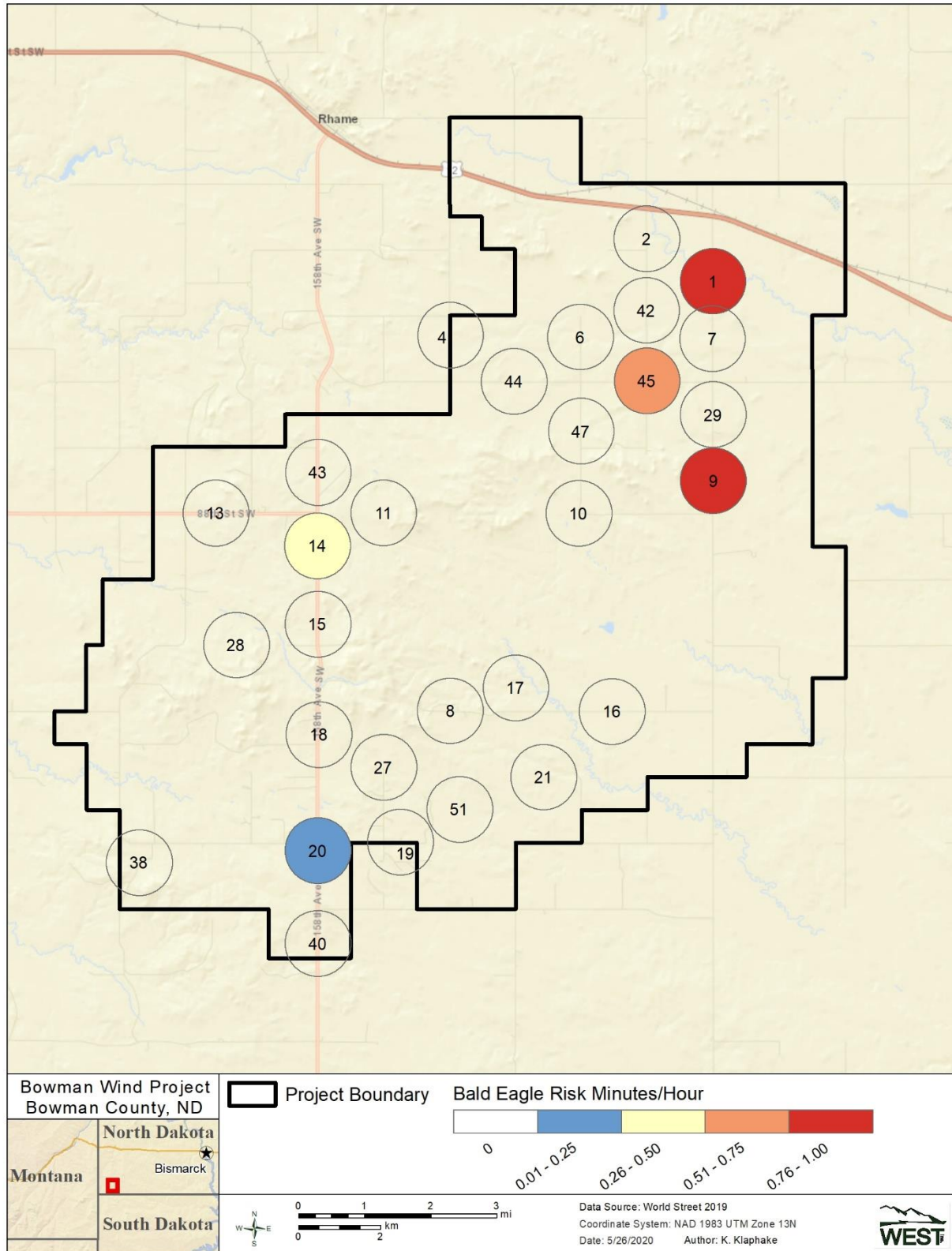


Figure 4. Estimated bald eagle risk (flying within 800 meters [2,625 feet] and below 200 meters [656 feet]) minutes per survey hour at the proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018.

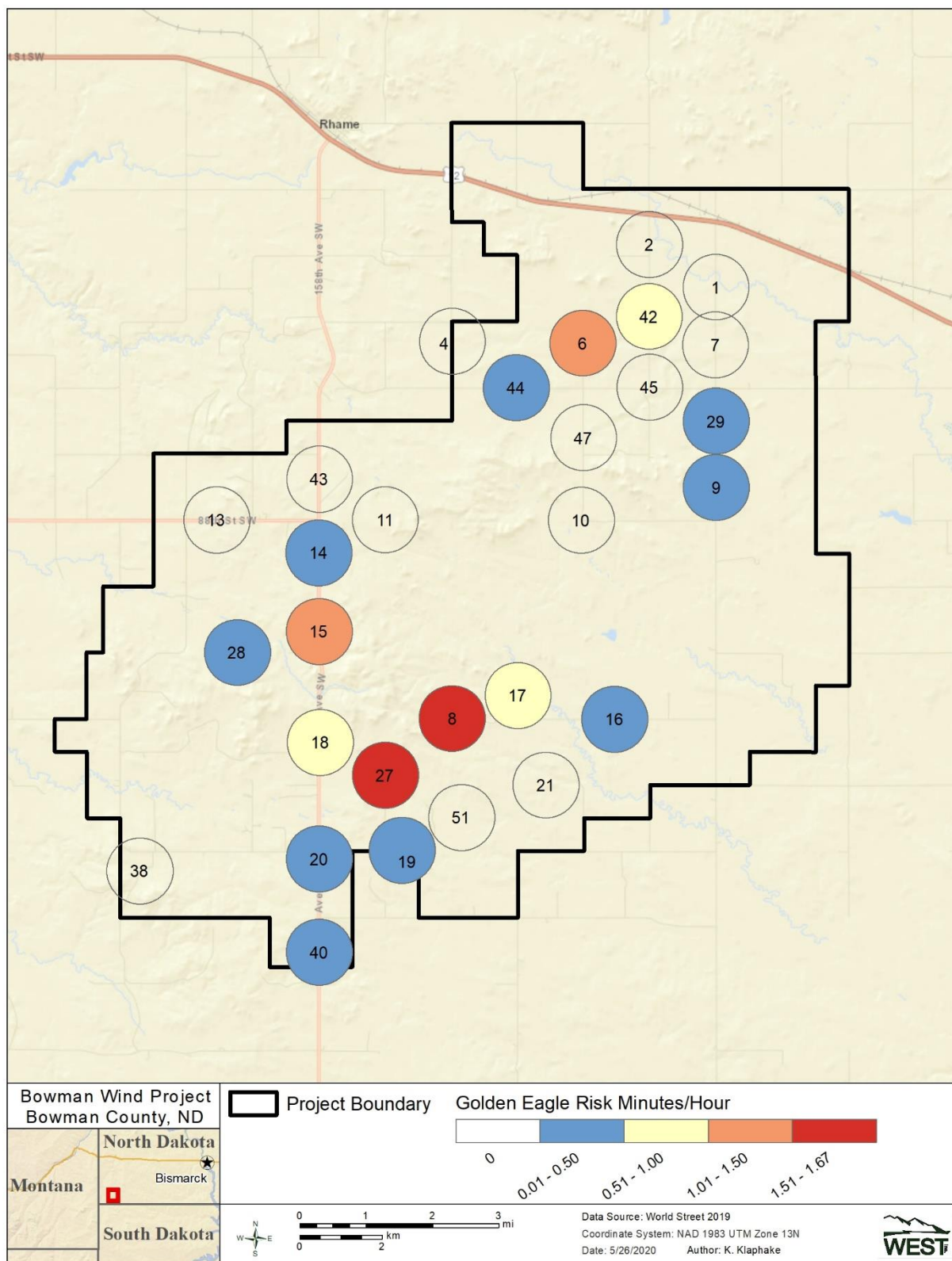


Figure 5. Estimated golden eagle risk (flying within 800 meters [2,625 feet] and below 200 meters [656 feet]) minutes per survey hour at the proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018.

- Spatial Use

Bald eagle observations were recorded at seven of the survey points, with mean use ranging from zero to 0.33 eagles/800-m plot/60-min survey among points (Appendix C1). Bald eagle use was highest at Point 14 (0.33). No clear pattern in bald eagle flight paths was observed (Figure 6).

Golden eagle observations were recorded at 18 of the survey points, with mean use ranging from zero to 1.08 eagles/800-m plot/60-min survey and was highest at Point 8 (1.08; Appendix C1). Golden eagle flight paths were slightly more concentrated in the southern third of the Project where survey points were conducted (Figure 6).

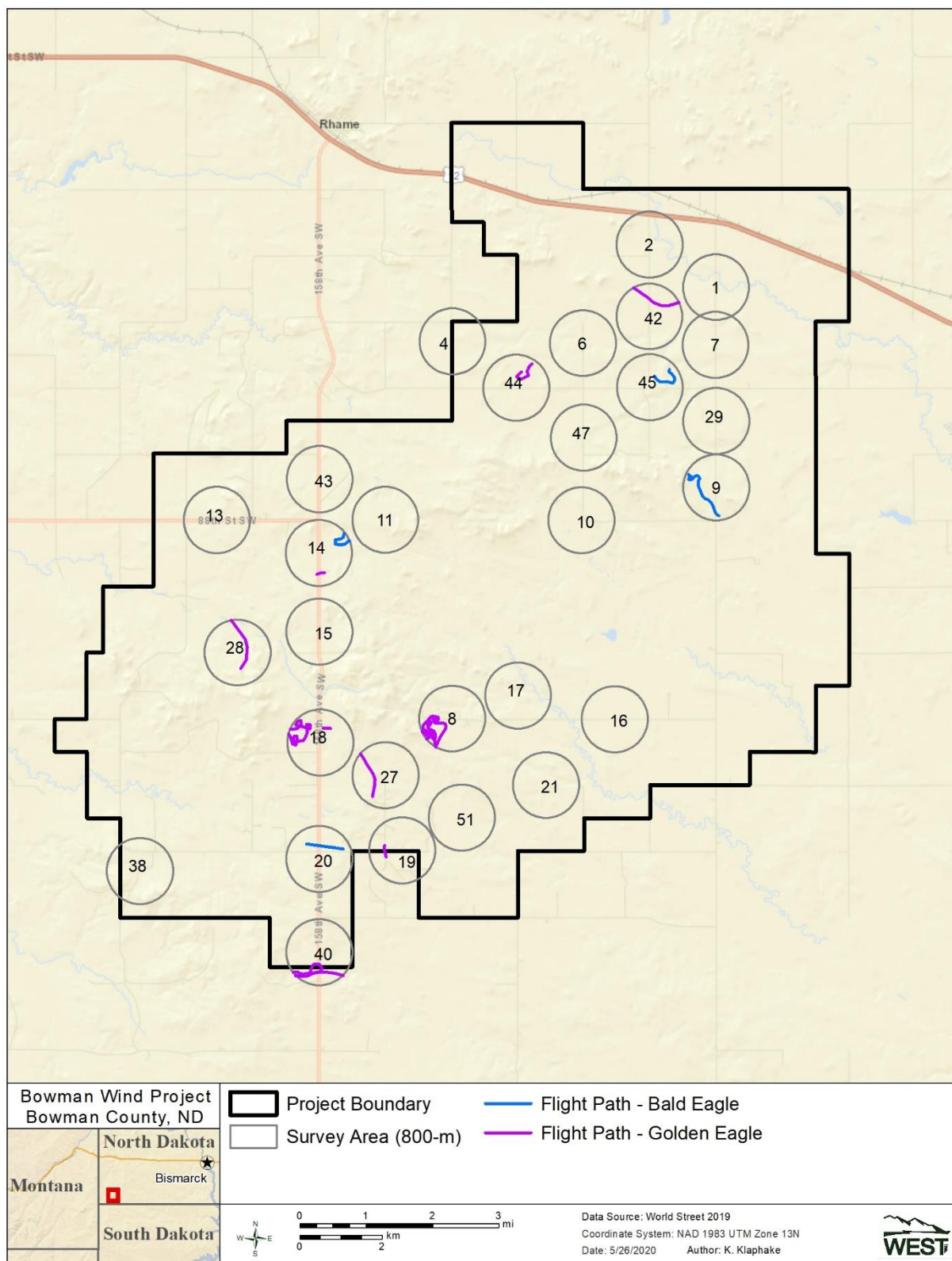


Figure 6. Estimated bald and golden eagle flight paths at the proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018.

- **Large Birds**

During 20 min avian use surveys, there were 660 large bird observations within 132 groups. The most commonly observed large bird was Canada goose (80.0% of large bird observations; Appendix A2). Diurnal raptors made up 18.5% of large bird species recorded. The most common non-eagle raptor species observed were the Swainson's hawk (26 observations) and northern harrier (28).

- *Mean Use, Percent of Use, and Frequency of Occurrence*

Large bird mean use was highest during spring (7.20; observations/800 m plot/20 min survey), followed by fall (0.50), summer (0.30), and winter (0.22; Appendix B2). Diurnal raptors, including eagles, accounted for 96.0% of use in summer, 100% of use in fall and winter, and 6.8% of use in spring (Appendix B2). Waterfowl (93.0% of use), primarily Canada goose (91.7%) accounted for the majority of use in spring (Appendix B2). Large bird frequency of occurrence varied among seasons with diurnal raptors recorded during all seasons, waterfowl and owls only in spring, and vultures on in summer (Appendix B2). For diurnal raptors, Swainson's hawk and northern harrier were the most frequently observed species in summer (7.1%), red-tailed hawk and Swainson's hawk in fall (9.5% and 8.3%, respectively), golden eagle (4.6%) in winter, and northern harrier in spring (11.0%; Appendix B2).

- *Flight Height*

Mean large bird estimated flight heights ranged from 79.4 m (260.5 ft) for raptors to 116.0 m (380.6 ft) for waterfowl and vultures (Table 6). Waterfowl and vultures were recorded flying within the estimated RSH 100% of the time. Diurnal raptors flew with the RSH 45.6% of the time; including prairie falcons flying within the RSH 66.7% (3 observations) of the time; red-tailed hawk flying 64.3% of the time (14 observations); Swainson's hawk flying 52.4% (21 observations); and eagles flying within the RSH 38.9% of flights (Table 6).

Table 6. Estimated flight height (meters [m]) characteristics (based on first activity and first flight height) by number (#) of groups (grps) and individual observations (obs) by large bird type and raptor subtype observed during the 20-minute large bird use surveys² at the proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018.

Bird Type	# Groups Flying	# Obs Flying	Estimated Mean Flight Height (m)	% Obs Flying	% within Estimated Flight Height Categories		
					<25 m	25–200 m ¹	>200 m
Waterfowl	14	536	116.0	100	0	100	0
mallard	3	8	116.0	100	0	100	0
Canada goose	11	528	116.0	100	0	100	0
Diurnal Raptors	84	90	79.4	73.8	43.3	45.6	11.1
<u>Buteos</u>	37	43	107.5	78.2	23.3	58.1	18.6
red-tailed hawk	14	14	79.92	77.8	35.7	64.3	0
rough-legged hawk	6	6	127.5	66.7	16.7	50.0	33.3
ferruginous hawk	2	2	116.0	100	0	100	0
Swainson's hawk	15	21	124.1	80.8	19.0	52.4	28.6
<u>Northern Harrier</u>	24	24	44.5	85.7	70.8	29.2	0
northern harrier	24	24	44.5	85.7	70.8	29.2	0
<u>Eagles</u>	18	18	79.9	52.9	50.0	38.9	11.1
golden eagle	18	18	79.9	58.1	50.0	38.9	11.1
<u>Falcons</u>	5	5	55.0	100	60.0	40.0	0
prairie falcon	3	3	82.3	100	33.3	66.7	0
American kestrel	2	2	15.0	100	100	0	0
Vultures	1	1	116.0	100	0	100	0
turkey vulture	1	1	116.0	100	0	100	0
Large Birds Overall	99	627	85.0	95.0	6.2	92.2	1.6

¹The likely rotor-swept height for potential collision with a turbine blade, or 25 to 200 meters (85 to 656 feet) above ground level

² 800-meter radius plot for large birds

- Spatial Use*

Large birds were observed at 26 of the 29 survey points, with highest use observed at Point 38 with 30.92 birds/800 m plot/20 min survey, followed by Point 13 (9.50), and Point 7 (3.75; Figure 7, Appendix C2). High use at Point 38 was due to high waterfowl use (30.67 waterfowl/800 m plot/20 min survey).

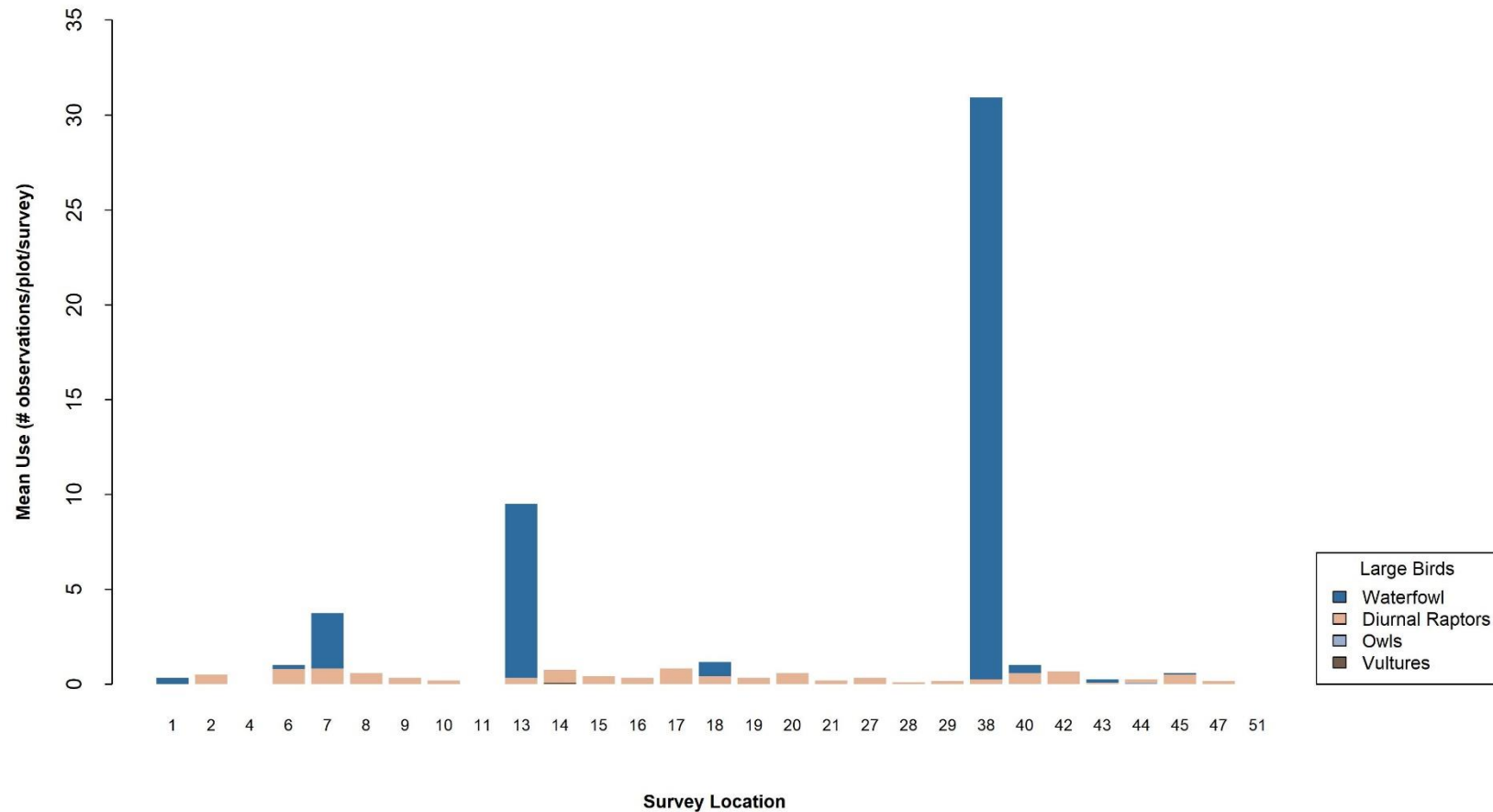


Figure 7. Large bird mean use (number of large birds/800-meter [2,625-foot] plot/20-minute survey) by point and bird type at the proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018.

- **Small Bird Use**

During 10 min avian use surveys, 2,420 small birds were observed in 702 groups over 55.5 hours of surveys (Appendix A3). The most commonly observed small birds were horned lark (39.7% of observations), western meadowlark (15.3%), and Lapland longspur (10.2%; Appendix A3). Together these three species accounted for 65.2% of all small bird observations. The remaining 26 passerine species observations make up 34.8% of total observations (Appendix A3).

- *Mean Use, Percent of Use, and Frequency of Occurrence*

Small bird mean use ranged from 2.97 observations/100-m plot/10 min survey in the winter to 17.29 during spring (Figure 8, Appendix B3). Passerines accounted for 100% of small bird use in each season. Western meadowlark accounted for 19.8% of use in summer and horned lark accounted for the highest use in fall (45.0%), winter (72.0%) and spring (47.8%; Appendix B3).

- *Spatial Use*

Small birds were observed at all points and ranged from 3.09 observations/100-m plot/10 min survey at Point 10 to 17.00 at Point 7 (Figure 9, Appendix C3). High use at Point 7 was largely due to horned larks (14.3 observations/100-m plot/10-min survey).

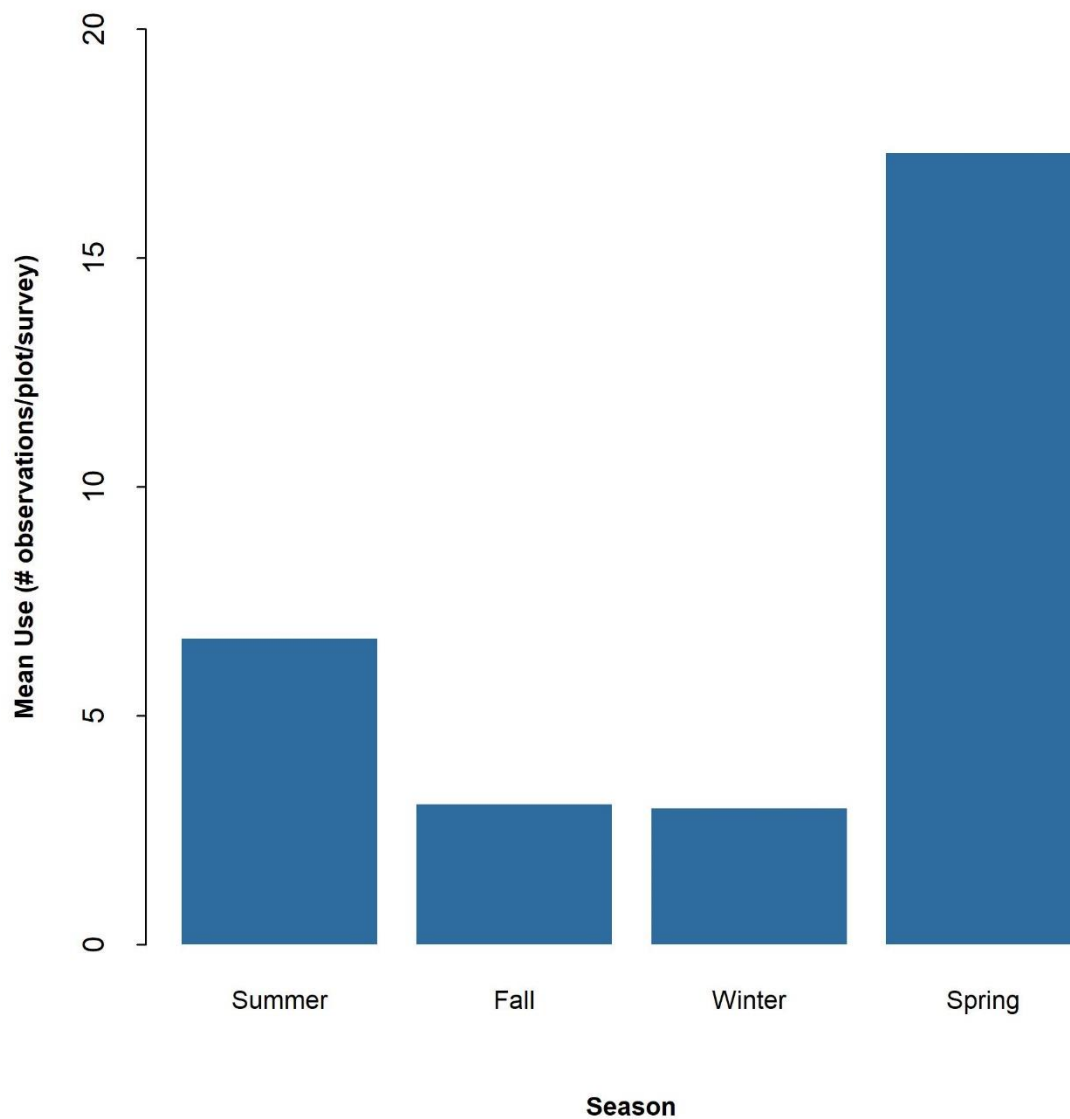


Figure 8. Small bird mean use (number of small birds/100-meter [328-foot] plot/10-minute survey) by season and bird type at the proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018.

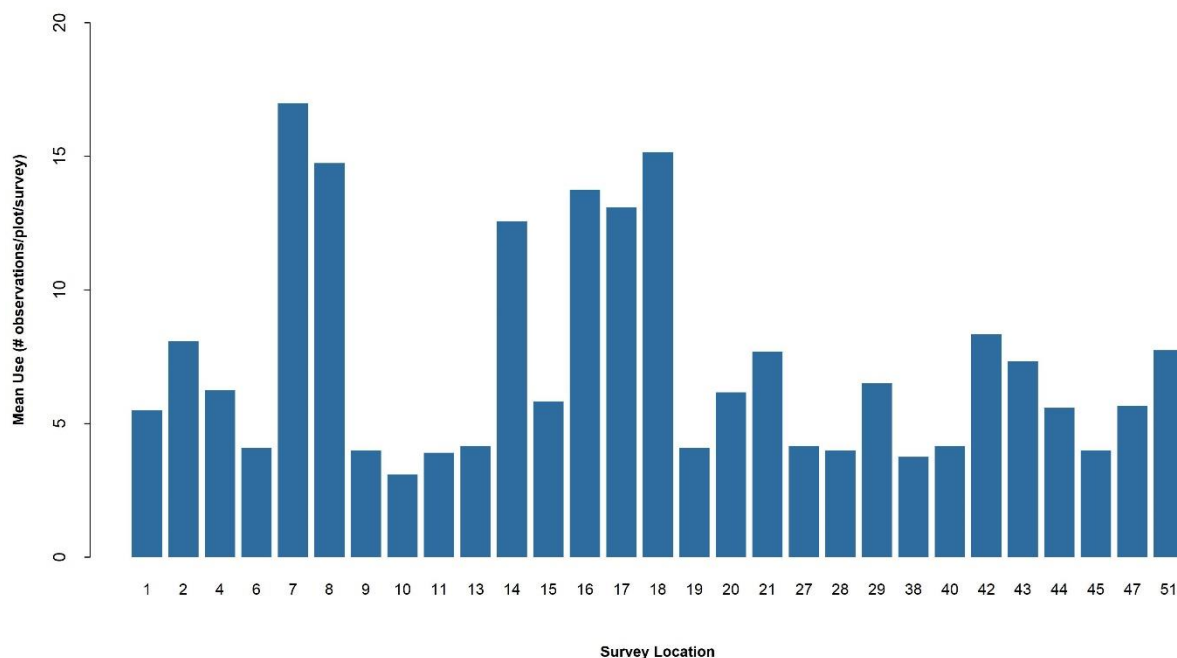


Figure 9. Small bird mean use (number of passerines/100-meter [328-foot] plot/10-minute survey) by point and bird type at the proposed Bowman Wind Project, Bowman County, North Dakota from December 13, 2018 – November 5, 2019.

• DISCUSSION

• Species of Concern

No federally threatened or endangered species were recorded at the Project during surveys. Four raptor species of concern (bald eagle, golden eagle, ferruginous hawk, and Swainson's hawk) and three passerine species of concern (Brewer's sparrow, chestnut-collared longspur, and lark bunting) were recorded during surveys.

Two ferruginous hawks were observed during summer. Southwestern North Dakota is the primary range of the hawk in North Dakota and thought to have some of the highest densities of the species in the state (Dyke et al. 2015). The Project contains preferred habitat (shrub/scrub and grasslands); however, is lacking nesting habitat. Twenty-six Swainson's hawks were observed in all seasons other than winter. Bowman County is considered primary range for the hawk (Dyke et al. 2015) and they are considered common in the state. Swainson's hawk utilize a wide variety of habitats, including those found within the Project. In general, impacts to these raptor species is likely to be low based on the relatively low number of observations and typical flight behavior. Fifty-three chestnut-collared longspurs were observed in summer and fall, suggesting they are potentially nesting in the Project. Chestnut-collared longspurs prefer native prairie habitat and avoid areas of dense shrub. This species of longspur is considered common and are abundant in North Dakota, with Bowman County included within their primary range (Dyke et al. 2015).

Twenty-one lark buntings were observed in summer and spring during surveys. Bowman County is within their primary range in North Dakota and contains some preferred habitat (shorter grasslands mixed with shrubs; Dyke et al. 2015). Brewer's sparrow was only observed in summer when 26 birds were recorded. This sparrow is a sagebrush-obligate (Dyke et al. 2015) with a North Dakota range in only the far southwest portion of the state. Brewer's sparrow is considered uncommon in North Dakota and is experiencing an overall population decline. The project is approximately 44% shrub/scrub and 32% herbaceous with the majority of sagebrush and grasslands located in the central and southwestern portions of the Project. Impacts to chestnut-collared longspurs, lark buntings, and Brewer's sparrows may be minimized by limiting surface disturbance in these areas.

- **Eagles**

Based on data collected during surveys, the Project may receive increased use by bald eagles during the winter and spring migration, suggesting eagles are foraging opportunistically and not breeding in the Project. Bald eagles prefer habitat combining large trees, such as cottonwood trees (*Populus spp.*), and larger bodies of water or rivers, which are lacking in the Project. Furthermore, no occupied bald eagle nests were observed within the Project during raptor nest surveys in 2018 (SWCA 2018). Bald eagle use was not concentrated in a particular portion of the Project; which is reflective of the potential prey base and the lack of major water features in the Project.

Seasonal patterns of activity found during surveys suggest that the Project may receive increased use by golden eagles during the migration periods and winter, with the potential for year-round use. The Project is located in an arid region dominated by shrub/scrub and herbaceous/cultivated grassland as the primary land cover, offering foraging opportunities, but limited nesting habitat. No occupied golden eagle nests were observed within the Project during raptor nest surveys, with the nearest occupied active golden eagle nest 14.3 km (8.9 mi) west of the Project (SWCA 2018). Although nesting habitat is limited within the Project, primary prey resources, including greater sage-grouse (*Centrocercus urophasianus*), sharp-tailed grouse (*Tympanuchus phasianellus*), black-tailed prairie dogs (*Cynomys ludovicianus*), lagomorphs, and livestock (including sheep and cattle) are located adjacent to or within the Project. Golden eagle use was concentrated in the central and southern third of the Project; which is likely attributed to the greater topographic relief of the Medicine Pole hills. Based on the results of this survey, presence of preferred habitat, and availability of prey resources, golden eagle use within the Project is likely to occur year-round which is typical for this region.

- **Large Birds**

During spring, migratory waterfowl was most often observed during large bird surveys, with Canada goose composing the most observations and the cause of high waterfowl use at point 38. While migratory waterfowl are often present in large numbers on the Midwestern landscape, waterfowl fatalities at wind farms are relatively uncommon. In an analysis of 116 studies of bird mortality at over 70 facilities, waterfowl made up 2.7% of 4,975 fatalities found (Erickson et al. 2014). Canada goose is common, geographically abundant, and likely to be unaffected by collision related mortality associated with the Project.

Swainson's hawk and northern harrier were the mostly frequently observed non-eagle raptor species observed within the Project. Both species were observed in relatively small numbers in all seasons except winter. Northern harriers may fly within the RSH during aerial courtship displays that occur at nesting sites during the breeding season, but otherwise, northern harriers are known to hunt, eat, and perch low to the ground (MacWhirter and Bildstein 1996, Smith et al. 2011). Whitfield and Madders (2006) reported up to 97.0% of northern harrier flights were below 20 m (66 ft); therefore, risk of collision with turbine blades is considered low for this species. Swainson's hawk are considered to be common species within the region with stable populations (Dyke et al. 2015; All About Birds 2020). The operation of a wind energy facility within the Project is not likely to incur population-level impacts to these species.

- **Small Birds**

The most commonly observed small birds were horned lark, western meadowlark, and Lapland longspur. These species are typical of this region and are widespread and abundant. Overall, 96.6% of small bird species were recorded below the estimated RSH, suggesting the Project is not likely to cause significant impacts to local small-bird populations. Limiting surface disturbance to previously undisturbed shrub/scrub and herbaceous habitats may minimize impacts to small birds that rely on these habitats for breeding.

• REFERENCES

- All About Birds. 2020. Swainson's Hawk. The Cornell Lab of Ornithology. Available online: https://www.allaboutbirds.org/guide/Swainsons_Hawk/overview
- Bald and Golden Eagle Protection Act (BGEPA). 1940. 16 United States Code (USC) Section (§) 668-668d. Bald Eagle Protection Act of 1940, June 8, 1940, Chapter 278, § 2, 54 Statute (Stat.) 250; Expanded to include the related species of the golden eagle October 24, 1962, Public Law (PL) 87-884, 76 Stat. 1246. [as amended: October 23, 1972, PL 92-535, § 2, 86 Stat. 1065; November 8, 1978, PL 95-616, § 9, 92 Stat. 3114.].
- Dyke, S. R., S. K. Johnson, and P. T. Isakson. 2015. North Dakota State Wildlife Action Plan. North Dakota Game and Fish Department, Bismarck, North Dakota. Available online: <https://gf.nd.gov/wildlife/swap>
- Erickson, W. P., M. M. Wolfe, K. J. Bay, D. H. Johnson, and J. L. Gehring. 2014. A Comprehensive Analysis of Small Passerine Fatalities from Collisions with Turbines at Wind Energy Facilities. PLoS ONE 9(9): e107491. doi: 10.1371/journal.pone.0107491.
- ESRI. 2006. U.S. National Atlas Water Feature Lines. Release 9.2. Scale 1:1,000,000. November 9, 2006. Information online: http://webhelp.esri.com/arcgisdesktop/9.2/index.cfm?id=5669&pid=5665&topicname=United_States_National_Atlas_Water_Feature_Lines
- ESRI. 2013. World Topographic Map. ArcGIS Resource Center. ESRI, producers of ArcGIS software. ESRI, Redlands, California. Last modified January 10, 2019. Information online: <http://www.arcgis.com/home/item.html?id=30e5fe3149c34df1ba922e6f5bbf808f>
- ESRI. 2020. World Street Map. ArcGIS Resource Center. Environmental Systems Research Institute (ESRI), producers of ArcGIS software, Redlands, California. Updated January 13, 2020. Information online: <https://www.arcgis.com/home/item.html?id=3b93337983e9436f8db950e38a8629af>
- MacWhirter, R. B. and K. L. Bildstein. 1996. Northern Harrier (*Circus Cyaneus*). A. Poole and F. Gill, eds. The Birds of North America, No. 210. The Academy of Natural Sciences, Philadelphia, Pennsylvania, and The American Ornithologists' Union, Washington, D. C., 32 pp.
- Multi-Resolution Land Characteristics (MRLC). 2019. National Land Cover Database (NLCD) 2011. Multi-Resolution Land Characteristics (MRLC) Consortium. US Geological Survey (USGS) Earth Resources Observation and Science (EROS) Center, MRLC Project, Sioux Falls, South Dakota. May 10, 2019. Information online: <https://www.mrlc.gov/data>
- North American Datum (NAD). 1983. NAD83 Geodetic Datum.
- North Dakota Game and Fish Department (NDGFD). 2019. Ferruginous Hawk. Fact Sheet. Bismarck, North Dakota. Available online: <https://gf.nd.gov/wildlife/id/raptors/ferruginous-hawk>
- Reynolds, R. T., J. M. Scott, and R. A. Nussbaum. 1980. A Variable Circular-Plot Method for Estimating Bird Numbers. Condor 82(3): 309-313.
- Smith, K. G., S. R. Wittenberg, R. B. Macwhirter, and K. L. Bildstein. 2011. Hen/Northern Harrier (*Circus cyaneus/hudsonius*), Version 2.0. A. F. Poole, ed. In: The Birds of North America. Cornell Lab of Ornithology, Ithaca, New York. Retrieved from The Birds of North America Online: <http://birdsna.org/Species-Account/bna/species/norhar>

- US Environmental Protection Agency (USEPA). 2017. Level III and Level IV Ecoregions of the Continental United States. Ecosystems Research, USEPA. Last updated December 26, 2018. Accessed November 2019. Information and maps online: <https://www.epa.gov/eco-research/level-iii-and-iv-ecoregions-continental-united-states>
- US Fish and Wildlife Service (USFWS). 2012. Land-Based Wind Energy Guidelines. March 23, 2012. 82 pp. Available online: http://www.fws.gov/cno/pdf/Energy/2012_Wind_Energy_Guidelines_final.pdf
- US Fish and Wildlife Service (USFWS). 2013. Eagle Conservation Plan Guidance: Module 1 - Land-Based Wind Energy, Version 2. US Department of the Interior, Fish and Wildlife Service, Division of Migratory Bird Management. April 2013. 103 pp. + frontmatter. Available online: <https://www.fws.gov/migratorybirds/pdf/management/eagleconservationplanguidance.pdf>
- US Fish and Wildlife Service (USFWS). 2020. Initial Project Scoping: IPaC - Information, Planning and Consultation. IPaC, Environmental Conservation Online System (ECOS), USFWS. USFWS Endangered Species Program homepage: <http://www.fws.gov/endangered/>; Environmental Conservation Online System (ECOS): <http://ecos.fws.gov/ecos/indexPublic.do>; IPaC: <http://ecos.fws.gov/ipac/>; IPaC Initial Project Scoping: <http://ecos.fws.gov/ipac/wizard/chooseLocation!prepare.action>
- US Geological Survey (USGS). 2019a. 3d Elevation Program (3dep). 3D elevation data from light detection and ranging (lidar) data: conterminous United States, Hawaii, and the US territories. USGS, Reston, Virginia. Accessed May 2019. Information online: <https://www.usgs.gov/core-science-systems/ngp/3dep>
- US Geological Survey (USGS). 2019b. National Hydrography Dataset (Nhd). USGS NHD Extracts. August 8, 2019. Accessed December 2019. Information online: <https://www.usgs.gov/core-science-systems/ngp/national-hydrography>
- Whitfield, D. P. and M. Madders. 2006. A Review of the Impacts of Wind Farms on Hen Harriers *Circus cyaneus* and an Estimation of Collision Avoidance Rates. Natural Research Information Note 1 (revised). Natural Research Ltd., Banchory, Banchory, Aberdeenshire, United Kingdom.
- Yang, L., S. Jin, P. Danielson, C. Homer, L. Gass, S. M. Bender, A. Case, C. Costello, J. Dewitz, J. Fry, M. Funk, B. Granneman, G. C. Liknes, M. Rigge, and G. Xian. 2018. A New Generation of the United States National Land Cover Database: Requirements, Research Priorities, Design, and Implementation Strategies. ISPRS Journal of Photogrammetry and Remote Sensing 146: 108-123. doi: 10.1016/j.isprsjprs.2018.09.006.

**Appendix A. Summary of Bird Species Observed during Fixed-Point Avian Use Surveys
at the Proposed Bowman Wind Project, Bowman County, North Dakota from
August 7, 2017 – July 22, 2018**

Appendix A1. Summary of number (#) of groups (grps) and individual observations (obs)¹ for eagles observed during the 60-minute fixed-point large bird use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018.

Type/Species	Scientific Name	Summer		Fall		Winter		Spring		Total	
		# grps	# obs	# grps	# obs	# grps	# obs	# grps	# obs	# grps	# obs
<u>Eagles</u>		0	0	13	13	37	37	37	37	87	87
golden eagle	<i>Aquila chrysaetos</i>	0	0	13	13	29	29	30	30	72	72
bald eagle	<i>Haliaeetus leucocephalus</i>	0	0	0	0	8	8	7	7	15	15
Overall		0	0	13	13	37	37	37	37	87	87

¹ within an 800-meter (2,625-foot) radius of the survey point.

Appendix A2. Summary of number (#) of groups (grps) and individual observations (obs)¹ by large bird type, diurnal raptor subtype, and species observed during the 20-minute fixed-point large bird use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018.

Type/Species	Scientific Name	Summer		Fall		Winter		Spring		Total	
		# grps	# obs	# grps	# obs	# grps	# obs	# grps	# obs	# grps	# obs
Waterfowl		0	0	0	0	0	0	14	536	14	536
mallard	<i>Anas platyrhynchos</i>	0	0	0	0	0	0	3	8	3	8
Canada goose	<i>Branta canadensis</i>	0	0	0	0	0	0	11	528	11	528
Diurnal Raptors		23	24	37	42	19	19	37	37	116	122
<u>Buteos</u>		15	16	19	24	4	4	11	11	49	55
red-tailed hawk	<i>Buteo jamaicensis</i>	5	5	9	9	0	0	4	4	18	18
rough-legged hawk	<i>Buteo lagopus</i>	0	0	2	2	4	4	3	3	9	9
ferruginous hawk	<i>Buteo regalis</i>	2	2	0	0	0	0	0	0	2	2
Swainson's hawk	<i>Buteo swainsoni</i>	8	9	8	13	0	0	4	4	20	26
<u>Northern Harrier</u>		6	6	7	7	0	0	15	15	28	28
northern harrier	<i>Circus hudsonius</i>	6	6	7	7	0	0	15	15	28	28
<u>Eagles</u>		0	0	8	8	15	15	11	11	34	34
golden eagle	<i>Aquila chrysaetos</i>	0	0	8	8	14	14	9	9	31	31
bald eagle	<i>Haliaeetus leucocephalus</i>	0	0	0	0	1	1	2	2	3	3
<u>Falcons</u>		2	2	3	3	0	0	0	0	5	5
prairie falcon	<i>Falco mexicanus</i>	0	0	3	3	0	0	0	0	3	3
American kestrel	<i>Falco sparverius</i>	2	2	0	0	0	0	0	0	2	2
Owls		0	0	0	0	0	0	1	1	1	1
snowy owl	<i>Bubo scandiacus</i>	0	0	0	0	0	0	1	1	1	1
Vultures		1	1	0	0	0	0	0	0	1	1
turkey vulture	<i>Cathartes aura</i>	1	1	0	0	0	0	0	0	1	1
Overall		24	25	37	42	19	19	52	574	132	660

¹ within an 800-meter (2,625-foot) radius of the survey point.

Appendix A3. Summary of number (#) of groups (grps) and individual observations (obs)¹ by small bird type, passerine subtype, and species observed during the 10-minute fixed-point small bird use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018.

Type/Species	Scientific Name	Summer		Fall		Winter		Spring		Total	
		# grps	# obs	# grps	# obs	# grps	# obs	# grps	# obs	# grps	# obs
Passerines		303	576	67	258	28	252	304	1,334	702	2,420
<u>Blackbirds/Orioles</u>		152	266	22	63	0	0	142	367	316	696
red-winged blackbird	<i>Agelaius phoeniceus</i>	35	60	0	0	0	0	24	99	59	159
bobolink	<i>Dolichonyx oryzivorus</i>	16	21	0	0	0	0	0	0	16	21
Brewer's blackbird	<i>Euphagus cyanocephalus</i>	4	10	1	17	0	0	10	40	15	67
brown-headed cowbird	<i>Molothrus ater</i>	5	17	0	0	0	0	0	0	5	17
common grackle	<i>Quiscalus quiscula</i>	16	43	0	0	0	0	0	0	16	43
western meadowlark	<i>Sturnella neglecta</i>	75	114	19	32	0	0	105	224	199	370
European starling	<i>Sturnus vulgaris</i>	0	0	2	14	0	0	3	4	5	18
yellow-headed blackbird	<i>Xanthocephalus xanthocephalus</i>	1	1	0	0	0	0	0	0	1	1
<u>Finches/Crossbills</u>		4	8	1	2	0	0	0	0	5	10
American goldfinch	<i>Spinus tristis</i>	4	8	1	2	0	0	0	0	5	10
<u>Flycatchers</u>		22	42	0	0	0	0	1	4	23	46
eastern kingbird	<i>Tyrannus tyrannus</i>	15	29	0	0	0	0	0	0	15	29
western kingbird	<i>Tyrannus verticalis</i>	7	13	0	0	0	0	1	4	8	17
<u>Grassland/Sparrows</u>		87	198	40	188	28	252	151	931	306	1,569
grasshopper sparrow	<i>Ammodramus savannarum</i>	32	42	0	0	0	0	5	23	37	65
lark bunting	<i>Calamospiza melanocorys</i>	8	19	0	0	0	0	1	2	9	21
Lapland longspur	<i>Calcarius lapponicus</i>	0	0	2	30	5	51	18	167	25	248
chestnut-collared longspur	<i>Calcarius ornatus</i>	4	23	11	30	0	0	0	0	15	53
horned lark	<i>Eremophila alpestris</i>	17	38	20	116	21	182	99	624	157	960
dark-eyed junco	<i>Junco hyemalis</i>	0	0	0	0	0	0	1	3	1	3
song sparrow	<i>Melospiza melodia</i>	0	0	0	0	0	0	4	11	4	11
house sparrow	<i>Passer domesticus</i>	0	0	0	0	0	0	5	21	5	21
savannah sparrow	<i>Passerculus sandwichensis</i>	10	17	5	10	0	0	4	20	19	47
snow bunting	<i>Plectrophenax nivalis</i>	0	0	0	0	2	19	4	11	6	30
vesper sparrow	<i>Poocetes gramineus</i>	5	28	1	1	0	0	8	43	14	72
Brewer's sparrow	<i>Spizella breweri</i>	7	26	0	0	0	0	0	0	7	26
clay-colored sparrow	<i>Spizella pallida</i>	4	5	1	1	0	0	2	6	7	12
<u>Swallows</u>		15	24	1	1	0	0	0	0	16	25
barn swallow	<i>Hirundo rustica</i>	12	17	1	1	0	0	0	0	13	18
bank swallow	<i>Riparia riparia</i>	1	2	0	0	0	0	0	0	1	2
tree swallow	<i>Tachycineta bicolor</i>	2	5	0	0	0	0	0	0	2	5
<u>Shrikes</u>		0	0	0	0	0	0	1	1	1	1

Appendix A3. Summary of number (#) of groups (grps) and individual observations (obs)¹ by small bird type, passerine subtype, and species observed during the 10-minute fixed-point small bird use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018.

Type/Species	Scientific Name	Summer		Fall		Winter		Spring		Total	
		# grps	# obs	# grps	# obs	# grps	# obs	# grps	# obs	# grps	# obs
loggerhead shrike	<i>Lanius ludovicianus</i>	0	0	0	0	0	0	1	1	1	1
<u>Thrushes</u>		23	38	3	4	0	0	9	31	35	73
American robin	<i>Turdus migratorius</i>	23	38	3	4	0	0	9	31	35	73
Overall		303	576	67	258	28	252	304	1,334	702	2,420

¹ within a 100-meter (328-foot) radius of the survey point.

**Appendix B. Mean Use, Percent of Use, and Frequency of Occurrence for Large Birds
and Small Birds Observed during Fixed-Point Avian Use Surveys at the Proposed
Bowman Wind Project, Bowman County, North Dakota from
August 7, 2017 – July 22, 2018**

Appendix B1. Mean eagle use¹, percent of total use (%), and frequency of occurrence (%) for each large bird type and species by season during the 60-minute fixed-point large bird use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018.

Type/Species	Mean Use				% of Use				% Frequency			
	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring
<i>Eagles</i>	0	0.15	0.43	0.47	0	100	100	100	0	10.7	11.5	16.5
golden eagle	0	0.15	0.33	0.38	0	100	78.3	81.4	0	10.7	9.2	11.5
bald eagle	0	0	0.09	0.09	0	0	21.7	18.6	0	0	4.6	4.9
Overall	0	0.15	0.43	0.47	0	100	100	100				

¹ Number of eagles/800-meter (2,625-foot) plot/60-minute survey.

Appendix B2. Mean large birds use¹, percent of total use (%), and frequency of occurrence (%) for each large bird type, diurnal raptor subtype, and species by season during the 20-minute fixed-point large bird use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018.

Type/Species	Mean Use				% of Use				% Frequency			
	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring
Waterfowl	0	0	0	6.70	0	0	0	93.0	0	0	0	11.6
mallard	0	0	0	0.10	0	0	0	1.4	0	0	0	3.7
Canada goose	0	0	0	6.60	0	0	0	91.7	0	0	0	9.3
Diurnal Raptors	0.28	0.50	0.22	0.49	96.0	100	100	6.8	18.8	34.6	9.3	28.8
<u>Buteos</u>	<i>0.19</i>	<i>0.29</i>	<i>0.05</i>	<i>0.14</i>	<i>63.9</i>	<i>57.2</i>	<i>21.3</i>	<i>2.0</i>	<i>11.7</i>	<i>20.3</i>	<i>3.5</i>	<i>8.9</i>
red-tailed hawk	0.06	0.11	0	0.05	19.9	21.4	0	0.7	5.9	9.5	0	4.0
rough-legged hawk	0	0.02	0.05	0.04	0	4.9	21.3	0.6	0	2.5	3.5	1.4
ferruginous hawk	0.02	0	0	0	8.1	0	0	0	2.4	0	0	0
Swainson's hawk	0.11	0.15	0	0.05	36.0	30.9	0	0.6	7.1	8.3	0	3.4
<u>Northern Harrier</u>	<i>0.07</i>	<i>0.08</i>	<i>0</i>	<i>0.21</i>	<i>24.0</i>	<i>16.6</i>	<i>0</i>	<i>2.9</i>	<i>7.1</i>	<i>7.1</i>	<i>0</i>	<i>11.0</i>
northern harrier	0.07	0.08	0	0.21	24.0	16.6	0	2.9	7.1	7.1	0	11.0
<u>Eagles</u>	<i>0</i>	<i>0.10</i>	<i>0.17</i>	<i>0.14</i>	<i>0</i>	<i>19.0</i>	<i>78.7</i>	<i>1.9</i>	<i>0</i>	<i>7.1</i>	<i>5.8</i>	<i>10.3</i>
golden eagle	0	0.10	0.16	0.12	0	19.0	73.3	1.6	0	7.1	4.6	7.8
bald eagle	0	0	0.01	0.02	0	0	5.4	0.3	0	0	1.2	2.5
<u>Falcons</u>	<i>0.02</i>	<i>0.04</i>	<i>0</i>	<i>0</i>	<i>8.1</i>	<i>7.1</i>	<i>0</i>	<i>0</i>	<i>1.2</i>	<i>3.6</i>	<i>0</i>	<i>0</i>
prairie falcon	0	0.04	0	0	0	7.1	0	0	0	3.6	0	0
American kestrel	0.02	0	0	0	8.1	0	0	0	1.2	0	0	0
Owls	0	0	0	0.01	0	0	0	0.2	0	0	0	1.2
snowy owl	0	0	0	0.01	0	0	0	0.2	0	0	0	1.2
Vultures	0.01	0	0	0	4.0	0	0	0	1.2	0	0	0
turkey vulture	0.01	0	0	0	4.0	0	0	0	1.2	0	0	0
Overall	0.30	0.50	0.22	7.20	100	100	100	100				

¹Number of large birds/800-meter (2,625-foot) plot/20-minute survey.

Appendix B3. Mean small birds use¹, percent of total use (%), and frequency of occurrence (%) for each small bird type, passerine subtype, and species by season during the 10-minute fixed-point small bird use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018.

Type/Species	Mean Use				% of Use				% Frequency			
	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring
Passerines	6.68	3.07	2.97	17.29	100	100	100	100	88.2	48.8	30.8	97.4
<u>Blackbirds/Orioles</u>	3.07	0.75	0	4.67	46.0	24.4	0	27.0	70.6	21.4	0	65.5
red-winged blackbird	0.69	0	0	1.16	10.3	0	0	6.7	28.8	0	0	27.6
bobolink	0.24	0	0	0	3.6	0	0	0	11.5	0	0	0
Brewer's blackbird	0.11	0.20	0	0.47	1.7	6.6	0	2.7	4.6	1.2	0	11.8
brown-headed cowbird	0.20	0	0	0	2.9	0	0	0	4.6	0	0	0
common grackle	0.50	0	0	0	7.4	0	0	0	15.0	0	0	0
western meadowlark	1.32	0.38	0	2.98	19.8	12.4	0	17.2	47.5	17.9	0	63.2
European starling	0	0.17	0	0.06	0	5.4	0	0.3	0	2.4	0	2.9
yellow-headed blackbird	0.01	0	0	0	0.2	0	0	0	1.1	0	0	0
<u>Finches/Crossbills</u>	0.10	0.02	0	0	1.4	0.8	0	0	4.8	1.2	0	0
American goldfinch	0.10	0.02	0	0	1.4	0.8	0	0	4.8	1.2	0	0
<u>Flycatchers</u>	0.49	0	0	0.05	7.3	0	0	0.3	18.6	0	0	1.1
eastern kingbird	0.34	0	0	0	5.1	0	0	0	14.0	0	0	0
western kingbird	0.15	0	0	0.05	2.3	0	0	0.3	7.0	0	0	1.1
<u>Grassland/Sparrows</u>	2.30	2.24	2.97	12.15	34.5	72.9	100	70.3	54.4	32.1	30.8	83.9
grasshopper sparrow	0.48	0	0	0.26	7.2	0	0	1.5	27.6	0	0	5.7
lark bunting	0.22	0	0	0.02	3.3	0	0	0.1	5.7	0	0	1.1
Lapland longspur	0	0.36	0.61	2.19	0	11.6	20.4	12.6	0	2.4	5.9	18.5
chestnut-collared longspur	0.27	0.36	0	0	4.1	11.6	0	0	1.2	10.7	0	0
horned lark	0.44	1.38	2.14	8.27	6.6	45.0	72.0	47.8	15.1	19.0	23.7	57.6
dark-eyed junco	0	0	0	0.04	0	0	0	0.3	0	0	0	1.4
song sparrow	0	0	0	0.13	0	0	0	0.7	0	0	0	4.6
house sparrow	0	0	0	0.30	0	0	0	1.8	0	0	0	2.9
savannah sparrow	0.20	0.12	0	0.23	3.0	3.9	0	1.3	10.5	6.0	0	4.6
snow bunting	0	0	0.23	0.14	0	0	7.6	0.8	0	0	2.4	2.6
vesper sparrow	0.33	0.01	0	0.49	5.0	0.4	0	2.9	4.8	1.2	0	9.2
Brewer's sparrow	0.30	0	0	0	4.5	0	0	0	6.9	0	0	0
clay-colored sparrow	0.06	0.01	0	0.07	0.9	0.4	0	0.4	4.6	1.2	0	2.3
<u>Swallows</u>	0.28	0.01	0	0	4.2	0.4	0	0	15.1	1.2	0	0
barn swallow	0.20	0.01	0	0	3.0	0.4	0	0	12.8	1.2	0	0
bank swallow	0.02	0	0	0	0.3	0	0	0	1.1	0	0	0
tree swallow	0.06	0	0	0	0.9	0	0	0	2.3	0	0	0
<u>Shrikes</u>	0	0	0	0.01	0	0	0	0.1	0	0	0	1.1

Appendix B3. Mean small birds use¹, percent of total use (%), and frequency of occurrence (%) for each small bird type, passerine subtype, and species by season during the 10-minute fixed-point small bird use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018.

Type/Species	Mean Use				% of Use				% Frequency			
	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring
loggerhead shrike	0	0	0	0.01	0	0	0	0.1	0	0	0	1.1
<i>Thrushes</i>	0.44	0.05	0	0.42	6.6	1.6	0	2.4	20.8	3.6	0	7.5
American robin	0.44	0.05	0	0.42	6.6	1.6	0	2.4	20.8	3.6	0	7.5
Overall	6.68	3.07	2.97	17.29	100	100	100	100				

¹Number of small birds/100-meter (328-foot) plot/10-minute survey.

**Appendix C. Overall Mean Use by Point for All Birds and Bird Types Observed during
Fixed-Point Avian Use Surveys at the Proposed Bowman Wind Project, Bowman County,
North Dakota from August 7, 2017 – July 22, 2018**

Appendix C1. Mean use by point for eagles¹ observed during fixed-point avian use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018.

Bird Type	Survey Point									
	1	2	4	6	7	8	9	10	11	13
<i>Eagles</i>	0.25	0	0	0.70	0.25	1.08	0.33	0.09	0	0
golden eagle	0	0	0	0.60	0.25	1.08	0.08	0.09	0	0
bald eagle	0.25	0	0	0.10	0	0	0.25	0	0	0
All Large Birds	0.25	0	0	0.70	0.25	1.08	0.33	0.09	0	0

¹ Number of eagles/800-meter (2,625-foot) plot/60-minute survey.

Appendix C1 (continued). Mean use by point for eagles¹ observed during fixed-point avian use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018.

Bird Type	Survey Point								
	14	15	16	17	18	19	20	21	27
<i>Eagles</i>	0.42	0.25	0.33	0.50	0.42	0.17	0.33	0	0.92
golden eagle	0.08	0.17	0.33	0.50	0.42	0.17	0.25	0	0.92
bald eagle	0.33	0.08	0	0	0	0	0.08	0	0
All Large Birds	0.42	0.25	0.33	0.50	0.42	0.17	0.33	0	0.92

¹ Number of eagles/800-meter (2,625-foot) plot/60-minute survey.

Appendix C1 (continued). Mean use by point for eagles¹ observed during fixed-point avian use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018.

Bird Type	Survey Point									
	28	29	38	40	42	43	44	45	47	51
<i>Eagles</i>	0.27	0.08	0	0.17	0.50	0	0.17	0.17	0	0
golden eagle	0.27	0.08	0	0.17	0.50	0	0.17	0	0	0
bald eagle	0	0	0	0	0	0	0	0.17	0	0
All Large Birds	0.27	0.08	0	0.17	0.50	0	0.17	0.17	0	0

¹ Number of eagles/800-meter (2,625-foot) plot/60-minute survey.

Appendix C2. Mean use by point for large birds¹ and diurnal raptor subtypes observed during fixed-point avian use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018.

Type/Species	Survey Point									
	1	2	4	6	7	8	9	10	11	13
Waterfowl	0.33	0	0	0.20	2.92	0	0	0	0	9.17
mallard	0.33	0	0	0.20	0	0	0	0	0	0
Canada goose	0	0	0	0	2.92	0	0	0	0	9.17
Diurnal Raptors	0	0.50	0	0.80	0.83	0.58	0.33	0.18	0	0.33
<u>Buteos</u>	0	0.42	0	0	0.08	0	0.25	0	0	0.17
red-tailed hawk	0	0.08	0	0	0.08	0	0.08	0	0	0
rough-legged hawk	0	0	0	0	0	0	0.08	0	0	0
ferruginous hawk	0	0	0	0	0	0	0	0	0	0
Swainson's hawk	0	0.33	0	0	0	0	0.08	0	0	0.17
<u>Northern Harrier</u>	0	0.08	0	0.30	0.42	0.17	0.08	0.09	0	0.17
northern harrier	0	0.08	0	0.30	0.42	0.17	0.08	0.09	0	0.17
<u>Eagles</u>	0	0	0	0.50	0.17	0.42	0	0.09	0	0
golden eagle	0	0	0	0.40	0.17	0.42	0	0.09	0	0
bald eagle	0	0	0	0.10	0	0	0	0	0	0
<u>Falcons</u>	0	0	0	0	0.17	0	0	0	0	0
prairie falcon	0	0	0	0	0	0	0	0	0	0
American kestrel	0	0	0	0	0.17	0	0	0	0	0
Owls	0	0	0	0	0	0	0	0	0	0
snowy owl	0	0	0	0	0	0	0	0	0	0
Vultures	0	0	0	0	0	0	0	0	0	0
turkey vulture	0	0	0	0	0	0	0	0	0	0
All Large Birds	0.33	0.50	0	1.00	3.75	0.58	0.33	0.18	0	9.50

¹ Number of large birds/800-meter (2,625-foot) plot/20-minute survey.

Appendix C2 (continued). Mean use by point for large birds¹ and diurnal raptor subtypes observed during fixed-point avian use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018.

Type/Species	Survey Point								
	14	15	16	17	18	19	20	21	27
Waterfowl	0	0	0	0	0.75	0	0	0	0
mallard	0	0	0	0	0	0	0	0	0
Canada goose	0	0	0	0	0.75	0	0	0	0
Diurnal Raptors	0.67	0.42	0.33	0.83	0.42	0.33	0.58	0.20	0.33
<u>Buteos</u>	0.25	0.25	0.08	0.58	0.17	0.08	0.33	0.10	0
red-tailed hawk	0.17	0.08	0	0	0	0	0.08	0	0
rough-legged hawk	0	0	0	0.17	0.17	0	0.08	0	0
ferruginous hawk	0.08	0	0	0	0	0.08	0	0	0
Swainson's hawk	0	0.17	0.08	0.42	0	0	0.17	0.10	0
<u>Northern Harrier</u>	0.25	0	0.08	0.08	0.17	0.08	0	0	0
northern harrier	0.25	0	0.08	0.08	0.17	0.08	0	0	0
<u>Eagles</u>	0.17	0.17	0.17	0.08	0.08	0.17	0.25	0	0.33
golden eagle	0	0.17	0.17	0.08	0.08	0.17	0.25	0	0.33
bald eagle	0.17	0	0	0	0	0	0	0	0
<u>Falcons</u>	0	0	0	0.08	0	0	0	0.10	0
prairie falcon	0	0	0	0.08	0	0	0	0.10	0

Appendix C2 (continued). Mean use by point for large birds¹ and diurnal raptor subtypes observed during fixed-point avian use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018.

Type/Species	Survey Point								
	14	15	16	17	18	19	20	21	27
American kestrel	0	0	0	0	0	0	0	0	0
Owls	0	0	0	0	0	0	0	0	0
snowy owl	0	0	0	0	0	0	0	0	0
Vultures	0.08	0	0	0	0	0	0	0	0
turkey vulture	0.08	0	0	0	0	0	0	0	0
All Large Birds	0.75	0.42	0.33	0.83	1.17	0.33	0.58	0.20	0.33

¹ Number of large birds/800-meter (2,625-foot) plot/20-minute survey.

Appendix C2 (continued). Mean use by point for large birds¹ and diurnal raptor subtypes observed during fixed-point avian use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018.

Type/Species	Survey Point									
	28	29	38	40	42	43	44	45	47	51
Waterfowl	0	0	30.67	0.42	0	0.17	0	0.08	0	0
mallard	0	0	0	0.17	0	0	0	0	0	0
Canada goose	0	0	30.67	0.25	0	0.17	0	0.08	0	0
Diurnal Raptors	0.09	0.17	0.25	0.58	0.67	0.08	0.17	0.50	0.17	0
<u>Buteos</u>	0.09	0.08	0.17	0.42	0.50	0	0.08	0.42	0.08	0
red-tailed hawk	0	0	0.17	0.17	0.42	0	0.08	0	0.08	0
rough-legged hawk	0	0	0	0.25	0	0	0	0	0	0
ferruginous hawk	0	0	0	0	0	0	0	0	0	0
Swainson's hawk	0.09	0.08	0	0	0.08	0	0	0.42	0	0
<u>Northern Harrier</u>	0	0	0.08	0.08	0	0.08	0	0.08	0.08	0
northern harrier	0	0	0.08	0.08	0	0.08	0	0.08	0.08	0
<u>Eagles</u>	0	0	0	0.08	0.17	0	0.08	0	0	0
golden eagle	0	0	0	0.08	0.17	0	0.08	0	0	0
bald eagle	0	0	0	0	0	0	0	0	0	0
<u>Falcons</u>	0	0.08	0	0	0	0	0	0	0	0
prairie falcon	0	0.08	0	0	0	0	0	0	0	0
American kestrel	0	0	0	0	0	0	0	0	0	0
Owls	0	0	0	0	0	0	0.08	0	0	0
snowy owl	0	0	0	0	0	0	0.08	0	0	0
Vultures	0	0	0	0	0	0	0	0	0	0
turkey vulture	0	0	0	0	0	0	0	0	0	0
All Large Birds	0.09	0.17	30.92	1.00	0.67	0.25	0.25	0.58	0.17	0

¹ Number of large birds/800-meter (2,625-foot) plot/20-minute survey.

Appendix C3. Mean use by point for small birds¹ and passerine subtypes observed during fixed-point avian use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018.

Type/Species	Survey Point									
	1	2	4	6	7	8	9	10	11	13
Passerines	5.50	8.08	6.25	4.09	17.00	14.75	4.00	3.09	3.91	4.17
red-winged blackbird	0.42	0.83	0.92	0	0.58	0.50	0	0.27	0	0.75
bobolink	0.08	0.17	0	0	0	0.17	0.25	0	0.27	0
Brewer's blackbird	0	0.42	0	1.73	0	0	0	0.27	0	0.25
brown-headed cowbird	0	0	0	0	0.33	0	0	0	0	0
common grackle	0	0	0	0	0.08	0	0	0	0	0
western meadowlark	1.08	1.17	1.08	0.27	1.00	2.50	1.33	0.36	0.73	0.83
European starling	0	0	0	0	0	0.25	0	0	0	0
yellow-headed blackbird	0	0	0	0	0	0	0	0	0	0
American goldfinch	0	0	0.25	0	0.17	0	0	0	0	0
eastern kingbird	0.42	0	0	0	0	0	0	0	0	0
western kingbird	0	0.08	0	0.55	0	0	0	0	0	0
grasshopper sparrow	0	0.42	0.25	0.27	0.33	0.17	0.25	0.27	0.27	0.08
lark bunting	0	0	0	0	0	0.33	0	0	0	0
Lapland longspur	0	0	0.33	0.27	0	0	0.42	0	0	0.25
chestnut-collared longspur	0.08	0	0	0	0	0.33	0	0	0	0
horned lark	2.67	2.75	2.83	0.91	14.25	8.17	1.67	0.82	1.73	1.17
dark-eyed junco	0	0	0	0	0	0	0	0	0	0
song sparrow	0	0	0	0	0	0	0	0	0	0.25
house sparrow	0	0	0	0	0	1.17	0	0	0	0
savannah sparrow	0.50	0.17	0.42	0	0	0	0	0	0	0.08
snow bunting	0	1.00	0	0	0	0	0	0	0	0
vesper sparrow	0	0.67	0	0.09	0	0	0	0.55	0.55	0
Brewer's sparrow	0	0.17	0	0	0	0	0	0.36	0	0
clay-colored sparrow	0	0.08	0	0	0	0	0	0.09	0	0.17
barn swallow	0.08	0	0.17	0	0	0	0	0.09	0	0
bank swallow	0	0	0	0	0	0.17	0	0	0	0
tree swallow	0	0	0	0	0	0	0	0	0.36	0
loggerhead shrike	0	0	0	0	0	0	0	0	0	0
American robin	0.17	0.17	0	0	0.25	1.00	0.08	0	0	0.33
All Small Birds	5.50	8.08	6.25	4.09	17.00	14.75	4.00	3.09	3.91	4.17

¹ Number of small birds/100-meter (328-foot) plot/10-minute survey.

Appendix C3 (continued). Mean use by point for small birds¹ and passerine subtypes observed during fixed-point avian use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018.

Type/Species	Survey Point								
	14	15	16	17	18	19	20	21	27
Passerines	12.58	5.83	13.75	13.09	15.17	4.08	6.17	7.70	4.17
red-winged blackbird	0.75	0.83	0.42	1.27	0.58	0.17	0.58	0.30	0.42
bobolink	0	0.08	0.17	0	0	0	0	0.40	0
Brewer's blackbird	0.58	0	0.33	0.27	0	0	0	0.20	0.50
brown-headed cowbird	0	0	0	0	0	0	0.17	0	0
common grackle	0.33	0.08	0.17	0	0.42	0.17	0.17	0	0
western meadowlark	1.58	1.42	2.33	1.55	1.17	1.25	1.33	1.30	0.75

Appendix C3 (continued). Mean use by point for small birds¹ and passerine subtypes observed during fixed-point avian use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018.

Type/Species	Survey Point								
	14	15	16	17	18	19	20	21	27
European starling	0	0.08	0	0	0	0	0	0.90	0
yellow-headed blackbird	0	0	0	0	0	0	0	0	0
American goldfinch	0	0	0.17	0	0	0	0.17	0	0
eastern kingbird	0.25	0	0	0.09	0	0.33	0.42	0	0.08
western kingbird	0	0	0.08	0	0	0	0	0	0.08
grasshopper sparrow	0	0	0.25	1.27	0.08	0	0.08	0.20	0
lark bunting	0	0	0	0	0	0	0	0.20	0
Lapland longspur	2.67	1.50	1.25	2.45	4.08	0.58	1.92	0	0
chestnut-collared longspur	0	0	0.25	2.55	0.08	0	0	0.20	0
horned lark	6.42	0.50	7.83	2.09	5.75	0.75	0.67	2.90	2.08
dark-eyed junco	0	0	0	0	0	0	0.25	0	0
song sparrow	0	0	0.17	0	0	0	0	0	0
house sparrow	0	0	0	0	0	0	0	0	0
savannah sparrow	0	0	0	1.00	0.17	0.17	0	0.10	0
snow bunting	0	0	0	0	0	0	0	0	0
vesper sparrow	0	0.50	0.33	0.36	1.33	0	0	1.00	0.25
Brewer's sparrow	0	0	0	0	1.42	0	0	0	0
clay-colored sparrow	0	0	0	0	0	0.08	0	0	0
barn swallow	0	0	0	0	0.08	0.42	0.08	0	0
bank swallow	0	0	0	0	0	0	0	0	0
tree swallow	0	0	0	0	0	0.08	0	0	0
loggerhead shrike	0	0	0	0	0	0	0	0	0
American robin	0	0.83	0	0.18	0	0.08	0.33	0	0
All Small Birds	12.58	5.83	13.75	13.09	15.17	4.08	6.17	7.70	4.17

¹ Number of small birds/100-meter (328-foot) plot/10-minute survey.

Appendix C3 (continued). Mean use by point for small birds¹ and passerine subtypes observed during fixed-point avian use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018.

Type/Species	Survey Point									
	28	29	38	40	42	43	44	45	47	51
Passerines	4.00	6.50	3.75	4.17	8.33	7.33	5.58	4.00	5.67	7.75
red-winged blackbird	0.27	1.08	0	0	0.67	0.25	0.42	0.58	0.25	1.00
bobolink	0.09	0	0	0	0	0	0	0	0	0.50
Brewer's blackbird	0.18	0.83	0	0	0.25	0	0	0	0	0
brown-headed cowbird	0	0.58	0	0	0	0	0.33	0	0	0
common grackle	0	0.08	0	0	1.50	0.17	0	0.17	0	0.75
western meadowlark	0.45	0.83	1.50	1.17	0.50	0.17	1.00	0.83	1.25	1.75
European starling	0	0	0	0	0.42	0	0	0	0	0
yellow-headed blackbird	0	0	0	0	0.08	0	0	0	0	0

Appendix C3 (continued). Mean use by point for small birds¹ and passerine subtypes observed during fixed-point avian use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota from August 7, 2017 – July 22, 2018.

Type/Species	Survey Point									
	28	29	38	40	42	43	44	45	47	51
American goldfinch	0	0	0	0	0	0	0	0.08	0	0
eastern kingbird	0	0	0.25	0.17	0	0	0.25	0.17	0	0
western kingbird	0	0	0	0	0.33	0	0	0.08	0	0.75
grasshopper sparrow	0.09	0	0	0	0.17	0	0.25	0.42	0.42	0.25
lark bunting	1.18	0	0	0	0	0.17	0	0	0	0
Lapland longspur	0	0.75	0	0	0.75	0.25	1.25	0	1.92	0.75
chestnut-collared longspur	0	0	0	0.42	0.50	0	0.25	0	0	0
horned lark	1.09	0	1.25	1.92	2.83	4.17	1.00	0.83	1.42	1.75
dark-eyed junco	0	0	0	0	0	0	0	0	0	0
song sparrow	0.27	0	0	0	0	0	0	0	0.25	0
house sparrow	0	0.58	0	0	0	0	0	0	0	0
savannah sparrow	0	0	0.17	0	0	0.17	0.58	0.50	0	0
snow bunting	0	0	0	0	0	1.33	0	0	0.17	0
vesper sparrow	0	0	0.42	0	0	0.25	0	0	0	0
Brewer's sparrow	0	0	0	0.08	0.17	0	0	0	0	0
clay-colored sparrow	0	0	0.17	0	0.08	0.33	0	0	0	0
barn swallow	0	0	0	0.33	0.08	0.08	0	0.08	0	0
bank swallow	0	0	0	0	0	0	0	0	0	0
tree swallow	0	0	0	0	0	0	0	0	0	0
loggerhead shrike	0	0	0	0.08	0	0	0	0	0	0
American robin	0.36	1.75	0	0	0	0	0.25	0.25	0	0.25
All Small Birds	4.00	6.50	3.75	4.17	8.33	7.33	5.58	4.00	5.67	7.75

¹ Number of small birds/100-meter (328-foot) plot/10-minute survey.

**Avian Use Survey for the
Proposed Bowman Wind Project
Bowman County, North Dakota**

**Final Report
August 23, 2018 – July 23, 2019**

Prepared for:

Bowman Wind, LLC

310 4th Street Northeast, Suite 300
Charlottesville, Virginia

Prepared by:

Chad LeBeau, Kristen Chodachek, and Kimberly Bailey

Western EcoSystems Technology, Inc.
1610 Reynolds Street
Laramie, Wyoming 82070

June 25, 2020



Privileged and Confidential – Not For Distribution

• EXECUTIVE SUMMARY

Western EcoSystems Technology, Inc. completed a year of avian use surveys for the proposed Bowman Wind Project (Project) located in Bowman County, North Dakota. The objective of surveys was to evaluate species composition and seasonal and spatial use of the Project by birds, with a particular focus on eagles and species of concern. The survey methods were consistent with recommendations outlined in the US Fish and Wildlife Service (USFWS) 2012 *Land-Based Wind Energy Guidelines*, Appendix C(1)(a) of the USFWS 2013 *Eagle Conservation Plan Guidelines*, USFWS *Revisions to Regulations for Eagle Incidental Take and Take of Eagle Nests* (2016) and recommendations from USFWS and the North Dakota Game and Fish Department.

Surveys were completed monthly from August 23, 2018 to July 23, 2019, at 33 points established throughout the Project. Surveys consisted of 5-minute (min) counts of small birds only within a 100-meter (m; 328-foot [ft]) radius plot, followed by 60 min counts recording large birds (including eagles) within 800 m (2,625 ft). The 60-min count was further divided into 20 min surveys of large birds (including eagles) and the remaining 40 min surveys for eagles only.

No federally listed threatened or endangered species were observed during avian use surveys. Fifteen bald eagle observations, 47 golden eagle observations, and two unidentified eagle observations, protected under the Bald and Golden Eagle Protection Act, were recorded during use surveys and incidentally. In addition, eight bird species of concern (ferruginous hawk, marbled godwit, Swainson's hawk, Wilson's phalarope, Baird's sparrow, chestnut-collared longspur, grasshopper sparrow, and lark bunting) were recorded during use surveys or incidentally.

Thirty-seven large bird species and 38 small bird species were recorded during surveys. The most commonly observed large bird was Canada goose (45.0% of large bird observations). Nine identified diurnal raptor species were observed during surveys, accounting for 10% of large bird observations recorded. Northern harrier (61 observations), red-tailed hawk (30), and Swainson's hawk (28) were the most common non-eagle raptor species observed. The most commonly observed small birds were horned lark (25.0% of observations), western meadowlark (19.9%), and red-winged blackbird (14.2%).

Overall, the species composition, seasonal abundance, and spatial use patterns documented during surveys are considered typical for birds in this region. The majority of species observed are common and abundant within the region. It is not likely development of the Project will cause substantial impacts to small or large bird populations, including diurnal raptors and species of concern. Based on the data collected, use of the Project by eagles is consistent with geographical use in this region. Bald eagles were recorded in fall, winter, and spring, suggesting primarily winter and migratory use by non-breeding eagles. Seasonal patterns of activity found during surveys suggest the Project may receive increased use by golden eagles during the migration periods and winter, with the potential for year-round use.

PARTICIPANTS

Chad LeBeau	Senior Project Manager, Senior Reviewer
Kristen Chodachek	Project Manager, Reviewer
Mandy Kauffman	Lead Client Analyst
Diem Pham	Analyst
Kimberly Bailey	Report Reviewer
Julia Preston-Fulton	Technical Editor
Kristen Klaphake	GIS Technician
Sofia Agudelo	QAQC Technician
Carmen Boyd	Project Tracking and Data Manager

REPORT REFERENCE

LeBeau, C., K. Chodachek, and K. Bailey. 2020. Avian Use Survey for the Proposed Bowman Wind Project, Bowman County, North Dakota. Draft Report: August 23, 2018 – August 23, 2019. Prepared for Bowman Wind, LLC. Charlottesville, Virginia. Prepared by Western EcoSystems Technology, Inc. (WEST), Laramie, Wyoming. June 25, 2020.

TABLE OF CONTENTS

EXECUTIVE SUMMARY	i
INTRODUCTION	1
PROJECT AREA	1
METHODS	4
Survey Design	4
Survey Methods	6
All Birds	6
Eagles	7
Incidental Observations	7
Data Management	7
Quality Assurance and Quality Control	7
Data Compilation and Storage	7
Statistical Analysis	7
Mean Use, Percent of Use, and Frequency of Occurrence	8
Flight Height	8
Spatial Use	8
Eagles	8
RESULTS	9
Species of Concern	9
Eagles	9
Large Birds	17
Mean Use, Percent of Use, and Frequency of Occurrence	17
Flight Height	17
Spatial Use	17
Small Bird Use	19
Mean Use, Percent of Use, and Frequency of Occurrence	19
Spatial Use	19
DISCUSSION	23
Species of Concern	23
Eagles	24
Large Birds	24
Small Birds	25
REFERENCES	26

LIST OF TABLES

Table 1. Land cover types, area, and percent (%) composition within the proposed Bowman Wind Project, Bowman County, North Dakota, based on National Land Cover Database.....	4
Table 2. Summary of survey effort by number (#) of visits, surveys, and hours at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.....	9
Table 3. Species of concern by number (#) of groups (grps) and individual observations (obs) observed during the 65-minute avian use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.....	11
Table 4. Summary of bald eagle activity minutes and observations within 800 meters of the observer recorded during the 60-minute avian use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.	12
Table 5. Summary of golden eagle activity minutes and observations within 800 meters of the observer recorded during the 60-minute avian use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.	13
Table 6. Estimated flight height (meters [m]) characteristics (based on first activity and first flight height) by number (#) of groups (grps) and individual observations (obs) by large bird type and raptor subtype observed during the 20-minute large bird use surveys ² at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.	18

LIST OF FIGURES

Figure 1. Location of the proposed Bowman Wind Project, Bowman County, North Dakota.....	2
Figure 2. Land cover types and coverage at the proposed Bowman Wind Project, Bowman County, North Dakota (Yang et al. 2018, Multi-Resolution Land Characteristics 2019).	3
Figure 3. Avian use survey points and plots at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.	5
Figure 4. Estimated bald eagle risk (flying within 800 meters [2,625 feet] and below 200 meters [656 feet]) minutes per survey hour at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.....	14
Figure 5. Estimated golden eagle risk (flying within 800 meters [2,625 feet] and below 200 meters [656 feet]) minutes per survey hour at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.....	15

Figure 6. Estimated bald, golden, and unidentified eagle flight paths at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.	16
Figure 7. Large bird mean use (number of large birds/800-meter [2,625-foot] plot/20-minute survey) by point and bird type at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.	20
Figure 8. Small bird mean use (number of small birds/100-meter [328-foot] plot/5-minute survey) by season and bird type at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.	21
Figure 9. Small bird mean use (number of small birds/100-meter [328-foot] plot/5-minute survey) by point and bird type at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.	22

LIST OF APPENDICES

Appendix A. Summary of Bird Species Observed during Fixed-Point Avian Use Surveys at the Proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019	
Appendix B. Mean Use, Percent of Use, and Frequency of Occurrence for Large Birds and Small Birds Observed during Fixed-Point Avian Use Surveys at the Proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019	
Appendix C. Overall Mean Use by Point for All Birds and Bird Types Observed during Fixed-Point Avian Use Surveys at the Proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019	

• INTRODUCTION

Bowman Wind, LLC (Bowman Wind) is proposing the development of the Bowman Wind Project (Project) located in Bowman County, North Dakota (Figure 1). To support the development of the Project, Bowman Wind contracted Western EcoSystems Technology, Inc. (WEST) to complete a year of avian use surveys from August 2018 through July 2019 within the Project. The objective of surveys was to evaluate species composition and seasonal and spatial use of the Project by birds, with a particular focus on eagles and species of concern (defined as species afforded protection under the Endangered Species Act of 1973, Bald and Golden Eagle Protection Act [BGEPA] of 1940, and defined as Level I Species of Conservation Priority by the state of North Dakota [Dyke et al. 2015]).

• PROJECT AREA

The proposed Project encompasses 23,803 hectares (58,818 acres) in the Missouri Plateau Level IV Ecoregion within the Northwestern Great Plains Level III Ecoregion of North Dakota (US Environmental Protection Agency 2017). The Missouri Plateau ecoregion was largely unaffected by glaciation, retaining its original soils and complex stream drainage patterns that now support a mosaic of spring wheat (*Triticum* spp.), alfalfa (*Medicago sativa*), and grazing lands. Elevations within the Project range from approximately 896 meters (m; 2,940 feet [ft]) to 1,051 m (3,448 ft; US Geological Survey 2019), with the greater topographic relief associated with the Medicine Pole hills in the center of the Project (Figure 1).

According to the National Land Cover Database (Yang et al. 2018, Multi-Resolution Land Characteristics 2019), the dominant land cover type in the Project is shrub/scrub (43.9%), followed by herbaceous/grassland (32.0%), and cultivated crops (19.7%; Figure 2, Table 1). The remaining land covers account for less than 3.0% of the Project, individually (Figure 2, Table 1).

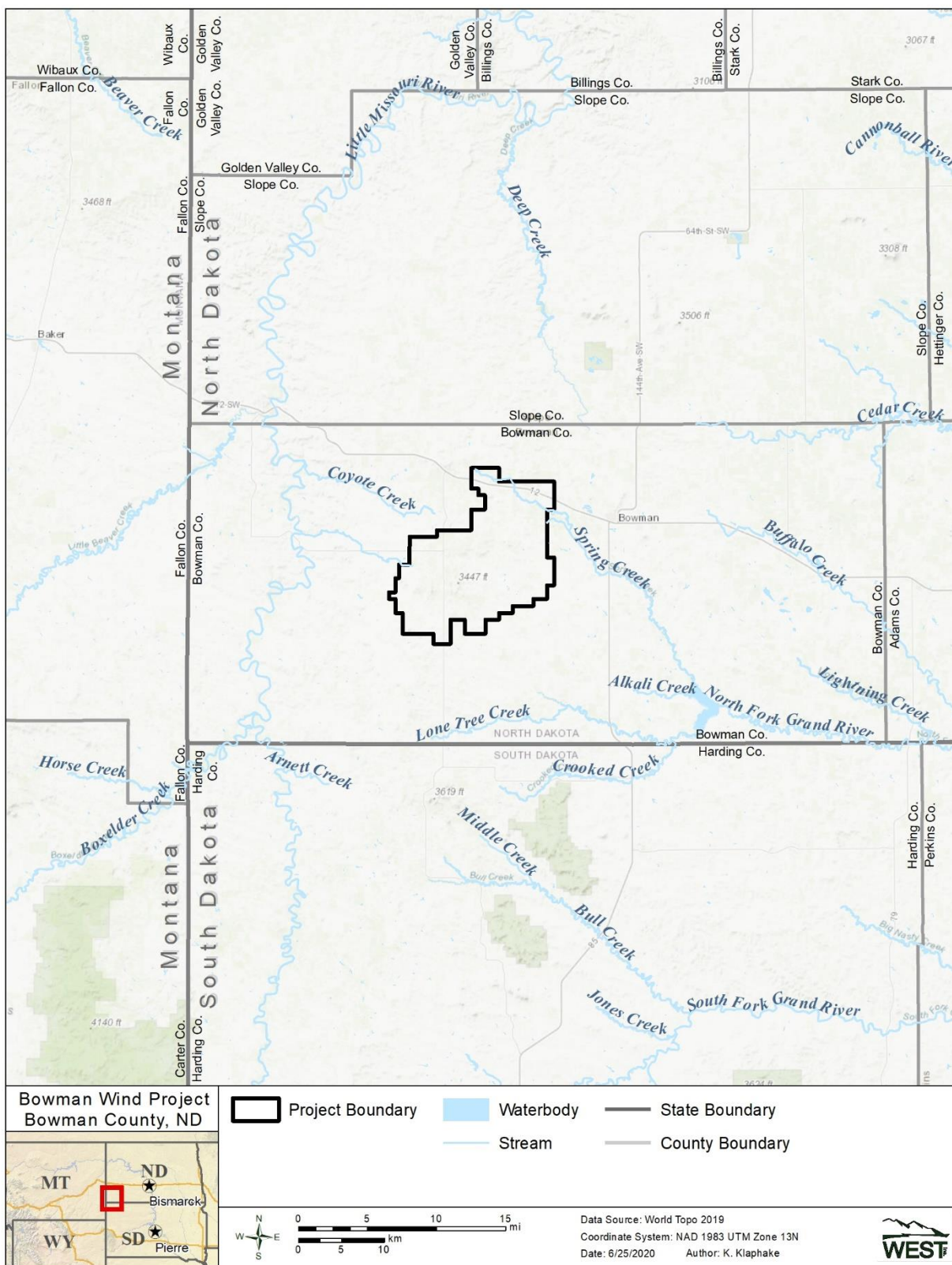


Figure 1. Location of the proposed Bowman Wind Project, Bowman County, North Dakota.

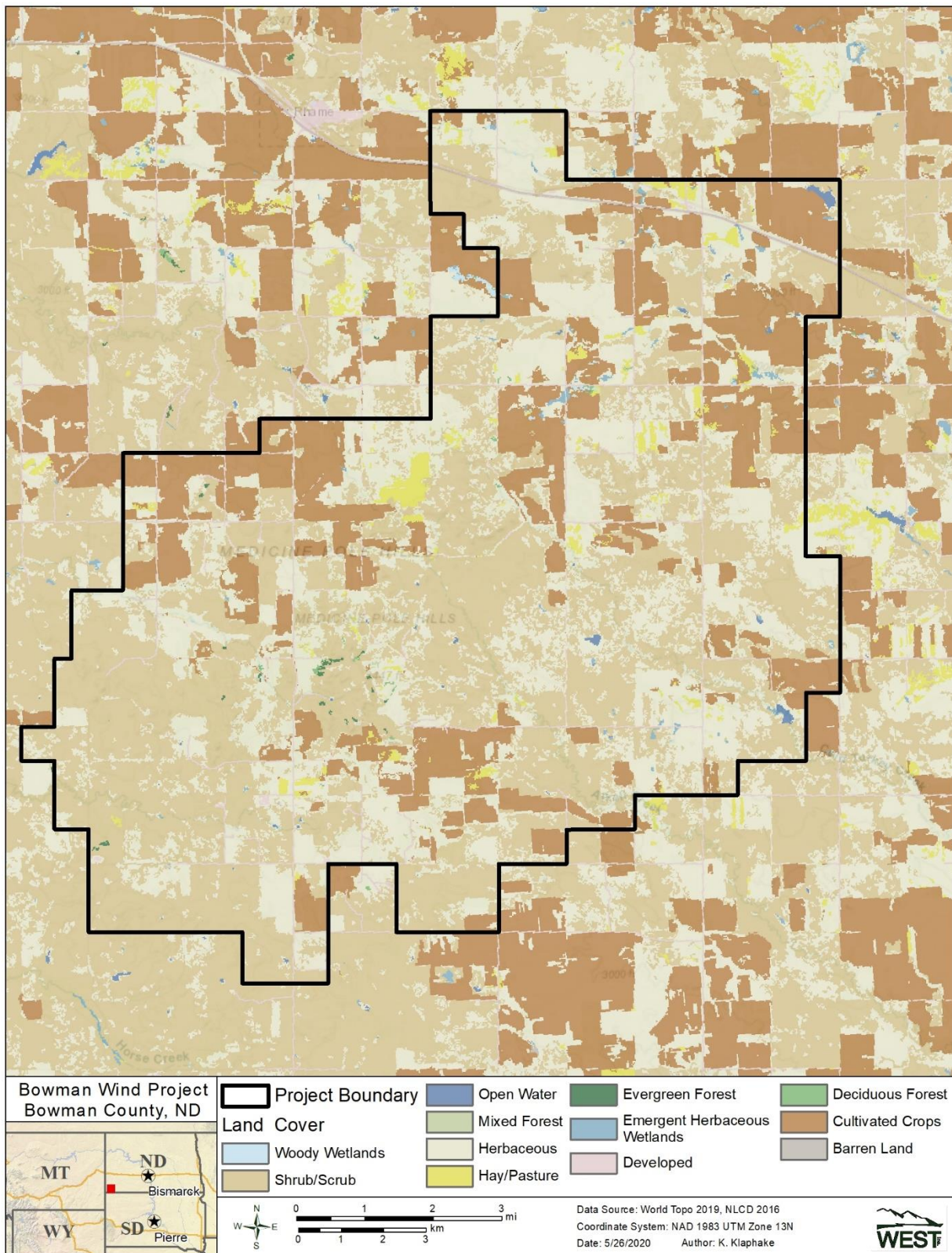


Figure 2. Land cover types and coverage at the proposed Bowman Wind Project, Bowman County, North Dakota (Yang et al. 2018, Multi-Resolution Land Characteristics 2019).

Table 1. Land cover types, area, and percent (%) composition within the proposed Bowman Wind Project, Bowman County, North Dakota, based on National Land Cover Database.

Land Cover Type	Area (acres)	Area (hectares)	% Composition
Shrub/Scrub	25,835	10,455	43.9
Herbaceous	18,817	7,615	32.0
Cultivated Crops	11,586	4,689	19.7
Developed	1,204	487	2.0
Hay/Pasture	977	396	1.7
Emergent Herbaceous Wetlands	164	66	0.3
Open Water	106	43	0.2
Woody Wetlands	45	18	0.1
Evergreen Forest	45	18	0.1
Deciduous Forest	30	12	0.1
Mixed Forest	7	3	<0.1
Barren Land	2	1	<0.1
Total¹	58,818	23,803	100

Sources: Yang et al. 2018, Multi-Resolution Land Characteristics 2019

¹. Sums of values may not add precisely to total value shown, due to rounding.

• METHODS

Survey methods were developed to be in accordance with recommendations outlined in the US Fish and Wildlife Service (USFWS) 2012 *Land-Based Wind Energy Guidelines*, Appendix C(1)(a) of the USFWS 2013 *Eagle Conservation Plan Guidelines* (ECPG), and recommendations from USFWS and the North Dakota Game and Fish Department. Methods described below, therefore, are common for all birds (i.e., large and small birds, eagles, and other species of concern) except as noted.

Large birds were defined as waterbirds, waterfowl, shorebirds, gulls and terns, diurnal raptors (accipiters, hawks, northern harrier, eagles, and falcons), vultures, upland game birds, doves and pigeons, and large corvids. Small birds were defined as passerines, cuckoos, swifts and hummingbirds, and woodpeckers.

• Survey Design

Thirty-three survey points located on accessible roads were surveyed within the Project boundary (Figure 3). Twenty-eight of the 29 survey plots from Year 1 and an additional five survey plots were selected for the second year of surveys to increase survey coverage within the Project. Each survey point consisted of an 800-m (2,625 ft) radius survey plot for large birds (including eagles) and 100-m (328 ft) radius survey plot for small birds, centered on the survey point. Per the ECPG, each survey point was located to maximize viewshed for the observer and to enable evaluation of representative habitats within the Project.

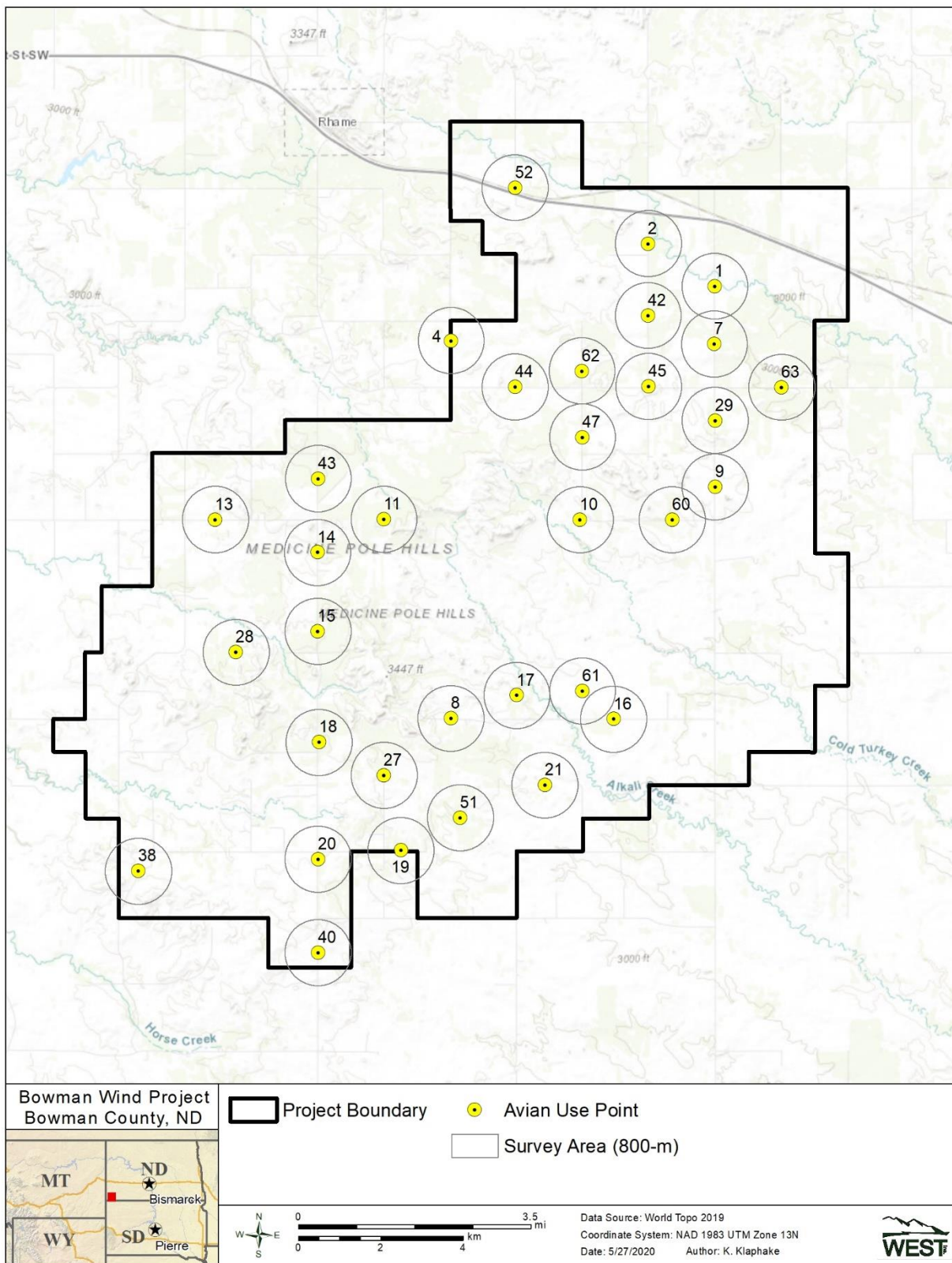


Figure 3. Avian use survey points and plots at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.

Surveys were completed once a month from August 23, 2018 to July 23, 2019. Seasons were defined as summer (May 9 – August 31), fall (September 1 – November 30), winter (December 1 – February 28), and spring (March 1 – May 8). Surveys were conducted during daylight hours, and survey times at survey points were varied to cover all daylight hours during a season. Surveys were conducted under all weather conditions except when visibility was less than 800 m horizontally and 200 m (656 ft) vertically.

- **Survey Methods**

- *All Birds*

Surveys at each point were conducted for a period of 65 minutes (min), with only small birds recorded during the first five min of the survey period out to a 100-m radius, followed by 60-min counts recording large birds (including eagles) out to an 800-m radius. The 60-min count was divided further into 20-min surveys of large birds (including eagles) and the remaining 40-min surveys for eagles only. The 20-min portion of the survey allowed for standardization and comparison of data with other wind energy facilities throughout the region, while the 60-min eagle counts allowed for a more robust evaluation of bald eagle (*Haliaeetus leucocephalus*) and golden eagle (*Aquila chrysaetos*) use of the Project in accordance with the ECPG and USFWS Revision to Regulations for Eagle Incidental Take and Take of Eagle Nests; Final Rule (USFWS 2016).

At each survey point, the date, start and end time of the survey period, and weather information (i.e., temperature, wind speed, wind direction, precipitation, and percent cloud cover) were recorded. Additionally, the following data for each individual or group of birds observed was recorded:

- Observation number
- Species (or best possible identification)
- Number of individuals
- Sex and age class (if identifiable)
- Distance from plot center when first observed (to the nearest 1-m [3-ft] interval)
- Closest distance
- Estimated flight height above ground level (AGL; to the nearest 1-m interval)
- Flight direction (first observed) for large birds only
- Habitat
- Activity (e.g., flying, perched)
- Observation type (visual or aural)
- Estimated flight path of eagles

- *Eagles*

Surveyors recorded the following metrics to characterize eagle use within the Project: age class (juvenile [first year], immature or sub-adult [second to fourth year], adult [at least fifth year]), eagle minutes, eagle risk minutes, and total minutes. Eagle minutes were defined as the number of minutes in which an eagle was observed flying within the identified flight height ranges either within or outside of the survey plot during each minute of survey. Eagle risk minutes were defined as the number of minutes an eagle was estimated to be flying within the risk cylinder (area within 800 m of the observer and 25-200 m AGL) during the 60-min survey period. Total minutes were defined as the amount of time eagles were observed inside and outside the risk cylinder.

- *Incidental Observations*

Species of concern observed outside the 800-m radius plot during surveys were recorded as incidental but were not included in statistical analysis. In addition, incidental wildlife observations made outside of standardized surveys (i.e., driving to and from avian use survey points) were recorded, but were limited to species of concern, rare species not documented in general avian use surveys, and unique events such as large flocks. These data do not represent a systematic sampling of the Project, but are useful to document rare or potentially localized birds that were not documented in the avian use study. Incidental observations were included in lists of species observed, but were not included in quantitative analyses.

- **Data Management**

- *Quality Assurance and Quality Control*

WEST implemented quality assurance and quality control (QA/QC) measures during data collection, data entry, analysis, and report writing. Multiple reviews of the data were conducted as QA/QC measures.

- *Data Compilation and Storage*

A Microsoft® SQL database was utilized to store, organize, and retrieve survey data. Project data were keyed into the electronic database using a pre-defined format to facilitate subsequent QA/QC and data analysis.

- **Statistical Analysis**

A *visit* was defined as the required length of time, in days, to survey all of the plots once within the Project and could occur across multiple dates, but had to be completed in a single season (e.g., spring). If conditions prevented all plots from being surveyed during a visit, then a visit might not have constituted a complete survey of all plots. A *survey* was defined as a single 60-min, 20-min, or 5-min count of birds. In some cases, a count of bird observations may represent repeated observations of the same individual. Only observations within the 800-m or 100-m survey plot were included in data analysis.

- *Mean Use, Percent of Use, and Frequency of Occurrence*

Mean use was the average number of birds observed per plot per survey for large birds (including eagles) or small birds. Large bird (per 800-m plot per 20-min survey), eagle use (per 800-m plot per 60-min survey) and small bird use (per 100-m plot per 5-min survey) were calculated by 1) summing birds per plot per visit, 2) averaging number of birds over plots within a visit, and 3) averaging number of birds across visits within a season. Overall mean use was calculated as a weighted average of seasonal values by the number of days in each season. *Percent of use* was calculated as the percentage of large birds (including eagles) or small bird use that was attributable to a particular bird type or species. *Frequency of occurrence* was calculated as the percent of surveys in which a particular bird type or species was observed.

Mean use and frequency of occurrence describe different aspects of relative abundance, in that mean use is based on the number of birds (i.e., large groups can produce high estimates), whereas frequency of occurrence is based on the number of groups (i.e., it is not influenced by group size). Qualitative comparisons were made with these metrics among bird types, seasons, and survey points to assist in understanding how birds are using the Project both temporally and spatially.

- *Flight Height*

Bird flight heights are important metrics to assess relative potential exposure to turbine blades and were used to calculate the percentage of eagles, large birds, and small birds observed flying within the rotor-swept height (RSH) of proposed turbines. A RSH estimated between 25 m (82 ft) and 200 m AGL was assumed for the purpose of the analysis. The percentage of birds flying within the RSH was calculated using the lowest and highest flight heights recorded. Auditory-only observations were excluded from flight height calculations.

- *Spatial Use*

Mean use was calculated by survey point for eagles, large birds, and small birds to make spatial comparisons among the survey points. Additionally, flight paths of eagles were mapped during large bird use surveys to qualitatively show flight path location compared to Project characteristics (e.g., topographic features) to identify if there were areas of concentration or consistent flight patterns within the Project.

- *Eagles*

Eagles observed during surveys were summarized to provide estimated flight heights (see *Flight Height*) and flight path maps (see *Spatial Use*). Data collected during each minute eagles were observed, were examined to count eagle risk minutes and total minutes. Eagle risk minutes per observation hour were reported by survey plot and month to enable spatial and temporal assessments of eagle risk minutes recorded in the Project. Data collected on perched eagles and those outside of survey plots were not considered eagle risk minutes; however, they were considered in the total eagle minutes. The flight paths of all eagles were mapped to qualitatively assess areas of eagle use within the Project.

• RESULTS

Overall, 389 eagle, large bird, and small bird surveys were completed resulting in approximately 389 hours of 60-min ECPG-level eagle use surveys, 129.7 hours of 20-min large bird surveys, and 32.5 hours of 5-min small bird surveys (Table 2). Thirty-seven species of large birds (including bald and golden eagles) and 38 species of small birds, totaling 75 species of birds were observed or heard during the surveys (Appendices A1, A2, and A3). Survey results are summarized below, supplemented by the appendices, which present species-level detail on the following: scientific names and numbers of groups and observations seen during surveys (Appendices A1, A2, and A3), avian use, percent of use, and frequency of occurrence by season (Appendices B1, B2, and B3), and mean use by survey point (Appendices C1, C2, and C3).

Table 2. Summary of survey effort by number (#) of visits, surveys, and hours at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.

Season ¹	Eagles			Large Birds			Small Birds		
	# Visits ²	# Surveys ³	Hours	# Visits ²	# Surveys ³	Hours	# Visits ²	# Surveys ³	Hours
Summer	4	126	126.0	4	126	42.0	4	126	10.5
Fall	3	98	98.0	3	98	32.7	3	98	8.2
Winter	3	99	99.0	3	99	33.0	3	99	8.3
Spring	2	66	66.0	2	66	22.0	2	66	5.5
Overall	12	389	389.0	12	389	129.7	12	389	32.5

¹ Season dates: summer (May 9 – August 31), fall (September 1 – November 30), winter (December 1 – February 28), and spring (March 1 – May 8).

² A visit was defined as surveying all of the survey plots once within the Project and could occur across multiple dates, but had to be completed in a single season.

³ A survey was defined as a single 60-minute, 20-minute, or 5-minute count of birds.

• Species of Concern

No federally listed threatened or endangered species were observed during the surveys. Bald eagles (15 observations), golden eagles (47), and unidentified eagles (two), protected under BGEPA were observed during use surveys and incidentally (Table 3, Appendix A1). Eight additional birds classified as Level I Species of Conservation Priority were recorded during avian use surveys and incidentally (Table 3, Appendices A2 and A3). Ferruginous hawk, marbled godwit, Wilson's phalarope, Baird's sparrow, chestnut-colored longspur, grasshopper sparrow, and lark bunting were only recorded during summer and Swainson's hawk were observed in summer, fall, and spring (Appendices A2 and A3).

• *Eagles*

• Mean Use

Bald eagles were recorded during fall, winter and spring, with approximate consistent mean use observed between the three seasons (0.02, 0.07, and 0.02 observations/800-m plot/60-min survey, respectively; Appendix B1). Overall bald eagle mean use was 0.03 observations/800-m plot/60-min survey.

Golden eagles were recorded in all seasons with mean use in winter (0.14 observations/800-m plot/60-min survey), fall (0.12), summer (0.06), and spring (0.03; Appendix B1). Overall golden eagle use was 0.09 observations/800-m plot/60-min survey. Unidentified eagles were only recorded during the winter (0.02 observations/800-m plot/60-min survey; Appendix B1) and overall use was less than 0.01.

Table 3. Species of concern by number (#) of groups (grps) and individual observations (obs) observed during the 65-minute avian use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.

Species	Scientific Name	Status ^a	Surveys		Incidental		Total	
			# of grps	# of obs	# of grps	# of obs	# of grps	# of obs
Large Birds								
bald eagle	<i>Haliaeetus leucocephalus</i>	BGEPA	10	10	3	5	13	15
ferruginous hawk	<i>Buteo regalis</i>	LEVEL 1 SCP	6	6	11	11	17	17
golden eagle	<i>Aquila chrysaetos</i>	BGEPA	35	35	11	12	46	47
Marbled godwit	<i>Limosa fedoa</i>	LEVEL 1 SCP	2	3	0	0	2	3
Swainson's hawk	<i>Buteo swainsoni</i>	LEVEL 1 SCP	25	28	29	29	54	57
unidentified eagle		BGEPA	2	2	0	0	2	2
Wilson's phalarope	<i>Phalaropus tricolor</i>	LEVEL 1 SCP	3	12	0	0	3	12
Small Bird								
Baird's sparrow	<i>Ammodramus bairdii</i>	LEVEL 1 SCP	13	14	0	0	13	14
chestnut-collared longspur	<i>Calcarius ornatus</i>	LEVEL 1 SCP	8	8	0	0	8	8
Grasshopper sparrow	<i>Ammodramus savannarum</i>	LEVEL 1 SCP	37	42	0	0	37	42
lark bunting	<i>Calamospiza melanocorys</i>	LEVEL 1 SCP	7	8	0	0	7	8
Total	10 species		148	168	54	57	202	225

^a BGEPA = Bald and Golden Eagle Protection Act (1940); Level I SCP = Level I North Dakota Species of Conservation Priority (Dyke et al. 2015).

- Activity Minutes

Ten bald eagle observations resulted in 22 bald eagle risk minutes out of 154 bald eagle minutes during 389 total survey hours (Table 4). Bald eagle risk minutes per survey hour ranged from zero to 0.48 across months, with an overall value of 0.06 for the entire survey period (Table 4). Bald eagle risk minutes per survey hour were recorded at points 18 (0.08 risk min/800-m plot/60-min survey), 60 (0.25), 21 (0.27), 40 (0.33), 29 (0.42), and 43 (0.50; Figure 4). The distribution of bald eagle risk minutes per survey hour was similar throughout the Project where survey points occurred (Figure 4).

Table 4. Summary of bald eagle activity minutes and observations within 800 meters of the observer recorded during the 60-minute avian use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.

Month/Year	Bald Eagle Observations		Bald Eagle Minutes		Survey Hours	Bald Eagle Risk Minutes/Survey Hour
	Within Estimated Risk Cylinder ^a	Total ^b	Within Estimated Risk Cylinder ^a	Total ^b		
August 2018	0	0	0	0	30	0
September 2018	2	2	3	59	32	0.09
October 2018	0	0	0	0	33	0
November 2018	0	0	0	0	33	0
December 2018	1	1	3	3	33	0.09
January 2019	6	6	16	32	33	0.48
February 2019	0	0	0	0	33	0
March 2019	0	1	0	60	42	0
April 2019	0	0	0	0	24	0
May 2019	0	0	0	0	32	0
June 2019	0	0	0	0	32	0
July 2019	0	0	0	0	32	0
Total	9	10	22	154	389	0.06

^a Risk cylinder = area within 800 meters (m; 2,625 feet [ft]) of the observer and below 200 m (656 ft) flight height; minutes within risk cylinder = eagle risk minutes.

^b Total = minutes or observations inside and outside the risk cylinder, but still within 800 m of the survey point.

Forty-three golden eagle observations resulted in 100 golden eagle risk minutes out of 570 golden eagle minutes during 389 total survey hours (Table 5). Golden eagle risk minutes per survey hour ranged from zero to 0.77 across months (Table 5). Golden eagle risk minutes were recorded at 20 survey points throughout the Project ranging from 0.08 golden eagle risk minutes per hour (points 18, 27, 28, 42, and 60) to 1.42 (Point 1; Figure 5). The northern half of the Project, where survey points occurred, had slightly higher levels of golden eagle risk minutes per survey hour (Figure 5).

Two unidentified eagle observations resulted in three unidentified eagle risk minutes out of 18 unidentified eagle minutes during 389 total survey hours. Unidentified eagle risk minutes per survey hour were recorded in December (0.06) and January (0.03), with an overall value of 0.01 for the entire survey period. Unidentified eagle risk minutes per survey hour were recorded at points 43 (0.08 observations/800-m plot/60-min survey) and 21 (0.18; Appendix C1).

Table 5. Summary of golden eagle activity minutes and observations within 800 meters of the observer recorded during the 60-minute avian use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.

Month/Year	Golden Eagle Observations		Golden Eagle Minutes		Survey Hours	Golden Eagle Risk Minutes/Survey Hour
	Within Estimated Risk Cylinder ^a	Total ^b	Within Estimated Risk Cylinder ^a	Total ^b		
August 2018	6	6	23	49	30	0.77
September 2018	5	7	5	18	32	0.16
October 2018	1	1	4	4	33	0.12
November 2018	6	8	25	62	33	0.76
December 2018	3	5	7	49	33	0.21
January 2019	4	5	9	95	33	0.27
February 2019	4	5	19	80	33	0.58
March 2019	2	5	2	207	42	0.05
April 2019	0	0	0	0	24	0
May 2019	0	0	0	0	32	0
June 2019	1	1	6	6	32	0.19
July 2019	0	0	0	0	32	0
Total	32	43	100	570	389	0.26

^a Risk cylinder = area within 800 meters (m; 2,625 feet [ft]) of the observer and below 200 m (656 ft) flight height; minutes within risk cylinder = eagle risk minutes.

^b Total = minutes or observations inside and outside the risk cylinder, but still within 800 m of the survey point.

- Spatial Use**

Bald eagle observations were recorded at six of the survey points, with mean use ranging from zero to 0.33 eagles/800-m plot/60-min survey among points (Appendix C1). Bald eagle use was highest at Point 43 (0.33). No clear pattern in bald eagle flight paths was observed (Figure 6).

Golden eagle observations were recorded at 21 of the survey points, with mean use ranging from zero to 0.42 and was highest at Point 10 (0.42; Appendix C1). Golden eagle flight paths were slightly more concentrated in the northern half and central regions of the Project where survey points were conducted (Figure 6).

Unidentified eagle observations were recorded at two of the survey points, with mean use ranging from zero to 0.09 eagles/800-m plot/60-min survey among points (Appendix C1). Unidentified eagle use was highest at Point 21 (0.09 eagles/800-m plot/60-min survey). No clear pattern in unidentified eagle flight paths was observed (Figure 6).

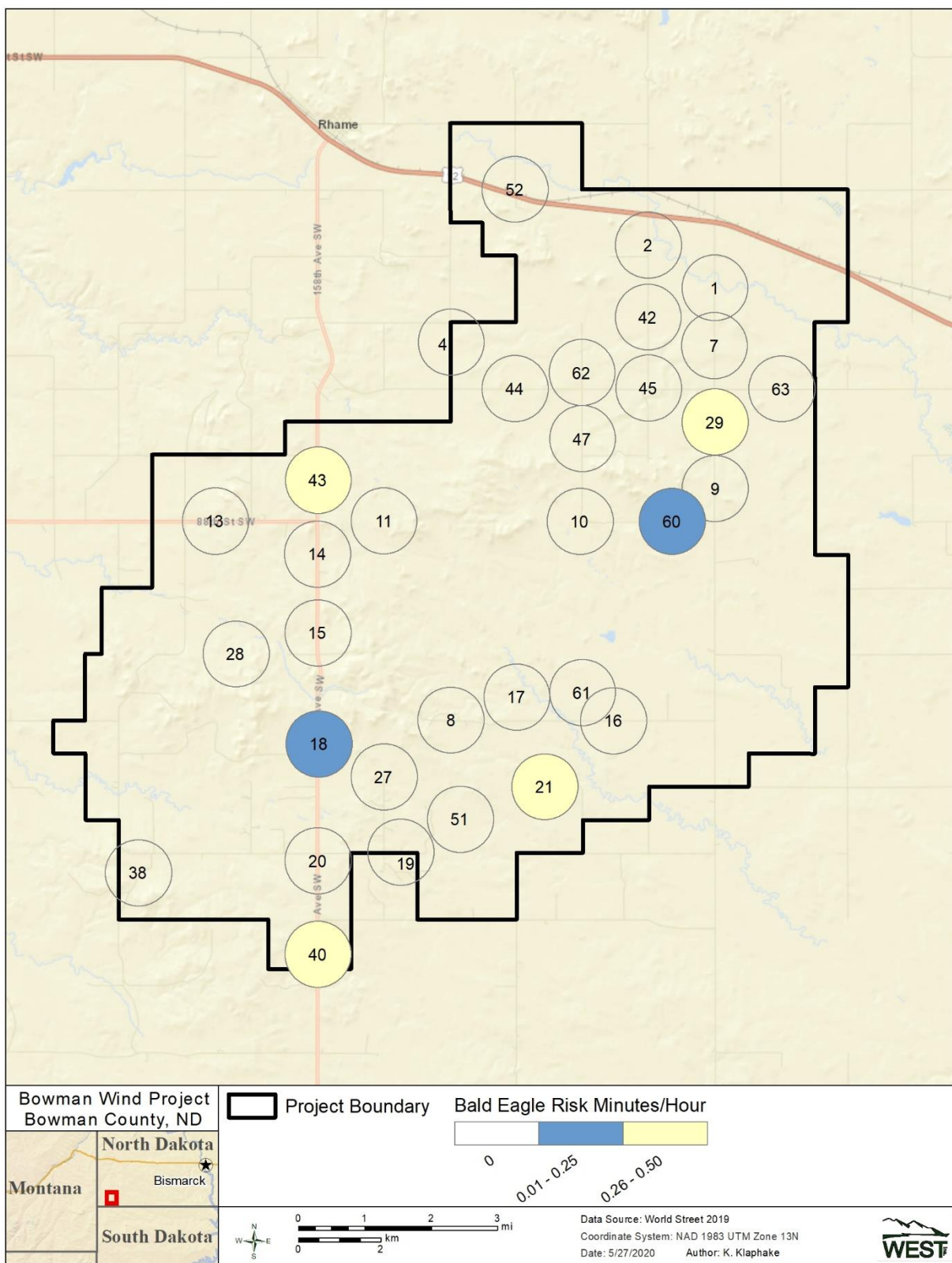


Figure 4. Estimated bald eagle risk (flying within 800 meters [2,625 feet] and below 200 meters [656 feet]) minutes per survey hour at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.

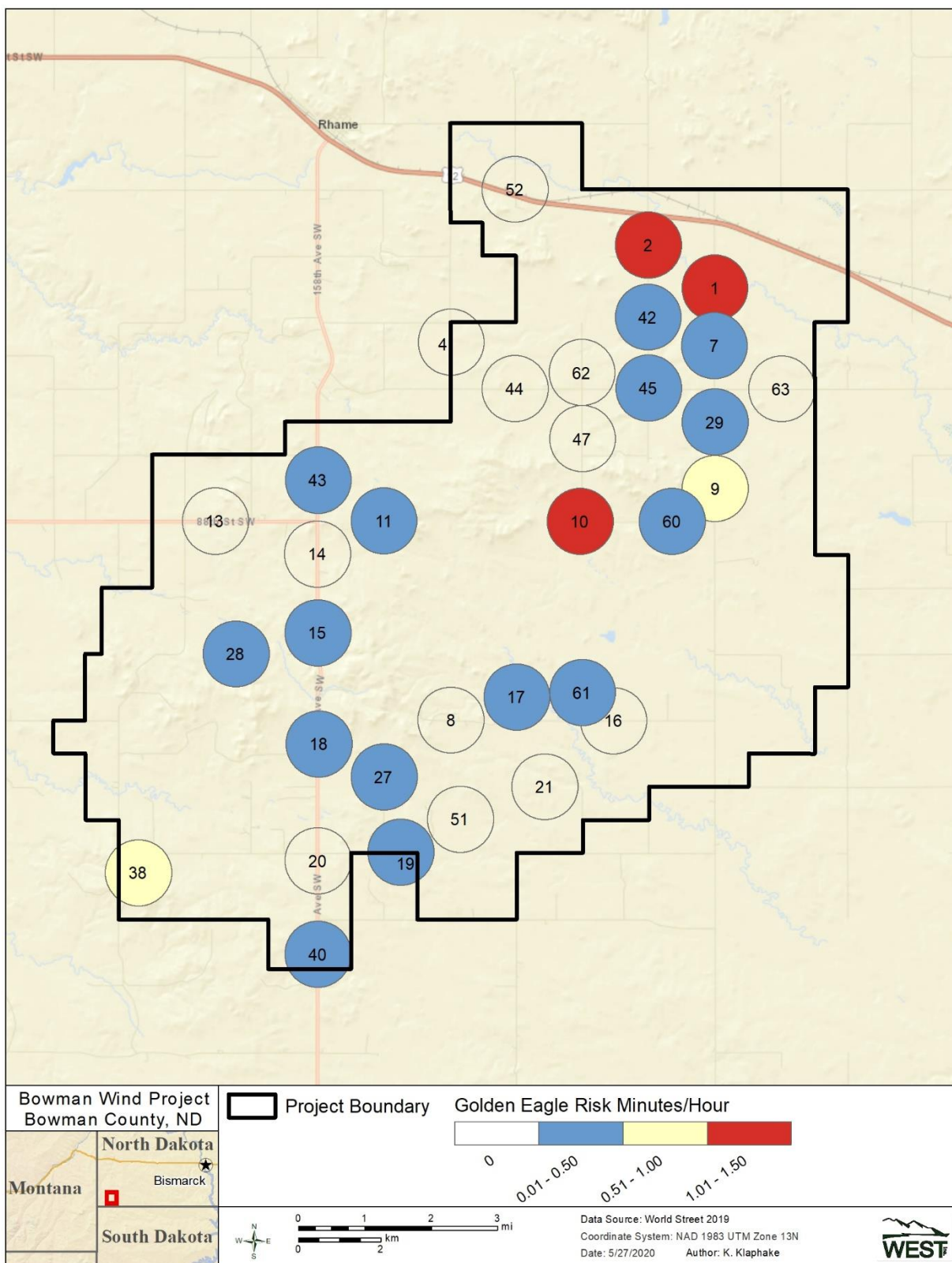


Figure 5. Estimated golden eagle risk (flying within 800 meters [2,625 feet] and below 200 meters [656 feet]) minutes per survey hour at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.

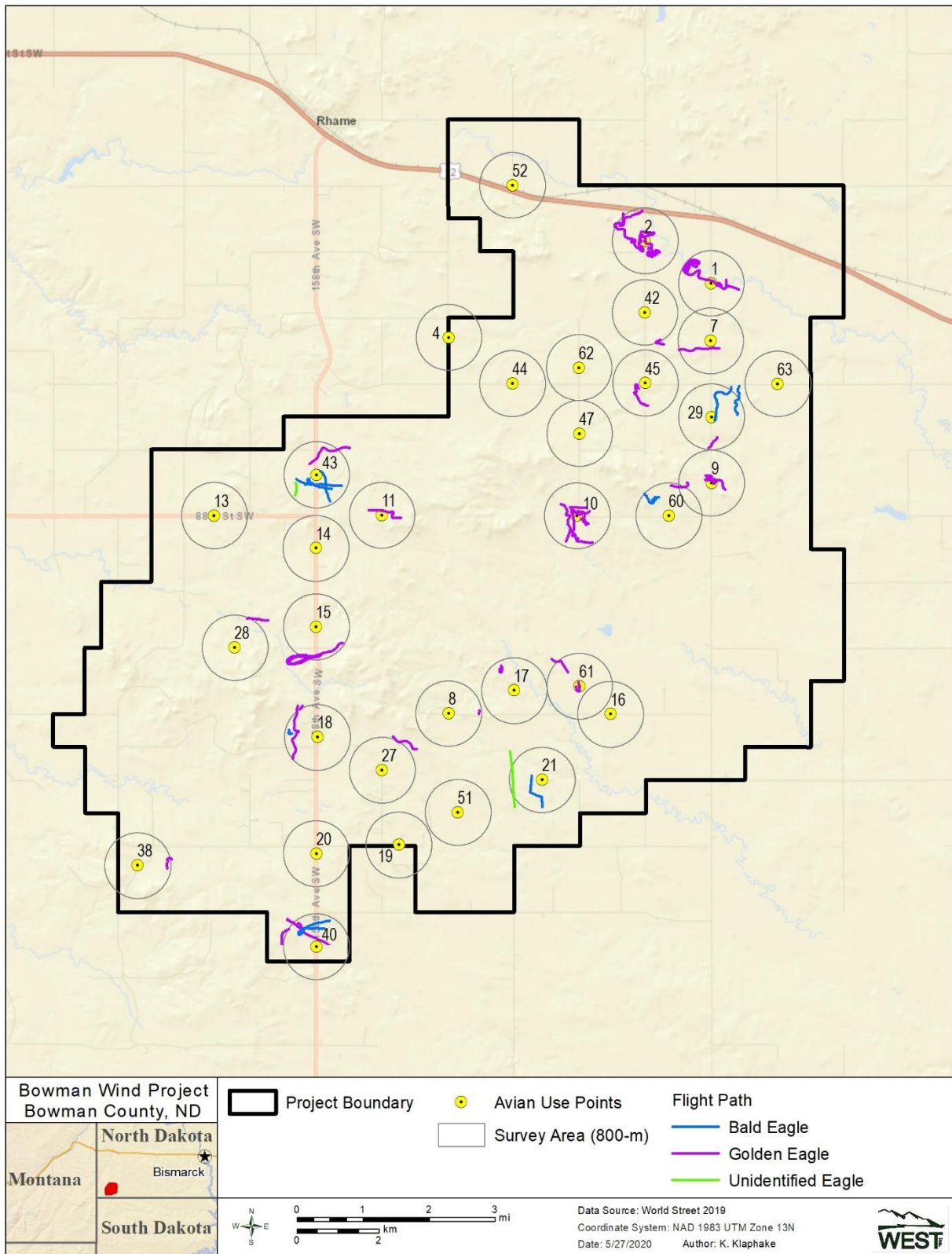


Figure 6. Estimated bald, golden, and unidentified eagle flight paths at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.

- **Large Birds**

During the 20-min avian use surveys, there were 1,858 large bird observations within 403 groups. The most commonly observed large bird was Canada goose (45.0% of large bird observations; Appendix A2). Diurnal raptors made up 10.0% of large bird species recorded. The most common non-eagle raptor species observed were northern harrier (61 observations), red-tailed hawk (30), and Swainson's hawk (28).

- *Mean Use, Percent of Use, and Frequency of Occurrence*

Large bird mean use was highest during fall (9.73 observations/800-m plot/20-min survey), followed by spring (5.09), summer (4.18), and winter (0.32; Appendix B2). Diurnal raptors, including eagles, accounted for 68.8% of use in winter, 12.7% of use in summer, 8.2% in fall, and 5.7% of use in spring (Appendix B2). Waterfowl accounted for the majority of use in fall and spring (75.8% and 50.62%, respectively) from Canada goose (72.0% in fall and 33.0% in spring; Appendix B2). Large bird frequency of occurrence varied among seasons with diurnal raptors recorded during all seasons and waterfowl only in summer, fall, and spring (Appendix B2). For diurnal raptors, northern harrier was the most frequently observed species in fall, summer, and spring (25.7%, 15.0%, and 9.1%, respectively), while red-tailed hawk and rough-legged hawk were in fall (13.3% and 10.1%, respectively), and golden eagle (8.1%) in winter (Appendix B2).

- *Flight Height*

Mean large bird estimated flight heights ranged from 3.0 m (9.8 ft) for large corvids to 95.0 m (311.7 ft) for waterbirds (Table 6). Waterbirds and vultures were recorded flying within the estimated RSH 100% of the time. Diurnal raptors flew within the estimated RSH 38.5% of the time, including unidentified accipiters within the estimated RSH 100% (one observation) of the time, golden eagle flying 92.9% (14), bald eagle flying 75.0% (four), rough-legged hawk flying 68.8% (16), and red-tailed hawk flying 56.3% (16; Table 6) of the time within the estimated RSH.

- *Spatial Use*

Large birds were observed at all 33 survey points, with highest use observed at Point 14 with 39.92 birds/800-m plot/20 min survey, followed by Point 17 (16.45), Point 20 (10.17), Point 4 (10.08), and Point 13 (9.91; Figure 7, Appendix C2). High use at Point 14 was due to high waterfowl use (33.33 waterfowl/800-m plot/20-min survey).

Table 6. Estimated flight height (meters [m]) characteristics (based on first activity and first flight height) by number (#) of groups (grps) and individual observations (obs) by large bird type and raptor subtype observed during the 20-minute large bird use surveys² at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.

Bird Type	# Groups Flying	# Obs Flying	Estimated Mean Flight Height (m)	% Obs Flying	% within Estimated Flight Height Categories		
					<25 m	25–200 m ¹	>200 m
Waterbirds	3	71	95.00	100	0	100	0
sandhill crane	1	30	200.00	100	0	100	0
great blue heron	1	1	35.00	100	0	100	0
American white pelican	1	40	50.00	100	0	100	0
Waterfowl	50	892	35.36	81.2	9.8	90.2	0
northern pintail	7	20	18.86	71.4	40.0	60.0	0
American wigeon	2	3	8.00	42.9	100	0	0
green-winged teal	1	16	1.00	100	100	0	0
mallard	14	25	25.36	48.1	44.0	56.0	0
snow goose	1	25	75.00	100	0	100	0
canvasback	1	7	1.00	100	100	0	0
Canada goose	17	779	58.88	93.1	4.4	95.6	0
tundra swan	1	2	80.00	100	0	100	0
gadwall	3	4	8.67	100	100	0	0
blue-winged teal	2	7	15.50	33.3	57.1	42.9	0
unidentified waterfowl	1	4	50.00	5.2	0	100	0
Shorebirds	12	15	11.58	34.1	100	0	0
upland sandpiper	1	1	20.00	50.0	100	0	0
killdeer	7	8	11.86	34.8	100	0	0
marbled godwit	2	3	8.00	100	100	0	0
Wilson's phalarope	1	2	5.00	16.7	100	0	0
American avocet	1	1	15.00	25.0	100	0	0
Diurnal Raptors	136	143	26.77	77.3	61.5	38.5	0
<u>Accipiters</u>	1	1	40.00	100	0	100	0
unidentified accipiter	1	1	40.00	100	0	100	0
<u>Buteos</u>	49	56	38.94	66.7	42.9	57.1	0
red-tailed hawk	15	16	44.00	53.3	43.8	56.3	0
rough-legged hawk	13	16	33.85	80.0	31.3	68.8	0
ferruginous hawk	3	3	21.00	50.0	66.7	33.3	0
Swainson's hawk	18	21	41.39	75.0	47.6	52.4	0
<u>Northern Harrier</u>	58	58	8.59	95.1	93.1	6.9	0
northern harrier	58	58	8.59	95.1	93.1	6.9	0
<u>Eagles</u>	18	18	59.44	69.2	11.1	88.9	0
golden eagle	14	14	59.29	70.0	7.1	92.9	0
bald eagle	4	4	60.00	66.7	25.0	75.0	0
<u>Falcons</u>	4	4	9.75	80.0	75.0	25.0	0
prairie falcon	2	2	14.00	66.7	50.0	50.0	0
American kestrel	2	2	5.50	100	100	0	0
<u>Other Raptors</u>	6	6	14.33	75.0	83.3	16.7	0
unidentified raptor	6	6	14.33	75.0	83.3	16.7	0
Vultures	4	4	40.00	100	0	100	0
turkey vulture	4	4	40.00	100	0	100	0
Upland Game Birds	6	26	3.83	25.2	100	0	0
ring-necked pheasant	2	3	2.50	4.0	100	0	0
sharp-tailed grouse	4	23	4.50	82.1	100	0	0
Doves/Pigeons	65	139	12.78	61.5	89.2	10.8	0
rock pigeon	9	34	31.67	61.8	64.7	35.3	0
mourning dove	56	105	9.75	61.4	97.1	2.9	0

Table 6. Estimated flight height (meters [m]) characteristics (based on first activity and first flight height) by number (#) of groups (grps) and individual observations (obs) by large bird type and raptor subtype observed during the 20-minute large bird use surveys² at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.

Bird Type	# Groups Flying	# Obs Flying	Estimated Mean Flight Height (m)	% Obs Flying	% within Estimated Flight Height Categories		
					<25 m	25–200 m ¹	>200 m
Large Corvids	2	14	3.00	11.5	100	0	0
American crow	2	14	3.00	11.5	100	0	0
Goatsuckers	3	3	10.00	100	100	0	0
common nighthawk	3	3	10.00	100	100	0	0
Large Birds Overall	281	1,307	24.49	70.3	27.3	72.7	0

¹ The likely rotor-swept height for potential collision with a turbine blade, or 25 to 200 m (82 to 656 feet [ft]) above ground level.

² 800-m (2,625-ft) radius plot for large birds.

• Small Bird Use

During the 5-min avian use surveys, 1,154 small birds were observed in 610 groups over 32.5 hours of surveys (Appendix A3). The most commonly observed small birds were horned lark (25.0% of observations), western meadowlark (19.9%), and red-winged blackbird (14.2%; Appendix A3). Together these three species accounted for approximately 59.1% of all small bird observations (Appendix A3).

• Mean Use, Percent of Use, and Frequency of Occurrence

Small bird mean use ranged from 0.59 observations/100-m plot/5-min survey in the winter to 4.87 during summer (Figure 8, Appendix B3). Passerines accounted for 100% of small bird use in fall, winter, and spring and 99.8% of use in summer. Horned larks accounted for 100% of use in winter, 65.4% in spring, and 31.3% of use in fall and western meadowlark accounted for the highest use in summer (25.5%; Appendix B3).

• Spatial Use

Small birds were observed at all but one point (Point 38) and ranged from 0.75 observations/100-m plot/5-min survey at points 9 and 47 to 7.08 at Point 10 (Figure 9, Appendix C3). High use at Point 10 was largely due to horned larks (5.08).

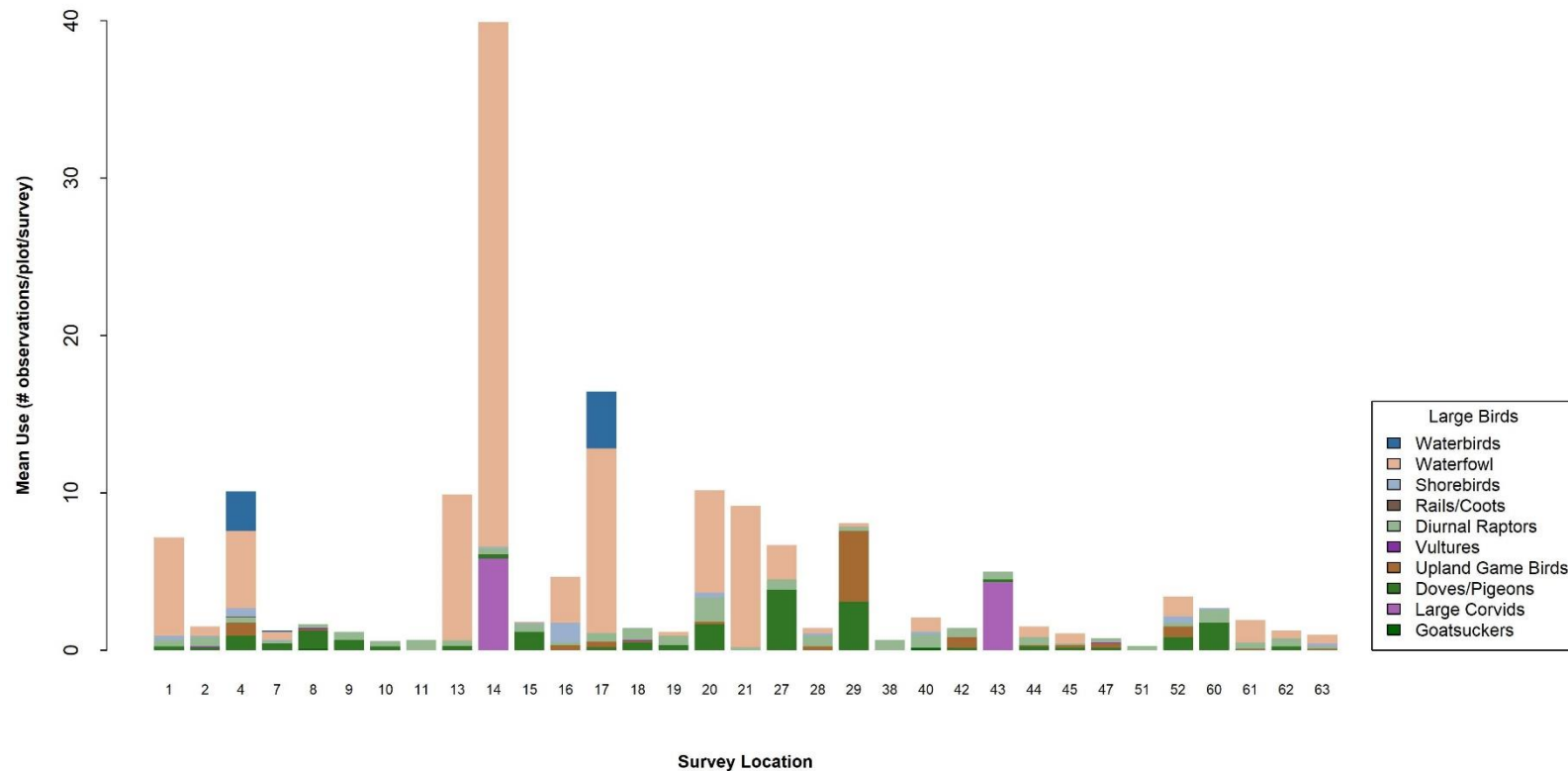


Figure 7. Large bird mean use (number of large birds/800-meter [2,625-foot] plot/20-minute survey) by point and bird type at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.

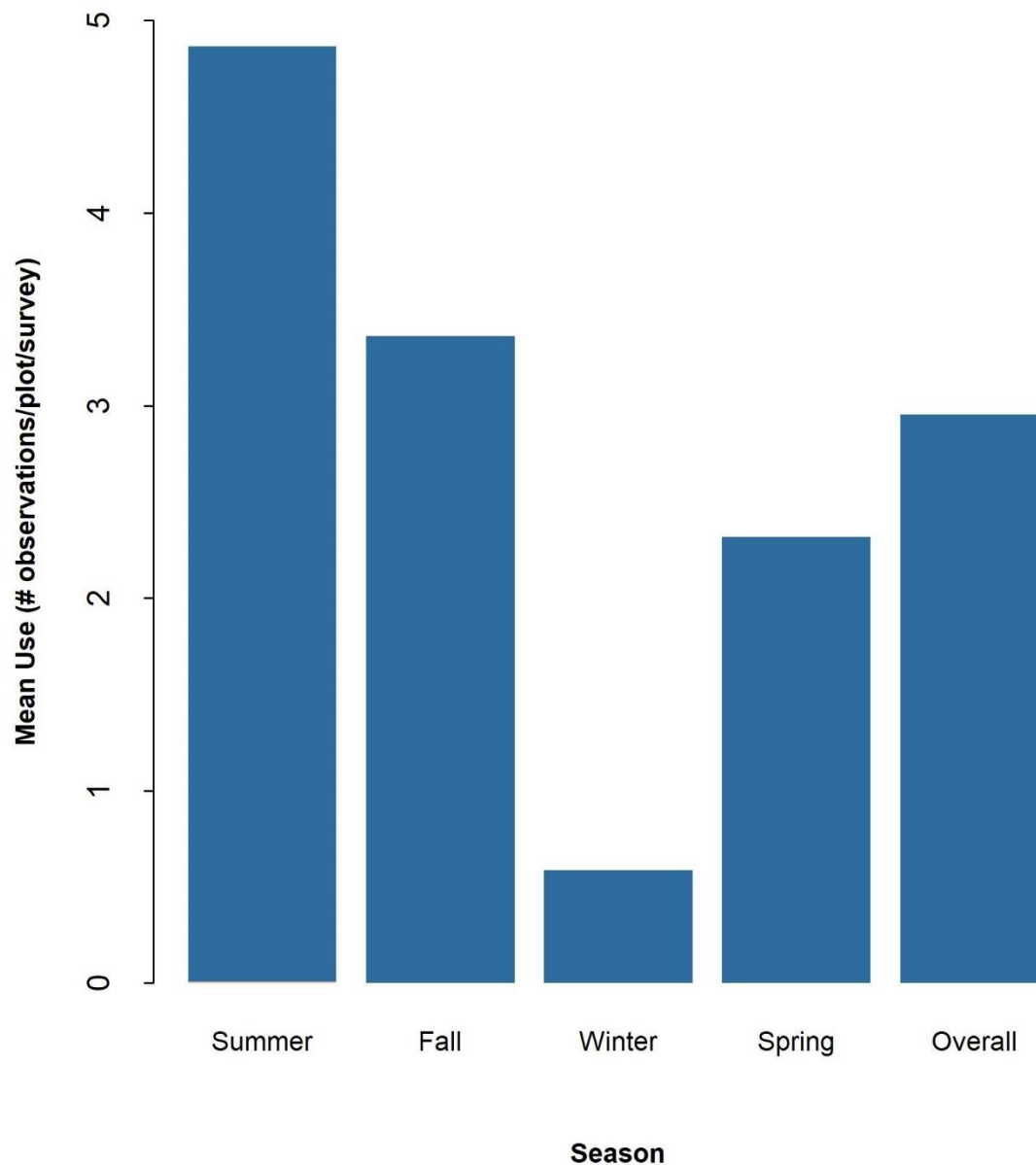


Figure 8. Small bird mean use (number of small birds/100-meter [328-foot] plot/5-minute survey) by season and bird type at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.

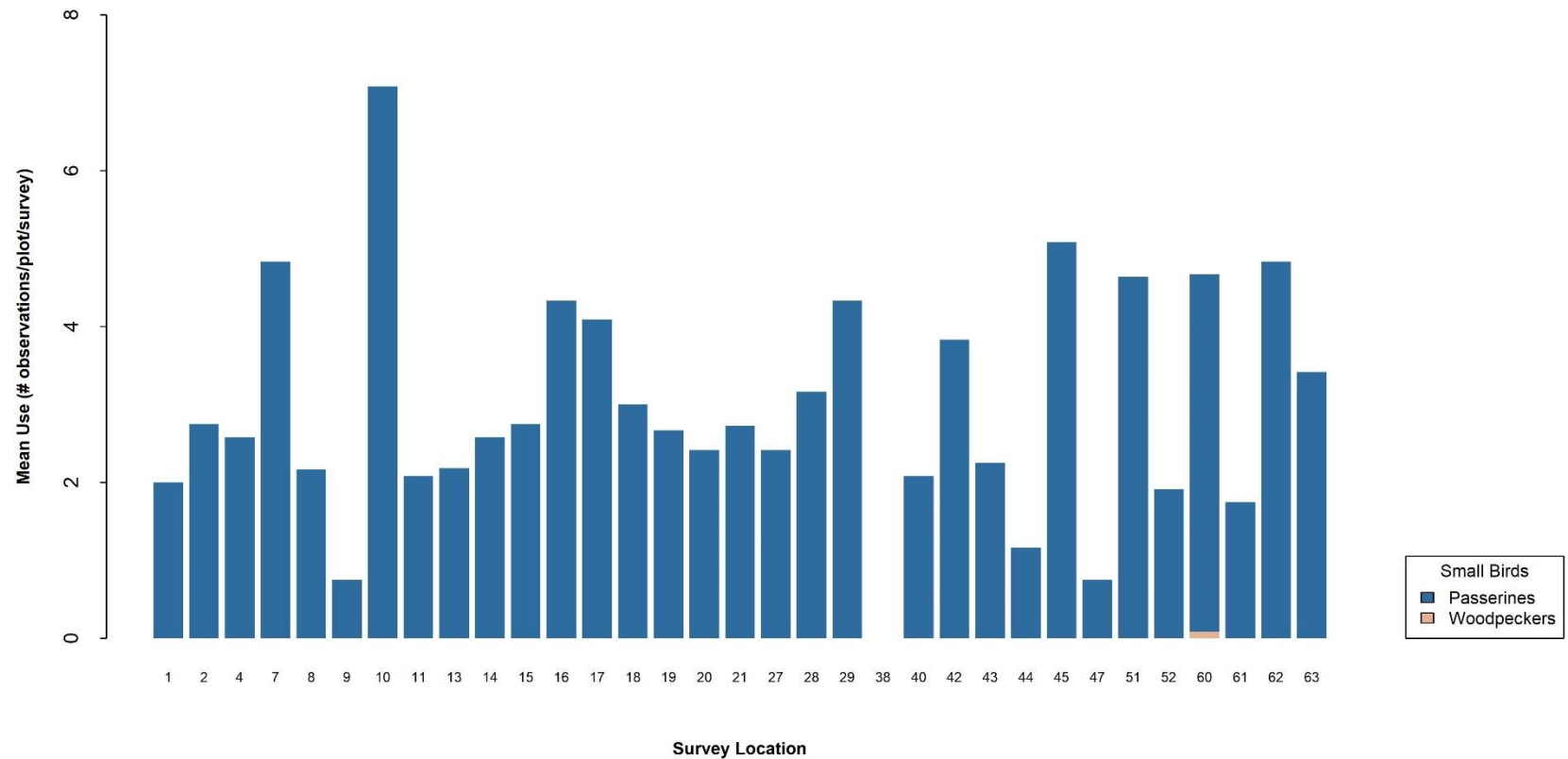


Figure 9. Small bird mean use (number of small birds/100-meter [328-foot] plot/5-minute survey) by point and bird type at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.

- **DISCUSSION**

- **Species of Concern**

No federally threatened or endangered species were recorded at the Project during surveys. Ten bird species of concern, including four raptors (bald eagle, golden eagle, ferruginous hawk, and Swainson's hawk), four passerines (Baird's sparrow, chestnut-collared longspur, grasshopper sparrow, and lark bunting) and two shorebirds (marbled godwit and Wilson's phalarope) were recorded during surveys.

Six ferruginous hawks were observed during the summer use surveys. Southwestern North Dakota is the primary range of the ferruginous hawk in North Dakota and thought to have some of the highest densities of the species in the state (Dyke et al. 2015). The Project contains preferred habitat (shrub/scrub and grasslands); however, it lacks nesting habitat. Twenty-eight Swainson's hawks were observed during spring, summer, and fall use surveys. Bowman County is considered primary range for the hawk (Dyke et al. 2015) and they are considered common in the state. Swainson's hawk utilize a wide variety of habitats, including those found within the Project. In general, impacts to these raptor species is likely to be low based on the relatively low number of observations and typical flight behavior.

Eight chestnut-collared longspurs were observed during the summer use surveys, suggesting they are potentially nesting in the Project. Chestnut-collared longspurs prefer native prairie habitat and avoid areas of dense shrub. This species of longspur is considered common and are abundant in North Dakota, with Bowman County included within their primary range (Dyke et al. 2015). Eight lark buntings were observed in summer. Bowman County is located within their primary range in North Dakota and contains some preferred habitat (shorter grasslands mixed with shrubs; Dyke et al. 2015). The grasshopper sparrow was only observed in summer when 42 birds were recorded. This sparrow is present statewide in North Dakota, occurring in grass-dominated habitats with some bare ground and minimal scrub cover (Dyke et al. 2015). Fourteen Baird's sparrow were recorded during the summer use surveys. This sparrow breeds mostly in native prairie; however, it has been documented using non-native grasslands, including pasture within North Dakota, with the highest densities found in northwestern North Dakota (Dyke et al. 2015). Based on NLCD data (Yang et al. 2018, Multi-Resolution Land Characteristics 2019), the Project is approximately 44% shrub/scrub and 32% herbaceous with the majority of sagebrush and grasslands located in the central and southwestern portions of the Project. Impacts to chestnut-collared longspurs, lark buntings, grasshopper sparrows, and Baird's sparrows may be minimized by limiting surface disturbance to any existing, intact shrub/scrub and herbaceous habitats.

Three marbled godwits and 12 Wilson's phalarope were only recorded during use surveys in the summer, indicating they were potentially nesting in the area. In North Dakota, marbled godwits and Wilson's phalarope are considered common summer residents. Marbled godwit nest within grazed native prairie, pastureland, and idle grasslands and haylands (Dyke et al. 2015). Wilson's

phalarope prefer shallow wetlands with open areas, nesting on the margins of wetlands. In general, impacts to these shorebird species are likely to be low based on the relatively low number of observations and very limited amount of open water (0.2%) within the Project.

- **Eagles**

Based on data collected during Year 2 surveys, the Project may receive increased use by bald eagles during spring, fall migration and winter. This corresponds with higher bald eagle use seen during winter and spring migration in Year 1, suggesting bald eagles are foraging opportunistically and not breeding in the Project. For breeding, bald eagles prefer habitat with large trees, such as cottonwood trees (*Populus* spp.), coupled with larger bodies of water or rivers, both of which are lacking in the Project. Furthermore, no occupied bald eagle nests were observed within the Project during raptor nest surveys in 2018 or 2019. The closest occupied active bald eagle nest occurred approximately 15 kilometers (km; nine miles) west of the Project along the Missouri River. Bald eagle prey resources such as waterfowl can be found within the Project and bald eagles will likely scavenge on wildlife carrion and livestock carcasses. Bald eagle use was not concentrated in a particular portion of the Project. Spatial use by bald eagles in Year 2 resembled their use in Year 1 and reflects the potential presence of a prey base but the lack of major water features in the Project.

Similar to the results from the Year 1 surveys, golden eagles were recorded during all seasons, with the highest use during winter and fall, suggesting increased use of the Project during the migration periods and winter. The Project is located in an arid region dominated by shrub/scrub and herbaceous/cultivated grassland as the primary land cover, offering foraging opportunities, but limited nesting habitat for golden eagles. No occupied golden eagle nests were observed within the Project during raptor nest surveys in 2018 or 2019. The nearest occupied active golden eagle nest occurs 15 km (nine miles) west of the Project. Although nesting habitat is limited within the Project, primary prey resources, including greater sage-grouse (*Centrocercus urophasianus*), sharp-tailed grouse (*Tympanuchus phasianellus*), black-tailed prairie dogs (*Cynomys ludovicianus*), lagomorphs, and livestock (including sheep and cattle) are located adjacent to or within the Project. Golden eagle use was slightly more concentrated in the northern and central regions of the Project, which is likely due to the presence of prey (prairie dog colonies in northern region) and greater topographic relief of the Medicine Pole hills in the central region providing foraging opportunities. Based on the results of this survey, the presence of foraging habitat and availability of potential prey resources, golden eagle use within the Project is likely to occur year-round, which is typical for this region.

- **Large Birds**

During spring, migratory waterfowl were the most often observed large bird group, with Canada goose observed more frequently than any other waterfowl species. While migratory waterfowl are often present in large numbers on the Midwestern landscape, waterfowl fatalities at wind farms are relatively uncommon. In an analysis of 116 studies of bird mortality at over 70 facilities, waterfowl made up 2.7% of 4,975 fatalities found (Erickson et al. 2014). Canada goose is common, geographically abundant, and likely to be unaffected by collision related mortality associated with the Project.

Northern harrier and Swainson's hawk were the mostly frequently observed non-eagle raptor species observed within the Project. Both species were observed in relatively small numbers in all seasons. Northern harriers may fly within the RSH during aerial courtship displays that occur at nesting sites during the breeding season, but otherwise, northern harriers are known to hunt, eat, and perch low to the ground (MacWhirter and Bildstein 1996, Smith et al. 2011). Whitfield and Madders (2006) reported up to 97.0% of northern harrier flights were below 20 m (66 ft); therefore, risk of collision with turbine blades is considered low for this species. Swainson's hawk are considered a common species within the region with stable populations (Dyke et al. 2015, All About Birds 2020) and the operation of a wind energy facility within the Project is not likely to incur population-level impacts to these species.

- **Small Birds**

The most commonly observed small birds were horned lark, western meadowlark, and red-winged blackbird. These species are typical of this region and are widespread and abundant. Overall, 99.5% of small bird species were recorded below the estimated RSH, suggesting the Project is not likely to cause significant impacts to local small-bird populations. Limiting surface disturbance to previously undisturbed shrub/scrub and herbaceous habitats may minimize impacts to small birds that rely on these habitats for breeding.

• REFERENCES

- All About Birds. 2020. Swainson's Hawk. Cornell Lab of Ornithology. Available online: https://www.allaboutbirds.org/guide/Swainsons_Hawk/overview
- Bald and Golden Eagle Protection Act (BGEPA). 1940. 16 United States Code (USC) Section (§) 668-668d. Bald Eagle Protection Act of 1940, June 8, 1940, Chapter 278, § 2, 54 Statute (Stat.) 250; Expanded to include the related species of the golden eagle October 24, 1962, Public Law (PL) 87-884, 76 Stat. 1246. [as amended: October 23, 1972, PL 92-535, § 2, 86 Stat. 1065; November 8, 1978, PL 95-616, § 9, 92 Stat. 3114.].
- Dyke, S. R., S. K. Johnson, and P. T. Isakson. 2015. North Dakota State Wildlife Action Plan. North Dakota Game and Fish Department, Bismarck, North Dakota. Available online: <https://gf.nd.gov/wildlife/swap>
- Erickson, W. P., M. M. Wolfe, K. J. Bay, D. H. Johnson, and J. L. Gehring. 2014. A Comprehensive Analysis of Small Passerine Fatalities from Collisions with Turbines at Wind Energy Facilities. PLoS ONE 9(9): e107491. doi: 10.1371/journal.pone.0107491.
- Esri. 2019a. World Imagery and Aerial Photos. (World Topo). ArcGIS Resource Center. Environmental Systems Research Institute (Esri), producers of ArcGIS software. Redlands, California. Information online: <https://www.arcgis.com/home/item.html?id=10df2279f9684e4a9f6a7f08febac2a9>
- Esri. 2019b. World Street Map. ArcGIS Resource Center. Environmental Systems Research Institute (Esri), producers of ArcGIS software, Redlands, California. Data accessed July 2019. Information online: <https://www.arcgis.com/home/item.html?id=10df2279f9684e4a9f6a7f08febac2a9>
- MacWhirter, R. B. and K. L. Bildstein. 1996. Northern Harrier (*Circus cyaneus*). A. Poole and F. Gill, eds. The Birds of North America, No. 210. The Academy of Natural Sciences, Philadelphia, Pennsylvania, and The American Ornithologists' Union, Washington, D. C., 32 pp.
- Multi-Resolution Land Characteristics (MRLC). 2019. National Land Cover Database (NLCD) 2016. Multi-Resolution Land Characteristics (MRLC) Consortium. US Geological Survey (USGS) Earth Resources Observation and Science (EROS) Center, MRLC Project, Sioux Falls, South Dakota. May 10, 2019. Information online: <https://www.mrlc.gov/data>
- North American Datum (NAD). 1983. NAD83 Geodetic Datum.
- Smith, K. G., S. R. Wittenberg, R. B. Macwhirter, and K. L. Bildstein. 2011. Hen/Northern Harrier (*Circus cyaneus/Hudsonius*), Version 2.0. A. F. Poole, ed. In: The Birds of North America. Cornell Lab of Ornithology, Ithaca, New York. doi: 10.2173/bna.210. Retrieved from The Birds of North America Online: <http://birdsna.org/Species-Account/bna/species/norhar>
- US Environmental Protection Agency (USEPA). 2017. Level III and Level IV Ecoregions of the Continental United States. Ecosystems Research, USEPA. Last updated December 26, 2018. Accessed March 2020. Information and maps online: <https://www.epa.gov/eco-research/level-iii-and-iv-ecoregions-continental-united-states>
- US Fish and Wildlife Service (USFWS). 2012. Land-Based Wind Energy Guidelines. March 23, 2012. 82 pp. Available online: http://www.fws.gov/cno/pdf/Energy/2012_Wind_Energy_Guidelines_final.pdf

- US Fish and Wildlife Service (USFWS). 2013. Eagle Conservation Plan Guidance: Module 1 - Land-Based Wind Energy, Version 2. US Department of the Interior, Fish and Wildlife Service, Division of Migratory Bird Management. April 2013. 103 pp. + frontmatter. Available online: <https://www.fws.gov/migratorybirds/pdf/management/eagleconservationplanguidance.pdf>
- US Fish and Wildlife Service (USFWS). 2016. Eagle Permits; Revisions to Regulations for Eagle Incidental Take and Take of Eagle Nests; Final Rule. 50 CFR 13 and 22. Department of the Interior Fish and Wildlife Service. 81 Federal Register (FR) 242: 91494-91554. December 16, 2016.
- US Fish and Wildlife Service (USFWS). 2020. Initial Project Scoping: IPaC - Information, Planning and Consultation. IPaC, Environmental Conservation Online System (ECOS), USFWS. Accessed March 9, 2020. Information online: <http://ecos.fws.gov/ipac/>
- US Geological Survey (USGS). 2019. 3D Elevation Program (3DEP). 3D elevation data from light detection and ranging (lidar) data: conterminous United States, Hawaii, and the US territories. USGS, Reston, Virginia. Accessed May 2019. Information online: <https://www.usgs.gov/core-science-systems/ngp/3dep>
- Whitfield, D. P. and M. Madders. 2006. A Review of the Impacts of Wind Farms on Hen Harriers *Circus cyaneus* and an Estimation of Collision Avoidance Rates. Natural Research Information Note 1 (revised). Natural Research Ltd., Banchory, Banchory, Aberdeenshire, United Kingdom.
- Yang, L., S. Jin, P. Danielson, C. Homer, L. Gass, S. M. Bender, A. Case, C. Costello, J. Dewitz, J. Fry, M. Funk, B. Granneman, G. C. Liknes, M. Rigge, and G. Xian. 2018. A New Generation of the United States National Land Cover Database: Requirements, Research Priorities, Design, and Implementation Strategies. ISPRS Journal of Photogrammetry and Remote Sensing 146: 108-123. doi: 10.1016/j.isprsjprs.2018.09.006.

**Appendix A. Summary of Bird Species Observed during Fixed-Point Avian Use Surveys
at the Proposed Bowman Wind Project, Bowman County, North Dakota, from
August 23, 2018 – July 23, 2019**

Appendix A1. Summary of number (#) of groups (grps) and individual observations (obs)¹ for eagles observed during the 60-minute fixed-point large bird use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.

Type/Species	Scientific Name	Summer		Fall		Winter		Spring		Total	
		# grps	# obs	# grps	# obs	# grps	# obs	# grps	# obs	# grps	# obs
<u>Eagles</u>		7	7	14	14	32	23	3	3	47	47
bald eagle	<i>Haliaeetus leucocephalus</i>	0	0	2	2	7	7	1	1	10	10
golden eagle	<i>Aquila chrysaetos</i>	7	7	12	12	14	14	2	2	35	35
unidentified eagle		0	0	0	0	2	2	0	0	2	2
Overall		7	7	14	14	23	23	3	3	47	47

¹ within an 800-meter (2,625-foot) radius of the survey point.

Appendix A2. Summary of number (#) of groups (grps) and individual observations (obs)¹ by large bird type, diurnal raptor subtype, and species observed during the 20-minute fixed-point large bird use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.

Type/Species	Scientific Name	Summer		Fall		Winter		Spring		Total	
		# grps	# obs	# grps	# obs	# grps	# obs	# grps	# obs	# grps	# obs
Waterbirds		2	41	1	30	0	0	0	0	3	71
sandhill crane	<i>Antigone canadensis</i>	0	0	1	30	0	0	0	0	1	30
great blue heron	<i>Ardea herodias</i>	1	1	0	0	0	0	0	0	1	1
American white pelican	<i>Pelecanus erythrorhynchos</i>	1	40	0	0	0	0	0	0	1	40
Waterfowl		48	199	8	730	0	0	22	170	78	1,099
northern pintail	<i>Anas acuta</i>	3	3	0	0	0	0	7	25	10	28
American wigeon	<i>Anas americana</i>	4	7	0	0	0	0	0	0	4	7
green-winged teal	<i>Anas crecca</i>	0	0	0	0	0	0	1	16	1	16
mallard	<i>Anas platyrhynchos</i>	12	24	1	10	0	0	6	18	19	52
snow goose	<i>Anser caerulescens</i>	0	0	1	25	0	0	0	0	1	25
canvasback	<i>Aythya valisineria</i>	1	7	0	0	0	0	0	0	1	7
Canada goose	<i>Branta canadensis</i>	8	33	5	693	0	0	8	111	21	837
tundra swan	<i>Cygnus columbianus</i>	0	0	1	2	0	0	0	0	1	2
gadwall	<i>Mareca strepera</i>	3	4	0	0	0	0	0	0	3	4
northern shoveler	<i>Spatula clypeata</i>	7	23	0	0	0	0	0	0	7	23
blue-winged teal	<i>Spatula discors</i>	6	21	0	0	0	0	0	0	6	21
unidentified waterfowl		4	77	0	0	0	0	0	0	4	77

Appendix A2. Summary of number (#) of groups (grps) and individual observations (obs)¹ by large bird type, diurnal raptor subtype, and species observed during the 20-minute fixed-point large bird use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.

Type/Species	Scientific Name	Summer		Fall		Winter		Spring		Total	
		# grps	# obs	# grps	# obs	# grps	# obs	# grps	# obs	# grps	# obs
Shorebirds		18	33	0	0	0	0	6	11	24	44
upland sandpiper	<i>Bartramia longicauda</i>	2	2	0	0	0	0	0	0	2	2
killdeer	<i>Charadrius vociferus</i>	9	12	0	0	0	0	6	11	15	23
marbled godwit	<i>Limosa fedoa</i>	2	3	0	0	0	0	0	0	2	3
Wilson's phalarope	<i>Phalaropus tricolor</i>	3	12	0	0	0	0	0	0	3	12
American avocet	<i>Recurvirostra americana</i>	2	4	0	0	0	0	0	0	2	4
Rails/Coots		1	1	0	0	0	0	0	0	1	1
American coot	<i>Fulica americana</i>	1	1	0	0	0	0	0	0	1	1
Diurnal Raptors		65	66	72	78	22	22	19	19	178	185
<u>Accipiters</u>		0	0	0	0	1	1	0	0	1	1
unidentified accipiter		0	0	0	0	1	1	0	0	1	1
<u>Buteos</u>		34	35	34	40	5	5	4	4	77	84
red-tailed hawk	<i>Buteo jamaicensis</i>	11	11	15	16	0	0	3	3	29	30
rough-legged hawk	<i>Buteo lagopus</i>	0	0	12	15	5	5	0	0	17	20
ferruginous hawk	<i>Buteo regalis</i>	6	6	0	0	0	0	0	0	6	6
Swainson's hawk	<i>Buteo swainsoni</i>	17	18	7	9	0	0	1	1	25	28
<u>Northern Harrier</u>		21	21	27	27	3	3	10	10	61	61
northern harrier	<i>Circus hudsonius</i>	21	21	27	27	3	3	10	10	61	61
<u>Eagles</u>		3	3	7	7	13	13	3	3	26	26
golden eagle	<i>Aquila chrysaetos</i>	3	3	5	5	10	10	2	2	20	20
bald eagle	<i>Haliaeetus leucocephalus</i>	0	0	2	2	3	3	1	1	6	6
<u>Falcons</u>		0	0	3	3	0	0	2	2	5	5
prairie falcon	<i>Falco mexicanus</i>	0	0	2	2	0	0	1	1	3	3
American kestrel	<i>Falco sparverius</i>	0	0	1	1	0	0	1	1	2	2
<u>Other Raptors</u>		7	7	1	1	0	0	0	0	8	8
unidentified raptor		7	7	1	1	0	0	0	0	8	8
Vultures		3	3	1	1	0	0	0	0	4	4
turkey vulture	<i>Cathartes aura</i>	3	3	1	1	0	0	0	0	4	4
Upland Game Birds		19	19	2	12	4	6	4	66	29	103
ring-necked pheasant	<i>Phasianus colchicus</i>	18	18	0	0	2	3	2	54	22	75
sharp-tailed grouse	<i>Tympanuchus phasianellus</i>	1	1	2	12	2	3	2	12	7	28
Doves/Pigeons		63	164	10	40	2	4	4	18	79	226
rock pigeon	<i>Columba livia</i>	2	11	3	22	2	4	4	18	11	55
mourning dove	<i>Zenaida macroura</i>	61	153	7	18	0	0	0	0	68	171

Appendix A2. Summary of number (#) of groups (grps) and individual observations (obs)¹ by large bird type, diurnal raptor subtype, and species observed during the 20-minute fixed-point large bird use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.

Type/Species	Scientific Name	Summer		Fall		Winter		Spring		Total	
		# grps	# obs	# grps	# obs	# grps	# obs	# grps	# obs	# grps	# obs
Large Corvids		0	0	1	70	0	0	3	52	4	122
American crow	<i>Corvus brachyrhynchos</i>	0	0	1	70	0	0	3	52	4	122
Goatsuckers		3	3	0	0	0	0	0	0	3	3
common nighthawk	<i>Chordeiles minor</i>	3	3	0	0	0	0	0	0	3	3
Overall		222	529	95	961	28	32	58	336	403	1,858

¹ within an 800-meter (2,625-foot) radius of the survey point.

Appendix A3. Summary of number (#) of groups (grps) and individual observations (obs)¹ by small bird type, passerine subtype, and species observed during the 5-minute fixed-point small bird use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.

Type/Species	Scientific Name	Summer		Fall		Winter		Spring		Total	
		# grps	# obs	# grps	# obs	# grps	# obs	# grps	# obs	# grps	# obs
Passerines		453	615	74	327	19	58	63	153	609	1,153
<u>Blackbirds/Orioles</u>		305	404	33	167	0	0	47	50	385	621
red-winged blackbird	<i>Agelaius phoeniceus</i>	70	96	4	61	0	0	6	7	80	164
bobolink	<i>Dolichonyx oryzivorus</i>	5	5	0	0	0	0	0	0	5	5
Brewer's blackbird	<i>Euphagus cyanocephalus</i>	1	3	0	0	0	0	0	0	1	3
orchard oriole	<i>Icterus spurius</i>	1	1	0	0	0	0	0	0	1	1
brown-headed cowbird	<i>Molothrus ater</i>	62	102	1	7	0	0	0	0	63	109
common grackle	<i>Quiscalus quiscula</i>	15	39	1	15	0	0	0	0	16	54
western meadowlark	<i>Sturnella neglecta</i>	150	157	25	30	0	0	41	43	216	230
European starling	<i>Sturnus vulgaris</i>	0	0	2	54	0	0	0	0	2	54
yellow-headed blackbird	<i>Xanthocephalus xanthocephalus</i>	1	1	0	0	0	0	0	0	1	1
<u>Finches/Crossbills</u>		1	2	2	5	0	0	2	3	5	10
house finch	<i>Haemorhous mexicanus</i>	0	0	0	0	0	0	1	1	1	1
American goldfinch	<i>Spinus tristis</i>	1	2	2	5	0	0	1	2	4	9
<u>Flycatchers</u>		10	11	1	1	0	0	0	0	11	12
eastern kingbird	<i>Tyrannus tyrannus</i>	6	7	0	0	0	0	0	0	6	7
western kingbird	<i>Tyrannus verticalis</i>	4	4	1	1	0	0	0	0	5	5

Appendix A3. Summary of number (#) of groups (grps) and individual observations (obs)¹ by small bird type, passerine subtype, and species observed during the 5-minute fixed-point small bird use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.

Type/Species	Scientific Name	Summer		Fall		Winter		Spring		Total	
		# grps	# obs	# grps	# obs	# grps	# obs	# grps	# obs	# grps	# obs
<u>Grassland/Sparrows</u>		99	130	35	151	19	58	14	100	167	439
Baird's sparrow	<i>Ammodramus bairdii</i>	13	14	0	0	0	0	0	0	13	14
grasshopper sparrow	<i>Ammodramus savannarum</i>	37	42	0	0	0	0	0	0	37	42
lark bunting	<i>Calamospiza melanocorys</i>	7	8	0	0	0	0	0	0	7	8
Lapland longspur	<i>Calcarius lapponicus</i>	0	0	1	1	0	0	0	0	1	1
chestnut-collared longspur	<i>Calcarius ornatus</i>	8	8	0	0	0	0	0	0	8	8
lark sparrow	<i>Chondestes grammacus</i>	3	5	4	7	0	0	0	0	7	12
horned lark	<i>Eremophila alpestris</i>	15	26	11	104	19	58	14	100	59	288
dark-eyed junco	<i>Junco hyemalis</i>	0	0	2	3	0	0	0	0	2	3
house sparrow	<i>Passer domesticus</i>	1	10	0	0	0	0	0	0	1	10
savannah sparrow	<i>Passerculus sandwichensis</i>	8	8	0	0	0	0	0	0	8	8
spotted towhee	<i>Pipilo maculatus</i>	1	1	0	0	0	0	0	0	1	1
clay-colored sparrow	<i>Spizella pallida</i>	1	1	2	2	0	0	0	0	3	3
chipping sparrow	<i>Spizella passerina</i>	0	0	4	11	0	0	0	0	4	11
field sparrow	<i>Spizella pusilla</i>	1	1	1	1	0	0	0	0	2	2
American tree sparrow	<i>Spizelloides arborea</i>	0	0	1	1	0	0	0	0	1	1
white-crowned sparrow	<i>Zonotrichia leucophrys</i>	2	4	0	0	0	0	0	0	2	4
unidentified sparrow		2	2	9	21	0	0	0	0	11	23
<u>Swallows</u>		20	43	2	2	0	0	0	0	22	45
barn swallow	<i>Hirundo rustica</i>	14	36	2	2	0	0	0	0	16	38
cliff swallow	<i>Petrochelidon pyrrhonota</i>	3	4	0	0	0	0	0	0	3	4
bank swallow	<i>Riparia riparia</i>	1	1	0	0	0	0	0	0	1	1
tree swallow	<i>Tachycineta bicolor</i>	2	2	0	0	0	0	0	0	2	2
<u>Shrikes</u>		1	1	0	0	0	0	0	0	1	1
loggerhead shrike	<i>Lanius ludovicianus</i>	1	1	0	0	0	0	0	0	1	1
<u>Thrushes</u>		14	21	1	1	0	0	0	0	15	22
American robin	<i>Turdus migratorius</i>	14	21	1	1	0	0	0	0	15	22
<u>Warblers</u>		3	3	0	0	0	0	0	0	3	3
orange-crowned warbler	<i>Leiothlypis celata</i>	2	2	0	0	0	0	0	0	2	2
yellow warbler	<i>Setophaga petechia</i>	1	1	0	0	0	0	0	0	1	1
Woodpeckers		1	1	0	0	0	0	0	0	1	1
downy woodpecker	<i>Dryobates pubescens</i>	1	1	0	0	0	0	0	0	1	1
Overall		454	616	74	327	19	58	63	153	610	1,154

¹ within a 100-meter (328-foot) radius of the survey point.

**Appendix B. Mean Use, Percent of Use, and Frequency of Occurrence for Large Birds
and Small Birds Observed during Fixed-Point Avian Use Surveys at the Proposed
Bowman Wind Project, Bowman County, North Dakota, from
August 23, 2018 – July 23, 2019**

Appendix B1. Mean eagle use¹, percent of total use (%), and frequency of occurrence (%) for eagles by season during the 60-minute fixed-point large bird use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.

Type/Species	Mean Use				% of Use				% Frequency			
	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring
<i>Eagles</i>	0.06	0.14	0.23	0.05	100	100	100	100	5.8	11.3	15.2	3.0
bald eagle	0	0.02	0.07	0.02	0	14.5	30.4	33.3	0	2.1	5.1	1.5
golden eagle	0.06	0.12	0.14	0.03	100	85.5	60.9	66.7	5.8	10.2	12.1	1.5
unidentified eagle	0	0	0.02	0	0	0	8.7	0	0	0	2.0	0
Overall	0.06	0.14	0.23	0.05	100	100	100	100				

¹ Number of eagles/800-meter (2,625-foot) plot/60-minute survey.

Appendix B2. Mean large birds use¹, percent of total use (%), and frequency of occurrence (%) for each large bird type, diurnal raptor subtype, and species by season during the 20-minute fixed-point large bird use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.

Type/Species	Mean Use				% of Use				% Frequency			
	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring
Waterbirds	0.32	0.30	0	0	7.7	3.1	0	0	1.6	1.0	0	0
sandhill crane	0	0.30	0	0	0	3.1	0	0	0	1.0	0	0
great blue heron	0.01	0	0	0	0.2	0	0	0	0.8	0	0	0
American white pelican	0.31	0	0	0	7.5	0	0	0	0.8	0	0	0
Waterfowl	1.57	7.37	0	2.58	37.5	75.8	0	50.6	23.6	8.1	0	15.2
northern pintail	0.02	0	0	0.38	0.6	0	0	7.4	2.3	0	0	9.1
American wigeon	0.05	0	0	0	1.3	0	0	0	3.1	0	0	0
green-winged teal	0	0	0	0.24	0	0	0	4.8	0	0	0	1.5
mallard	0.19	0.10	0	0.27	4.5	1.0	0	5.4	7.8	1.0	0	6.1
snow goose	0	0.25	0	0	0	2.6	0	0	0	1.0	0	0
canvasback	0.06	0	0	0	1.4	0	0	0	0.8	0	0	0
Canada goose	0.27	7.00	0	1.68	6.4	72.0	0	33.0	4.8	5.1	0	9.1
tundra swan	0	0.02	0	0	0	0.2	0	0	0	1.0	0	0
gadwall	0.03	0	0	0	0.7	0	0	0	2.3	0	0	0
northern shoveler	0.18	0	0	0	4.3	0	0	0	5.5	0	0	0
blue-winged teal	0.16	0	0	0	3.9	0	0	0	4.7	0	0	0
unidentified waterfowl	0.60	0	0	0	14.4	0	0	0	3.1	0	0	0

Appendix B2. Mean large birds use¹, percent of total use (%), and frequency of occurrence (%) for each large bird type, diurnal raptor subtype, and species by season during the 20-minute fixed-point large bird use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.

Type/Species	Mean Use				% of Use				% Frequency			
	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring
Shorebirds	0.26	0	0	0.17	6.2	0	0	3.3	10.3	0	0	7.6
upland sandpiper	0.02	0	0	0	0.4	0	0	0	0.8	0	0	0
killdeer	0.10	0	0	0.17	2.3	0	0	3.3	7.2	0	0	7.6
marbled godwit	0.02	0	0	0	0.6	0	0	0	0.8	0	0	0
Wilson's phalarope	0.09	0	0	0	2.2	0	0	0	2.3	0	0	0
American avocet	0.03	0	0	0	0.7	0	0	0	1.6	0	0	0
Rails/Coots	0.01	0	0	0	0.2	0	0	0	0.8	0	0	0
American coot	0.01	0	0	0	0.2	0	0	0	0.8	0	0	0
Diurnal Raptors	0.53	0.80	0.22	0.29	12.7	8.2	68.8	5.7	37.8	47.1	19.2	19.7
<u>Accipiters</u>	0	0	0.01	0	0	0	3.1	0	0	0	1.0	0
unidentified accipiter	0	0	0.01	0	0	0	3.1	0	0	0	1.0	0
<u>Buteos</u>	0.28	0.41	0.05	0.06	6.8	4.2	15.6	1.2	17.8	24.5	5.1	6.1
red-tailed hawk	0.09	0.16	0	0.05	2.1	1.7	0	0.9	4.8	13.3	0	4.5
rough-legged hawk	0	0.15	0.05	0	0	1.6	15.6	0	0	10.1	5.1	0
ferruginous hawk	0.05	0	0	0	1.2	0	0	0	4.1	0	0	0
Swainson's hawk	0.15	0.09	0	0.02	3.5	1.0	0	0.3	10.5	5.2	0	1.5
<u>Northern Harrier</u>	0.17	0.28	0.03	0.15	4.0	2.9	9.4	3.0	15.0	25.7	3.0	9.1
northern harrier	0.17	0.28	0.03	0.15	4.0	2.9	9.4	3.0	15.0	25.7	3.0	9.1
<u>Eagles</u>	0.03	0.07	0.13	0.05	0.6	0.7	40.6	0.9	2.5	6.2	10.1	3.0
golden eagle	0.03	0.05	0.10	0.03	0.6	0.5	31.3	0.6	2.5	5.1	8.1	1.5
bald eagle	0	0.02	0.03	0.02	0	0.2	9.4	0.3	0	2.1	2.0	1.5
<u>Falcons</u>	0	0.03	0	0.03	0	0.3	0	0.6	0	3.1	0	3.0
prairie falcon	0	0.02	0	0.02	0	0.2	0	0.3	0	2.1	0	1.5
American kestrel	0	0.01	0	0.02	0	0.1	0	0.3	0	1.0	0	1.5
<u>Other Raptors</u>	0.06	0.01	0	0	1.4	0.1	0	0	5.0	1.0	0	0
unidentified raptor	0.06	0.01	0	0	1.4	0.1	0	0	5.0	1.0	0	0
Vultures	0.02	0.01	0	0	0.6	0.1	0	0	2.3	1.0	0	0
turkey vulture	0.02	0.01	0	0	0.6	0.1	0	0	2.3	1.0	0	0
Upland Game Birds	0.15	0.12	0.06	1.00	3.5	1.3	18.8	19.6	12.5	2.1	4.0	6.1
ring-necked pheasant	0.14	0	0.03	0.82	3.4	0	9.4	16.1	11.7	0	2.0	3.0
sharp-tailed grouse	0.01	0.12	0.03	0.18	0.2	1.3	9.4	3.6	0.8	2.1	2.0	3.0
Doves/Pigeons	1.30	0.41	0.04	0.27	31.0	4.2	12.5	5.4	27.9	9.2	2.0	4.5
rock pigeon	0.09	0.22	0.04	0.27	2.1	2.3	12.5	5.4	1.6	3.0	2.0	4.5
mourning dove	1.21	0.19	0	0	28.9	1.9	0	0	27.1	6.2	0	0

Appendix B2. Mean large birds use¹, percent of total use (%), and frequency of occurrence (%) for each large bird type, diurnal raptor subtype, and species by season during the 20-minute fixed-point large bird use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.

Type/Species	Mean Use				% of Use				% Frequency			
	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring
Large Corvids	0	0.71	0	0.79	0	7.3	0	15.5	0	1.0	0	1.5
American crow	0	0.71	0	0.79	0	7.3	0	15.5	0	1.0	0	1.5
Goatsuckers	0.02	0	0	0	0.6	0	0	0	1.6	0	0	0
common nighthawk	0.02	0	0	0	0.6	0	0	0	1.6	0	0	0
Overall	4.18	9.73	0.32	5.09	100	100	100	100				

¹Number of large birds/800-meter (2,625-foot) plot/20-minute survey.

Appendix B3. Mean small birds use¹, percent of total use (%), and frequency of occurrence (%) for each small bird type, passerine subtype, and species by season during the 5-minute fixed-point small bird use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.

Type/Species	Mean Use				% of Use				% Frequency			
	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring
Passerines	4.86	3.36	0.59	2.32	99.8	100	100	100	87.9	46.3	19.2	50.0
<u>Blackbirds/Orioles</u>	3.19	1.73	0	0.76	65.5	51.5	0	32.7	78.4	24.9	0	34.8
red-winged blackbird	0.76	0.64	0	0.11	15.7	18.9	0	4.6	35.4	4.2	0	4.5
bobolink	0.04	0	0	0	0.8	0	0	0	3.1	0	0	0
Brewer's blackbird	0.02	0	0	0	0.5	0	0	0	0.8	0	0	0
orchard oriole	0.01	0	0	0	0.2	0	0	0	0.8	0	0	0
brown-headed cowbird	0.80	0.07	0	0	16.4	2.2	0	0	32.0	1.0	0	0
common grackle	0.31	0.15	0	0	6.4	4.5	0	0	8.6	1.0	0	0
western meadowlark	1.24	0.31	0	0.65	25.5	9.3	0	28.1	62.5	19.7	0	34.8
European starling	0	0.56	0	0	0	16.7	0	0	0	2.1	0	0
yellow-headed blackbird	0.01	0	0	0	0.2	0	0	0	0.8	0	0	0
<u>Finches/Crossbills</u>	0.02	0.05	0	0.05	0.3	1.5	0	2.0	0.8	2.0	0	1.5
house finch	0	0	0	0.02	0	0	0	0.7	0	0	0	1.5
American goldfinch	0.02	0.05	0	0.03	0.3	1.5	0	1.3	0.8	2.0	0	1.5
<u>Flycatchers</u>	0.09	0.01	0	0	1.8	0.3	0	0	5.5	1.0	0	0
eastern kingbird	0.06	0	0	0	1.1	0	0	0	3.2	0	0	0
western kingbird	0.03	0.01	0	0	0.7	0.3	0	0	3.2	1.0	0	0

Appendix B3. Mean small birds use¹, percent of total use (%), and frequency of occurrence (%) for each small bird type, passerine subtype, and species by season during the 5-minute fixed-point small bird use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.

Type/Species	Mean Use				% of Use				% Frequency			
	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring
<u>Grassland/Sparrows</u>	1.03	1.54	0.59	1.52	21.1	45.7	100	65.4	38.8	27.7	19.2	18.2
Baird's sparrow	0.11	0	0	0	2.3	0	0	0	8.7	0	0	0
grasshopper sparrow	0.33	0	0	0	6.9	0	0	0	21.3	0	0	0
lark bunting	0.06	0	0	0	1.3	0	0	0	1.6	0	0	0
Lapland longspur	0	0.01	0	0	0	0.3	0	0	0	1.0	0	0
chestnut-collared longspur	0.06	0	0	0	1.3	0	0	0	3.1	0	0	0
lark sparrow	0.04	0.07	0	0	0.8	2.2	0	0	1.6	4.2	0	0
horned lark	0.20	1.05	0.59	1.52	4.2	31.3	100	65.4	9.4	11.1	19.2	18.2
dark-eyed junco	0	0.03	0	0	0	0.9	0	0	0	2.0	0	0
house sparrow	0.08	0	0	0	1.6	0	0	0	0.8	0	0	0
savannah sparrow	0.06	0	0	0	1.3	0	0	0	4.7	0	0	0
spotted towhee	0.01	0	0	0	0.2	0	0	0	0.8	0	0	0
clay-colored sparrow	0.01	0.02	0	0	0.2	0.6	0	0	0.8	2.1	0	0
chipping sparrow	0	0.11	0	0	0	3.4	0	0	0	3.1	0	0
field sparrow	0.01	0.01	0	0	0.2	0.3	0	0	0.8	1.0	0	0
American tree sparrow	0	0.01	0	0	0	0.3	0	0	0	1.0	0	0
white-crowned sparrow	0.03	0	0	0	0.6	0	0	0	1.6	0	0	0
unidentified sparrow	0.02	0.22	0	0	0.3	6.5	0	0	1.7	9.4	0	0
<u>Swallows</u>	0.35	0.02	0	0	7.1	0.6	0	0	14.3	2.1	0	0
barn swallow	0.29	0.02	0	0	6.0	0.6	0	0	11.2	2.1	0	0
cliff swallow	0.03	0	0	0	0.6	0	0	0	1.6	0	0	0
bank swallow	0.01	0	0	0	0.2	0	0	0	0.8	0	0	0
tree swallow	0.02	0	0	0	0.3	0	0	0	1.6	0	0	0
<u>Shrikes</u>	0.01	0	0	0	0.2	0	0	0	0.8	0	0	0
loggerhead shrike	0.01	0	0	0	0.2	0	0	0	0.8	0	0	0
<u>Thrushes</u>	0.17	0.01	0	0	3.4	0.3	0	0	7.1	1.0	0	0
American robin	0.17	0.01	0	0	3.4	0.3	0	0	7.1	1.0	0	0
<u>Warblers</u>	0.02	0	0	0	0.5	0	0	0	1.6	0	0	0
orange-crowned warbler	0.02	0	0	0	0.3	0	0	0	1.6	0	0	0
yellow warbler	0.01	0	0	0	0.2	0	0	0	0.8	0	0	0
Woodpeckers	0.01	0	0	0	0.2	0	0	0	0.8	0	0	0
downy woodpecker	0.01	0	0	0	0.2	0	0	0	0.8	0	0	0
Overall	4.87	3.36	0.59	2.32	100	100	100	100				

¹Number of small birds/100-meter (328-foot) plot/5-minute survey.

**Appendix C. Overall Mean Use by Point for All Birds and Bird Types Observed during
Fixed-Point Avian Use Surveys at the Proposed Bowman Wind Project, Bowman County,
North Dakota, from August 23, 2018 – July 23, 2019**

Appendix C1. Mean use by point for eagles¹ observed during fixed-point avian use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.

Bird Type	Survey Point										
	1	2	4	7	8	9	10	11	13	14	15
Diurnal Raptors	0.17	0.25	0	0.08	0	0.25	0.42	0.08	0.09	0	0.17
<u>Eagles</u>	0.17	0.25	0	0.08	0	0.25	0.42	0.08	0.09	0	0.17
golden eagle	0.17	0.25	0	0.08	0	0.25	0.42	0.08	0.09	0	0.17
bald eagle	0	0	0	0	0	0	0	0	0	0	0
unidentified eagle	0	0	0	0	0	0	0	0	0	0	0
All Large Birds	0.17	0.25	0	0.08	0	0.25	0.42	0.08	0.09	0	0.17

¹ Number of eagles/800-meter (2,625-foot) plot/60-minute survey.

Appendix C1 (continued). Mean use by point for eagles¹ observed during fixed-point avian use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.

Bird Type	Survey Point										
	16	17	18	19	20	21	27	28	29	38	40
<u>Eagles</u>	0	0.09	0.17	0.08	0	0.18	0.08	0.08	0.25	0.22	0.33
bald eagle	0	0.09	0.08	0.08	0	0	0.08	0.08	0.08	0.22	0.25
golden eagle	0	0	0.08	0	0	0.09	0	0	0.17	0	0.08
unidentified eagle	0	0	0	0	0	0.09	0	0	0	0	0
All Eagles	0	0.09	0.17	0.08	0	0.18	0.08	0.08	0.25	0.22	0.33

¹ Number of eagles/800-meter (2,625-foot) plot/60-minute survey.

Appendix C1 (continued). Mean use by point for eagles¹ observed during fixed-point avian use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.

Bird Type	Survey Point										
	42	43	44	45	47	51	52	60	61	62	63
<u>Eagles</u>	0.08	0.50	0	0.17	0	0	0	0.17	0.08	0	0
bald eagle	0.08	0.08	0	0.17	0	0	0	0.08	0.08	0	0
golden eagle	0	0.33	0	0	0	0	0	0.08	0	0	0
unidentified eagle	0	0.08	0	0	0	0	0	0	0	0	0
All Eagles	0.08	0.50	0	0.17	0	0	0	0.17	0.08	0	0

¹ Number of eagles/800-meter (2,625-foot) plot/60-minute survey.

Appendix C2. Mean use by point for large birds¹ and diurnal raptor subtypes observed during fixed-point avian use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.

Type/Species	Survey Point										
	1	2	4	7	8	9	10	11	13	14	15
Waterbirds	0	0	2.50	0.08	0	0	0	0	0	0	0
sandhill crane	0	0	2.50	0	0	0	0	0	0	0	0
great blue heron	0	0	0	0.08	0	0	0	0	0	0	0
American white pelican	0	0	0	0	0	0	0	0	0	0	0
Waterfowl	6.25	0.58	4.92	0.50	0	0	0	0	9.27	33.33	0.08
northern pintail	0.58	0	0	0	0	0	0	0	0	0	0.08
American wigeon	0	0	0.17	0.17	0	0	0	0	0	0	0
green-winged teal	0	0	0	0	0	0	0	0	0	0	0
mallard	0	0	0	0.17	0	0	0	0	0	0	0
snow goose	0	0	0	0	0	0	0	0	0	0	0
canvasback	0	0.58	0	0	0	0	0	0	0	0	0
Canada goose	5.67	0	4.50	0.17	0	0	0	0	9.27	33.33	0
tundra swan	0	0	0	0	0	0	0	0	0	0	0
gadwall	0	0	0.08	0	0	0	0	0	0	0	0
northern shoveler	0	0	0.08	0	0	0	0	0	0	0	0
blue-winged teal	0	0	0.08	0	0	0	0	0	0	0	0
unidentified waterfowl	0	0	0	0	0	0	0	0	0	0	0
Shorebirds	0.25	0.08	0.50	0.08	0	0	0	0	0	0.08	0.08
upland sandpiper	0	0	0	0	0	0	0	0	0	0	0
killdeer	0.25	0.08	0.50	0.08	0	0	0	0	0	0.08	0.08
marbled godwit	0	0	0	0	0	0	0	0	0	0	0
Wilson's phalarope	0	0	0	0	0	0	0	0	0	0	0
American avocet	0	0	0	0	0	0	0	0	0	0	0
Rails/Coots	0	0	0.08	0	0	0	0	0	0	0	0
American coot	0	0	0.08	0	0	0	0	0	0	0	0
Diurnal Raptors	0.42	0.58	0.33	0.17	0.25	0.50	0.33	0.67	0.36	0.42	0.50
<u>Accipiters</u>	0.08	0	0	0	0	0	0	0	0	0	0
unidentified accipiter	0.08	0	0	0	0	0	0	0	0	0	0
<u>Buteos</u>	0	0	0	0	0.17	0	0.17	0.50	0	0.17	0.25
red-tailed hawk	0	0	0	0	0.08	0	0	0.08	0	0	0.08
rough-legged hawk	0	0	0	0	0.08	0	0	0	0	0	0.08
ferruginous hawk	0	0	0	0	0	0	0.08	0.08	0	0	0.08
Swainson's hawk	0	0	0	0	0	0	0.08	0.33	0	0.17	0
<u>Northern Harrier</u>	0.08	0.25	0.25	0.08	0.08	0.17	0.08	0.08	0.27	0.25	0.08
northern harrier	0.08	0.25	0.25	0.08	0.08	0.17	0.08	0.08	0.27	0.25	0.08
<u>Eagles</u>	0	0.25	0	0	0	0.25	0.08	0.08	0.09	0	0.17
golden eagle	0	0.25	0	0	0	0.25	0.08	0.08	0.09	0	0.17
bald eagle	0	0	0	0	0	0	0	0	0	0	0
<u>Falcons</u>	0.08	0	0	0	0	0	0	0	0	0	0
prairie falcon	0.08	0	0	0	0	0	0	0	0	0	0
American kestrel	0	0	0	0	0	0	0	0	0	0	0
<u>Other Raptors</u>	0.17	0.08	0.08	0.08	0	0.08	0	0	0	0	0
unidentified raptor	0.17	0.08	0.08	0.08	0	0.08	0	0	0	0	0
Vultures	0	0.08	0	0	0.08	0	0	0	0	0	0
turkey vulture	0	0.08	0	0	0.08	0	0	0	0	0	0
Upland Game Birds	0	0	0.83	0	0.08	0	0	0	0	0	0
ring-necked pheasant	0	0	0	0	0.08	0	0	0	0	0	0
sharp-tailed grouse	0	0	0.83	0	0	0	0	0	0	0	0

Appendix C2. Mean use by point for large birds¹ and diurnal raptor subtypes observed during fixed-point avian use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.

Type/Species	Survey Point										
	1	2	4	7	8	9	10	11	13	14	15
Doves/Pigeons	0.25	0.17	0.92	0.42	1.17	0.67	0.25	0	0.27	0.25	1.17
rock pigeon	0	0	0	0	0	0.67	0	0	0.27	0	1.08
mourning dove	0.25	0.17	0.92	0.42	1.17	0	0.25	0	0	0.25	0.08
Large Corvids	0	0	0	0	0	0	0	0	0	5.83	0
American crow	0	0	0	0	0	0	0	0	0	5.83	0
Goatsuckers	0	0	0	0	0.08	0	0	0	0	0	0
common nighthawk	0	0	0	0	0.08	0	0	0	0	0	0
All Large Birds	7.17	1.50	10.08	1.25	1.67	1.17	0.58	0.67	9.91	39.92	1.83

¹ Number of large birds/800-meter (2,625-foot) plot/20-minute survey.

Appendix C2 (continued). Mean use by point for large birds¹ and diurnal raptor subtypes observed during fixed-point avian use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.

[illegible]

Appendix C2 (continued). Mean use by point for large birds¹ and diurnal raptor subtypes observed during fixed-point avian use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.

Type/Species	Survey Point										
	16	17	18	19	20	21	27	28	29	38	40
<u>Buteos</u>	0	0.36	0.33	0.50	1.25	0.09	0.50	0.50	0.08	0.22	0.42
red-tailed hawk	0	0	0	0.17	0.67	0.09	0.17	0.25	0	0	0.08
rough-legged hawk	0	0.27	0.08	0.17	0.25	0	0	0	0.08	0.11	0.17
ferruginous hawk	0	0	0	0	0	0	0.17	0	0	0	0
Swainson's hawk	0	0.09	0.25	0.17	0.33	0	0.17	0.25	0	0.11	0.17
<u>Northern Harrier</u>	0.17	0.18	0.25	0	0.25	0.09	0	0.17	0	0.22	0.17
northern harrier	0.17	0.18	0.25	0	0.25	0.09	0	0.17	0	0.22	0.17
<u>Eagles</u>	0	0	0.17	0.08	0	0	0.08	0	0.17	0.22	0.17
golden eagle	0	0	0.08	0.08	0	0	0.08	0	0.08	0.22	0.17
bald eagle	0	0	0.08	0	0	0	0	0	0.08	0	0
<u>Falcons</u>	0	0	0	0	0	0	0.08	0	0	0	0.08
prairie falcon	0	0	0	0	0	0	0.08	0	0	0	0.08
American kestrel	0	0	0	0	0	0	0	0	0	0	0
<u>Other Raptors</u>	0	0	0	0	0	0	0	0	0	0	0
unidentified raptor	0	0	0	0	0	0	0	0	0	0	0
Vultures	0	0	0.08	0	0	0	0	0	0	0	0
turkey vulture	0	0	0.08	0	0	0	0	0	0	0	0
Upland Game Birds	0.33	0.36	0.08	0	0.17	0	0	0.25	4.50	0	0
ring-necked pheasant	0.33	0	0.08	0	0.08	0	0	0.25	4.50	0	0
sharp-tailed grouse	0	0.36	0	0	0.08	0	0	0	0	0	0
Doves/Pigeons	0	0.18	0.50	0.33	1.67	0	3.83	0	3.08	0	0
rock pigeon	0	0	0.17	0	0.25	0	0	0	0	0	0
mourning dove	0	0.18	0.33	0.33	1.42	0	3.83	0	3.08	0	0
Large Corvids	0	0	0	0	0	0	0	0	0	0	0
American crow	0	0	0	0	0	0	0	0	0	0	0
Goatsuckers	0	0	0	0	0	0	0	0	0	0	0.17
common nighthawk	0	0	0	0	0	0	0	0	0	0	0.17
All Large Birds	4.67	16.45	1.42	1.17	10.17	9.18	6.67	1.42	8.08	0.67	2.08

¹ Number of large birds/800-meter (2,625-foot) plot/20-minute survey.

Appendix C2 (continued). Mean use by point for large birds¹ and diurnal raptor subtypes observed during fixed-point avian use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.

Type/Species	Survey Point										
	42	43	44	45	47	51	52	60	61	62	63
Waterbirds	0	0	0	0	0	0	0	0	0	0	0
sandhill crane	0	0	0	0	0	0	0	0	0	0	0
great blue heron	0	0	0	0	0	0	0	0	0	0	0
American white pelican	0	0	0	0	0	0	0	0	0	0	0
Waterfowl	0	0	0.67	0.67	0	0	1.25	0	1.42	0.50	0.58
northern pintail	0	0	0	0	0	0	0	0	0	0.42	0.08
American wigeon	0	0	0	0	0	0	0.25	0	0	0	0
green-winged teal	0	0	0	0	0	0	0	0	0	0	0
mallard	0	0	0	0.67	0	0	0	0	0	0.08	0
snow goose	0	0	0	0	0	0	0	0	0	0	0
canvasback	0	0	0	0	0	0	0	0	0	0	0
Canada goose	0	0	0	0	0	0	0.08	0	1.42	0	0

Appendix C2 (continued). Mean use by point for large birds¹ and diurnal raptor subtypes observed during fixed-point avian use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.

Type/Species	Survey Point										
	42	43	44	45	47	51	52	60	61	62	63
tundra swan	0	0	0	0	0	0	0	0	0	0	0
gadwall	0	0	0	0	0	0	0	0	0	0	0.17
northern shoveler	0	0	0	0	0	0	0.17	0	0	0	0
blue-winged teal	0	0	0	0	0	0	0.75	0	0	0	0
unidentified waterfowl	0	0	0.67	0	0	0	0	0	0	0	0.33
Shorebirds	0	0	0	0	0	0	0.42	0.08	0	0	0.17
upland sandpiper	0	0	0	0	0	0	0	0	0	0	0
killdeer	0	0	0	0	0	0	0.08	0.08	0	0	0.17
marbled godwit	0	0	0	0	0	0	0	0	0	0	0
Wilson's phalarope	0	0	0	0	0	0	0.33	0	0	0	0
American avocet	0	0	0	0	0	0	0	0	0	0	0
Rails/Coots	0	0	0	0	0	0	0	0	0	0	0
American coot	0	0	0	0	0	0	0	0	0	0	0
Diurnal Raptors	0.58	0.50	0.50	0.08	0.25	0.27	0.25	0.83	0.42	0.50	0.17
<u>Accipiters</u>	0	0	0	0	0	0	0	0	0	0	0
unidentified accipiter	0	0	0	0	0	0	0	0	0	0	0
<u>Buteos</u>	0.58	0	0.25	0	0	0.09	0.25	0.17	0.17	0	0.08
red-tailed hawk	0.50	0	0.25	0	0	0	0.08	0	0	0	0
rough-legged hawk	0.08	0	0	0	0	0.09	0.17	0	0	0	0.08
ferruginous hawk	0	0	0	0	0	0	0	0	0.08	0	0
Swainson's hawk	0	0	0	0	0	0	0	0.17	0.08	0	0
<u>Northern Harrier</u>	0	0.17	0.25	0	0.25	0.18	0	0.50	0.17	0.50	0
northern harrier	0	0.17	0.25	0	0.25	0.18	0	0.50	0.17	0.50	0
<u>Eagles</u>	0	0.25	0	0	0	0	0	0.08	0.08	0	0
golden eagle	0	0	0	0	0	0	0	0	0.08	0	0
bald eagle	0	0.25	0	0	0	0	0	0.08	0	0	0
<u>Falcons</u>	0	0.08	0	0	0	0	0	0.08	0	0	0
prairie falcon	0	0	0	0	0	0	0	0	0	0	0
American kestrel	0	0.08	0	0	0	0	0	0.08	0	0	0
<u>Other Raptors</u>	0	0	0	0.08	0	0	0	0	0	0	0.08
unidentified raptor	0	0	0	0.08	0	0	0	0	0	0	0.08
Vultures	0	0	0	0	0.08	0	0	0	0	0	0
turkey vulture	0	0	0	0	0.08	0	0	0	0	0	0
Upland Game Birds	0.67	0	0.08	0.17	0.25	0	0.67	0	0.08	0	0.08
ring-necked pheasant	0.50	0	0.08	0	0.25	0	0	0	0	0	0.08
sharp-tailed grouse	0.17	0	0	0.17	0	0	0.67	0	0.08	0	0
Doves/Pigeons	0.17	0.17	0.25	0.17	0.17	0	0.83	1.75	0	0.25	0
rock pigeon	0	0	0	0	0	0	0.42	1.75	0	0	0
mourning dove	0.17	0.17	0.25	0.17	0.17	0	0.42	0	0	0.25	0
Large Corvids	0	4.33	0	0	0	0	0	0	0	0	0
American crow	0	4.33	0	0	0	0	0	0	0	0	0
Goatsuckers	0	0	0	0	0	0	0	0	0	0	0
common nighthawk	0	0	0	0	0	0	0	0	0	0	0
All Large Birds	1.42	5.00	1.50	1.08	0.75	0.27	3.42	2.67	1.92	1.25	1.00

¹ Number of large birds/800-meter (2,625-foot) plot/20-minute survey.

Appendix C3. Mean use by point for small birds¹ and passerine subtypes observed during fixed-point avian use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.

Type/Species	Survey Point										
	1	2	4	7	8	9	10	11	13	14	15
Passerines	2.00	2.75	2.58	4.83	2.17	0.75	7.08	2.08	2.18	2.58	2.75
red-winged blackbird	0	0.42	0.25	2.33	0.17	0	0.17	0.25	0.55	0.42	0.08
bobolink	0.08	0	0	0	0	0	0	0.08	0	0	0
Brewer's blackbird	0	0	0	0	0	0	0	0	0	0	0
orchard oriole	0	0	0	0	0	0	0	0	0	0	0
brown-headed cowbird	0.58	0.67	0.08	0.17	0.25	0	0.08	0.17	0.73	0.92	0
common grackle	0	0.08	0	0	0	0	0	0	0.09	0	0
western meadowlark	0.92	0.25	0.42	0.75	0.50	0.67	0.67	1.00	0.45	0.58	0.75
European starling	0	0	0	0	0	0	0	0	0	0	0
yellow-headed blackbird	0	0	0	0.08	0	0	0	0	0	0	0
house finch	0	0	0	0	0	0	0	0	0	0	0
American goldfinch	0	0	0	0	0	0	0	0	0	0	0
eastern kingbird	0	0	0	0	0	0	0	0	0	0.08	0
western kingbird	0	0	0	0	0	0	0	0	0	0	0.08
Baird's sparrow	0	0	0	0	0	0	0	0	0	0	0
grasshopper sparrow	0.17	0	0.33	0	0	0.08	0.33	0.08	0.09	0	0
lark bunting	0	0	0	0	0	0	0	0	0	0	0
Lapland longspur	0	0	0	0	0	0	0.08	0	0	0	0
chestnut-collared longspur	0	0	0	0	0	0	0	0	0	0	0
lark sparrow	0	0	0.08	0	0	0	0	0	0	0	0
horned lark	0.17	0	1.33	1.08	0.75	0	5.08	0.50	0.09	0.25	1.75
dark-eyed junco	0	0	0	0	0	0	0	0	0	0	0
house sparrow	0	0	0	0	0	0	0	0	0	0	0
savannah sparrow	0.08	0	0	0	0	0	0	0	0.09	0	0
spotted towhee	0	0	0	0	0	0	0	0	0	0	0
clay-colored sparrow	0	0	0	0	0.08	0	0	0	0	0	0
chipping sparrow	0	0	0.08	0	0	0	0	0	0	0	0
field sparrow	0	0.08	0	0	0	0	0	0	0	0	0
American tree sparrow	0	0	0	0	0	0	0	0	0	0	0
white-crowned sparrow	0	0	0	0	0	0	0	0	0	0	0
unidentified sparrow	0	0	0	0.17	0	0	0	0	0	0.25	0.08
barn swallow	0	0.75	0	0	0	0	0.67	0	0	0	0
cliff swallow	0	0	0	0	0	0	0	0	0	0	0
bank swallow	0	0	0	0	0	0	0	0	0	0	0
tree swallow	0	0	0	0	0	0	0	0	0.09	0	0
loggerhead shrike	0	0	0	0	0	0	0	0	0	0.08	0
American robin	0	0.50	0	0.25	0.42	0	0	0	0	0	0
orange-crowned warbler	0	0	0	0	0	0	0	0	0	0	0
yellow warbler	0	0	0	0	0	0	0	0	0	0	0
Woodpeckers	0	0	0	0	0	0	0	0	0	0	0
downy woodpecker	0	0	0	0	0	0	0	0	0	0	0
All Small Birds	2.00	2.75	2.58	4.83	2.17	0.75	7.08	2.08	2.18	2.58	2.75

¹ Number of small birds/100-meter (328-foot) plot/5-minute survey.

Appendix C3 (continued). Mean use by point for small birds¹ and passerine subtypes observed during fixed-point avian use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.

Type/Species	Survey Point										
	16	17	18	19	20	21	27	28	29	38	40
Passerines	4.33	4.09	3.00	2.67	2.42	2.73	2.42	3.17	4.33	0	2.08
red-winged blackbird	2.00	0.73	0.08	0.33	0.33	0.18	0.25	0.08	1.17	0	0.25
bobolink	0	0	0	0	0	0	0	0	0	0	0
Brewer's blackbird	0	0	0	0	0	0	0	0	0	0	0
orchard oriole	0	0	0	0	0	0	0.08	0	0	0	0
brown-headed cowbird	0.25	1.36	0	0.50	0.25	0	0.33	0.42	0	0	0.33
common grackle	0	0	0	0.08	0	0	0.25	0.25	1.33	0	0
western meadowlark	0.75	0.73	0.25	0.67	0.33	0.73	1.08	1.00	0.17	0	1.08
European starling	0	0	0	0	0	0	0	0	0	0	0
yellow-headed blackbird	0	0	0	0	0	0	0	0	0	0	0
house finch	0	0	0	0	0	0	0	0	0.08	0	0
American goldfinch	0	0.18	0	0	0.33	0	0	0	0.25	0	0
eastern kingbird	0	0.18	0	0	0	0	0	0	0.25	0	0
western kingbird	0.08	0	0.08	0	0	0	0	0	0	0	0
Baird's sparrow	0.17	0	0.08	0.08	0	0	0	0	0	0	0.08
grasshopper sparrow	0.25	0.09	0.08	0	0.25	0	0	0.58	0	0	0
lark bunting	0	0	0	0	0	0.64	0	0	0	0	0
Lapland longspur	0	0	0	0	0	0	0	0	0	0	0
chestnut-collared longspur	0	0	0	0	0	0.27	0	0	0	0	0
lark sparrow	0.25	0	0	0	0.42	0	0	0	0	0	0
horned lark	0.42	0	2.25	1.00	0	0.64	0.33	0	0	0	0.17
dark-eyed junco	0	0.09	0	0	0	0	0	0	0.17	0	0
house sparrow	0	0	0	0	0	0	0	0	0	0	0
savannah sparrow	0	0	0	0	0	0.09	0	0	0	0	0
spotted towhee	0	0.09	0	0	0	0	0	0	0	0	0
clay-colored sparrow	0	0.09	0	0	0	0	0	0	0	0	0
chipping sparrow	0	0	0	0	0	0	0	0	0	0	0
field sparrow	0	0	0	0	0	0	0	0	0	0	0
American tree sparrow	0	0	0	0	0	0	0	0	0.08	0	0
white-crowned sparrow	0	0.18	0	0	0	0.18	0	0	0	0	0
unidentified sparrow	0	0.09	0	0	0	0	0.08	0.58	0.17	0	0.17
barn swallow	0.17	0	0.17	0	0.42	0	0	0.25	0.08	0	0
cliff swallow	0	0	0	0	0	0	0	0	0	0	0
bank swallow	0	0	0	0	0.08	0	0	0	0	0	0
tree swallow	0	0.09	0	0	0	0	0	0	0	0	0
loggerhead shrike	0	0	0	0	0	0	0	0	0	0	0
American robin	0	0	0	0	0	0	0	0	0.58	0	0
orange-crowned warbler	0	0.09	0	0	0	0	0	0	0	0	0
yellow warbler	0	0.09	0	0	0	0	0	0	0	0	0
Woodpeckers	0	0	0	0	0	0	0	0	0	0	0
downy woodpecker	0	0	0	0	0	0	0	0	0	0	0
All Small Birds	4.33	4.09	3.00	2.67	2.42	2.73	2.42	3.17	4.33	0	2.08

¹ Number of small birds/100-meter (328-foot) plot/5-minute survey.

Appendix C3 (continued). Mean use by point for small birds¹ and passerine subtypes observed during fixed-point avian use surveys at the proposed Bowman Wind Project, Bowman County, North Dakota, from August 23, 2018 – July 23, 2019.

Type/Species	Survey Point										
	42	43	44	45	47	51	52	60	61	62	63
Passerines	3.83	2.25	1.17	5.08	0.75	4.64	1.92	4.58	1.75	4.83	3.42
red-winged blackbird	0.17	0.33	0	0	0	0.09	0.50	2.08	0.17	0	0.42
bobolink	0	0	0	0	0	0	0	0.08	0	0.17	0
Brewer's blackbird	0	0.25	0	0	0	0	0	0	0	0	0
orchard oriole	0	0	0	0	0	0	0	0	0	0	0
brown-headed cowbird	0	0	0	0.25	0.08	0.09	0.42	0.25	0.17	0	0.92
common grackle	1.00	0	0.08	0	0	1.36	0	0	0	0	0.08
western meadowlark	0.42	0.50	0.67	0.25	0.25	0.82	0.67	0.50	0.83	0.17	0.58
European starling	0	0	0	4.17	0	0.36	0	0	0	0	0
yellow-headed blackbird	0	0	0	0	0	0	0	0	0	0	0
house finch	0	0	0	0	0	0	0	0	0	0	0
American goldfinch	0	0	0	0	0	0	0	0	0	0	0
eastern kingbird	0	0	0	0	0	0	0	0.08	0	0	0
western kingbird	0	0	0	0	0	0	0	0.08	0	0.08	0
Baird's sparrow	0	0	0	0	0.08	0.18	0	0.25	0.17	0	0.08
grasshopper sparrow	0	0	0.17	0	0.17	0.09	0.08	0.08	0.08	0.33	0.17
lark bunting	0	0	0	0	0	0.09	0	0	0	0	0
Lapland longspur	0	0	0	0	0	0	0	0	0	0	0
chestnut-collared longspur	0	0	0	0	0	0.45	0	0	0	0	0
lark sparrow	0.08	0	0	0	0	0	0	0	0	0.17	0
horned lark	1.67	1.17	0.08	0.33	0.17	0.27	0.17	0.25	0	3.67	0.50
dark-eyed junco	0	0	0	0	0	0	0	0	0	0	0
house sparrow	0	0	0	0	0	0	0	0.83	0	0	0
savannah sparrow	0.17	0	0	0	0	0.18	0	0	0.08	0	0
spotted towhee	0	0	0	0	0	0	0	0	0	0	0
clay-colored sparrow	0	0	0	0	0	0	0	0	0	0	0.08
chipping sparrow	0.33	0	0	0	0	0.55	0	0	0	0	0
field sparrow	0	0	0	0	0	0	0	0	0.08	0	0
American tree sparrow	0	0	0	0	0	0	0	0	0	0	0
white-crowned sparrow	0	0	0	0	0	0	0	0	0	0	0
unidentified sparrow	0	0	0	0	0	0	0	0	0	0.08	0.25
barn swallow	0	0	0.17	0	0	0.09	0.08	0	0.17	0.08	0.08
cliff swallow	0	0	0	0	0	0	0	0	0	0.08	0.25
bank swallow	0	0	0	0	0	0	0	0	0	0	0
tree swallow	0	0	0	0	0	0	0	0	0	0	0
loggerhead shrike	0	0	0	0	0	0	0	0	0	0	0
American robin	0	0	0	0.08	0	0	0	0	0	0	0
orange-crowned warbler	0	0	0	0	0	0	0	0.08	0	0	0
yellow warbler	0	0	0	0	0	0	0	0	0	0	0
Woodpeckers	0	0	0	0	0	0	0	0.08	0	0	0
downy woodpecker	0	0	0	0	0	0	0	0.08	0	0	0
All Small Birds	3.83	2.25	1.17	5.08	0.75	4.64	1.92	4.67	1.75	4.83	3.42

¹ Number of small birds/100-meter (328-foot) plot/5-minute survey.

The logo for SWCA is positioned on the left side of the page. It consists of the letters 'S', 'W', 'C', and 'A' stacked vertically in a large, light blue, sans-serif font. The 'S' and 'W' are partially cut off by the left edge of the page.

EAGLE AND RAPTOR NEST SURVEY REPORT BOWMAN WIND PROJECT, BOWMAN COUNTY, NORTH DAKOTA

CONFIDENTIAL BUSINESS INFORMATION

AUGUST 2018

PREPARED BY
SWCA Environmental Consultants

EAGLE AND RAPTOR NEST SURVEY REPORT
BOWMAN WIND PROJECT,
BOWMAN COUNTY, NORTH DAKOTA

Prepared by

SWCA Environmental Consultants

116 North 4th Street, Suite 200

Bismarck, North Dakota, 58501

(701) 258-6622

www.swca.com

August 2018

Confidential Business Information

CONTENTS

Introduction	1
Methods.....	3
Raptor Nest Aerial Survey	3
Eagle Nest Aerial Survey	3
Nest Monitoring.....	4
Results	4
Raptor Nest Aerial Survey	4
Eagle Nest Aerial Survey	6
Nest Monitoring.....	6
Conclusions	8
Literature Cited	8

Figures

Figure 1. Raptor and eagle nest survey buffers for the proposed Bowman Wind Project.....	2
Figure 2. Raptor nest aerial survey results for the proposed Bowman Wind Project.	5
Figure 3. Eagle nest survey results for the proposed Bowman Wind Project.....	7

Appendices

Appendix A. Nest Data for the Bowman Wind Project Raptor/Eagle Nest Surveys completed March 2018	
Appendix B. Eagle Nest Photographs	

This page is intentionally left blank.

INTRODUCTION

SWCA Environmental Consultants (SWCA) completed raptor and eagle nest aerial surveys in March 2018 and additional follow-up nest monitoring for three potential eagle nests in June 2018 for the proposed Bowman Wind Project (Project). The Project site is located approximately 5 miles west of Bowman in Bowman County, North Dakota (Figure 1). The Project Area is comprised of approximately 102,316 acres.

Raptor nest aerial surveys were completed within the Project Area and a 1-mile (1.6-kilometer [km]) survey buffer and eagle nest aerial surveys were completed within the Project Area and a 10-mile (16.1-km) survey buffer (see Figure 1). The raptor nest survey buffer covered approximately 148,750 acres and the eagle nest survey buffer covered approximately 708,439 acres. The aerial survey buffers were based on recommendations from the U.S. Fish and Wildlife Service (USFWS 2012) and the North Dakota Game and Fish Department (NDGFD) and completed in general accordance with the *Eagle Conservation Plan Guidance: Module 1—Land-based Wind Energy* (USFWS 2013) and the USFWS's *Land-Based Wind Energy Guidelines* (USFWS 2014).

The objective of the aerial surveys was to identify and map non-eagle raptor, bald eagle (*Haliaeetus leucocephalus*), and golden eagle (*Aquila chrysaetos*) nests within the respective survey buffers, and document 2018 activity status. Based on the results of the aerial surveys, follow-up nest monitoring occurred at three potential eagle nests to observe potential late nesting activity at these sites.

Eagle and Raptor Nest Survey Report
Bowman Wind Project, Bowman County, North Dakota

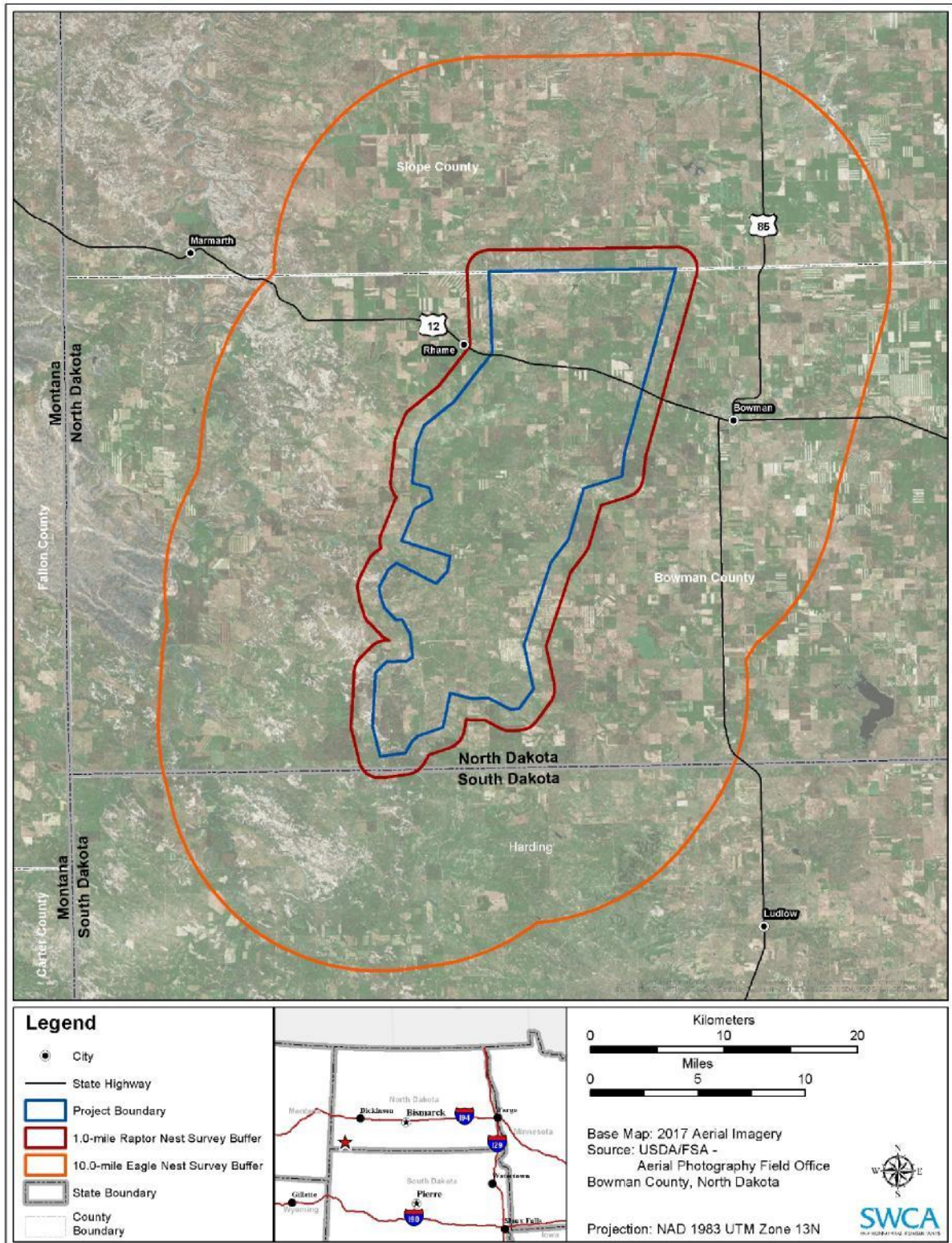


Figure 1. Raptor and eagle nest survey buffers for the proposed Bowman Wind Project.

METHODS

Raptor Nest Aerial Survey

Prior to conducting the raptor nest aerial survey, SWCA staff reviewed NDGFD historic and active raptor nest data. In total, 16 raptor nest locations were previously recorded within the raptor nest survey buffer. Of the 16 agency raptor nest records, eight were recorded in the Project Area and eight within the 1-mile survey buffer.

One raptor nest aerial survey was completed by two SWCA biologists and a pilot, using a fixed-wing Cessna 205 aircraft on March 9 and 11, 2018. Linear north–south transects were pre-established using ArcGIS software and loaded into the aircraft’s global positioning system (GPS) unit for guidance during the survey. The pilot flew the pre-established transects within the survey buffer at an altitude of approximately 200 to 300 feet above ground level, depending on terrain and flight safety conditions, at speeds averaging 100 miles per hour. Each nest location in the agency database was checked during the survey, and all new nests found were recorded.

Data recorded at each raptor nest location included nest location; substrate; status (e.g., occupied or unoccupied); raptor species using occupied nests; and number of adults, eggs, and/or nestlings, if observed.

Eagle Nest Aerial Survey

Prior to conducting the eagle nest aerial survey, SWCA staff obtained and reviewed available agency historic and active eagle nest data from the NDGFD, USFWS (Reinisch 2018), and South Dakota Game, Fish, and Parks (Heimerl 2018). Thirty-one eagle nest locations were previously recorded in the various agency datasets within the Project Area and 10-mile eagle nest survey buffer; however, one record was determined to be a duplicate record, based on GPS location and field observations, and is not included in this report. None of the 30 eagle nest records from the agency datasets occur within the Project Area.

Prior to the aerial survey, a desktop analysis of the eagle survey buffer was completed, and potential habitat areas were identified and marked using geographic information system (GIS) software. Potential eagle nesting habitat was defined as cliff bands, rock outcrops, wooded riparian corridors, utility structures, and stands of or individual large trees capable of supporting the weight of an eagle nest. This information was used to inform the aerial survey.

One eagle nest aerial survey was completed by two SWCA biologists and a pilot, using a fixed-wing Cessna 205 aircraft, over 3 days: March 9, 11, and 21, 2018. The Project Area and a 1-mile survey buffer was surveyed by flying pre-established, linear north–south transects, as described above for the raptor nest aerial survey. Additionally, all potentially suitable habitats identified within the desktop analysis within the 10-mile survey buffer were visually inspected from an altitude of 100 to 300 feet above ground level for eagle nests. Areas between identified suitable habitat were also visually inspected for eagle nests using roaming transects. All previously recorded golden and bald eagle nest locations provided in the agency datasets were checked during the aerial survey, and all new nests found were recorded.

Data recorded at each eagle nest location included nest location; substrate; status (e.g., occupied or unoccupied); eagle species using occupied nests; and number of adults, eggs, and/or nestlings, if observed.

Nest Monitoring

Based on the results of the March 2018 aerial surveys, SWCA biologists identified three potential unoccupied golden eagle nests (31, 32 and 52) within the Project area. Follow-up nest monitoring was completed at these three potential eagle nests in June 2018. Nests 31 and 32 are located in the Project Area and Nest 52 is located 30 feet outside the Project boundary, but due to its close proximity to the Project Area it was also monitored. Each nest was monitored twice for a total of 4 hours each; 0.5 hour before sunrise to 1.5 hours after sunrise and again 1.5 hours before sunset to 0.5 hour after sunset. Each monitoring period was separated by a minimum of 24 hours, so that if a nest was monitored at sunset it was not monitored again the following morning or if a nest was monitored at sunrise it was not monitored again that evening.

None of the three nests are located on parcels in which land access has been granted, so monitoring occurred from the closest location possible. Two nests were monitored from a public roadway and the third nest was monitored from a neighboring parcel in which ground access was permitted.

Nest 31 is located in Section 16, Township (T) 131 North (N), Range (R) 103 West (W) and was monitored at sunrise on June 22 and at sunset on June 24. Monitoring of Nest 31 occurred from a public road located approximately 0.6 mile west of the nest location (Figure 3). This nest was partially obstructed by dense foliage of surrounding trees.

Nest 32 is located in Section 21, T131N, R103W and was monitored at sunset on June 22 and at sunrise on June 24. Monitoring of Nest 32 occurred from a neighboring parcel located approximately 0.2 mile south of the nest location where ground access was permitted (Figure 3). The nest was clearly visible from the monitoring location.

Nest 52 is located in Section 30 T130N, R104W and was monitored at sunrise on June 22 and at sunset on June 23. Monitoring of Nest 52 occurred from a public road located approximately 1.1 miles northeast of the nest location (Figure 3). This nest was clearly visible with the use of a spotting scope as the nest was located in a dead tree.

RESULTS

The results of the aerial surveys are presented in tabular format in Appendix A; representative photographs taken within the Project Area and survey buffers are provided in Appendix B.

Raptor Nest Aerial Survey

A total of forty-five non-eagle raptor nests (5 occupied, 40 unoccupied) were observed within the raptor nest survey area, of which 42 (4 occupied, 38 unoccupied) were within the Project boundary. The occupied nests included one great horned owl and three unknown species.

Of the 16 agency nest record locations evaluated, only 3 nests were located and all three were confirmed unoccupied (nests ND12, ND15, and ND16; see Figure 2 and Table A-1).

Eagle and Raptor Nest Survey Report
Bowman Wind Project, Bowman County, North Dakota

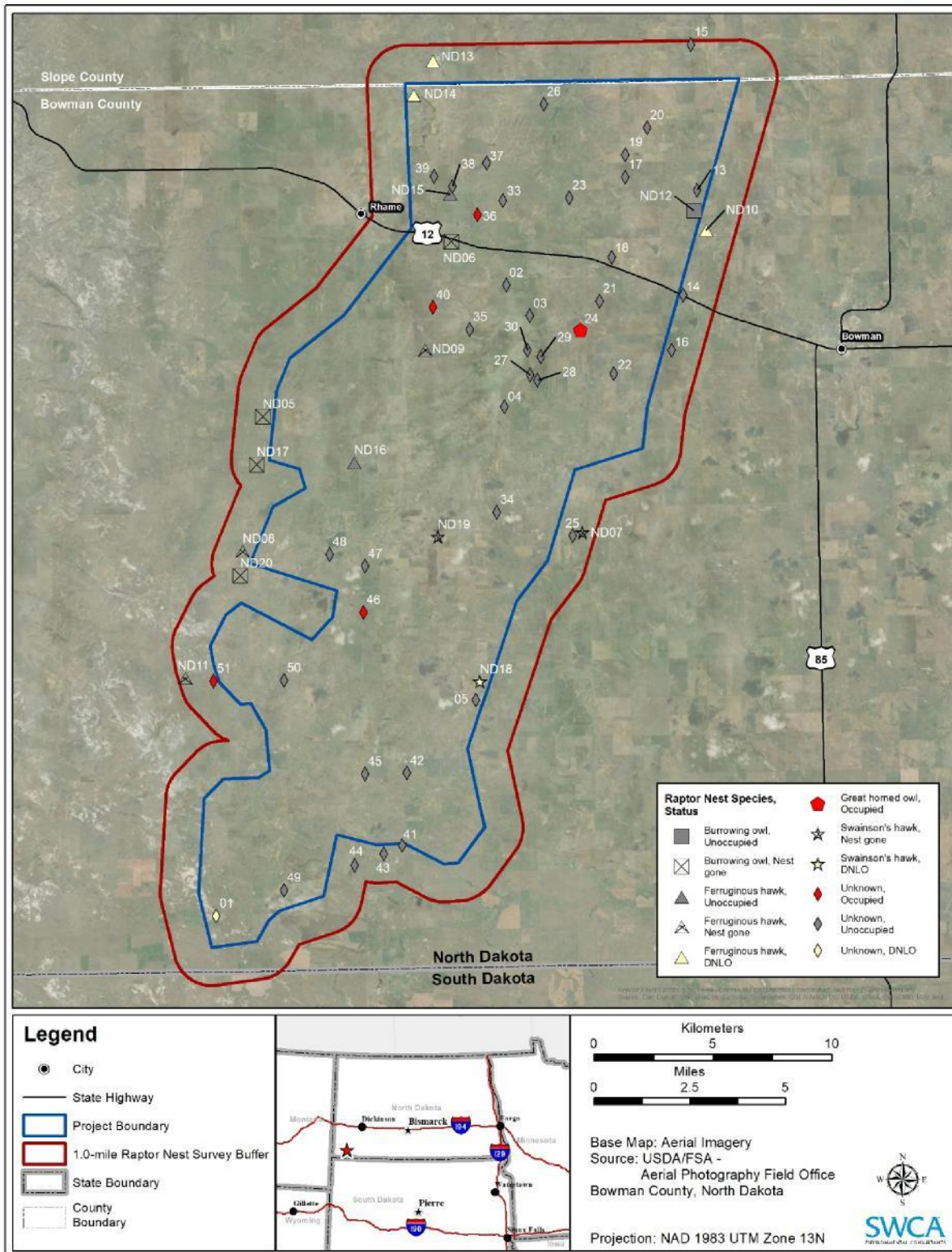


Figure 2. Raptor nest aerial survey results for the proposed Bowman Wind Project.

Eagle Nest Aerial Survey

No known bald eagle nests and 11 known golden eagle nests (4 occupied, 7 unoccupied) were located within the eagle nest survey area (Figure 3; Table A-2). Fourteen potential eagle nests were documented during the aerial survey, two of which are located within the Project boundary.

Of the 30 agency nest record locations evaluated, only 9 nests were located. Nests SD06 and US19 were active with golden eagles (see Figure 3 and Table A-2).

Nest Monitoring

Nest 31 was unoccupied during the aerial survey. During follow-up ground surveys it was confirmed occupied. On June 22, one nestling was observed in the nest. On June 24, two nestlings were observed in the nest and an adult was observed feeding the nestlings; however, due to landowner access restrictions and the dense foliage prevented a clear view of the adult to identify the species and no adult was observed flying in the area during the monitoring periods.

Nests 32 and 52 were unoccupied during the aerial survey. During the follow-up ground surveys these were confirmed unoccupied with no eagles or other raptors observed at either site during any of the monitoring period.

Eagle and Raptor Nest Survey Report
Bowman Wind Project, Bowman County, North Dakota

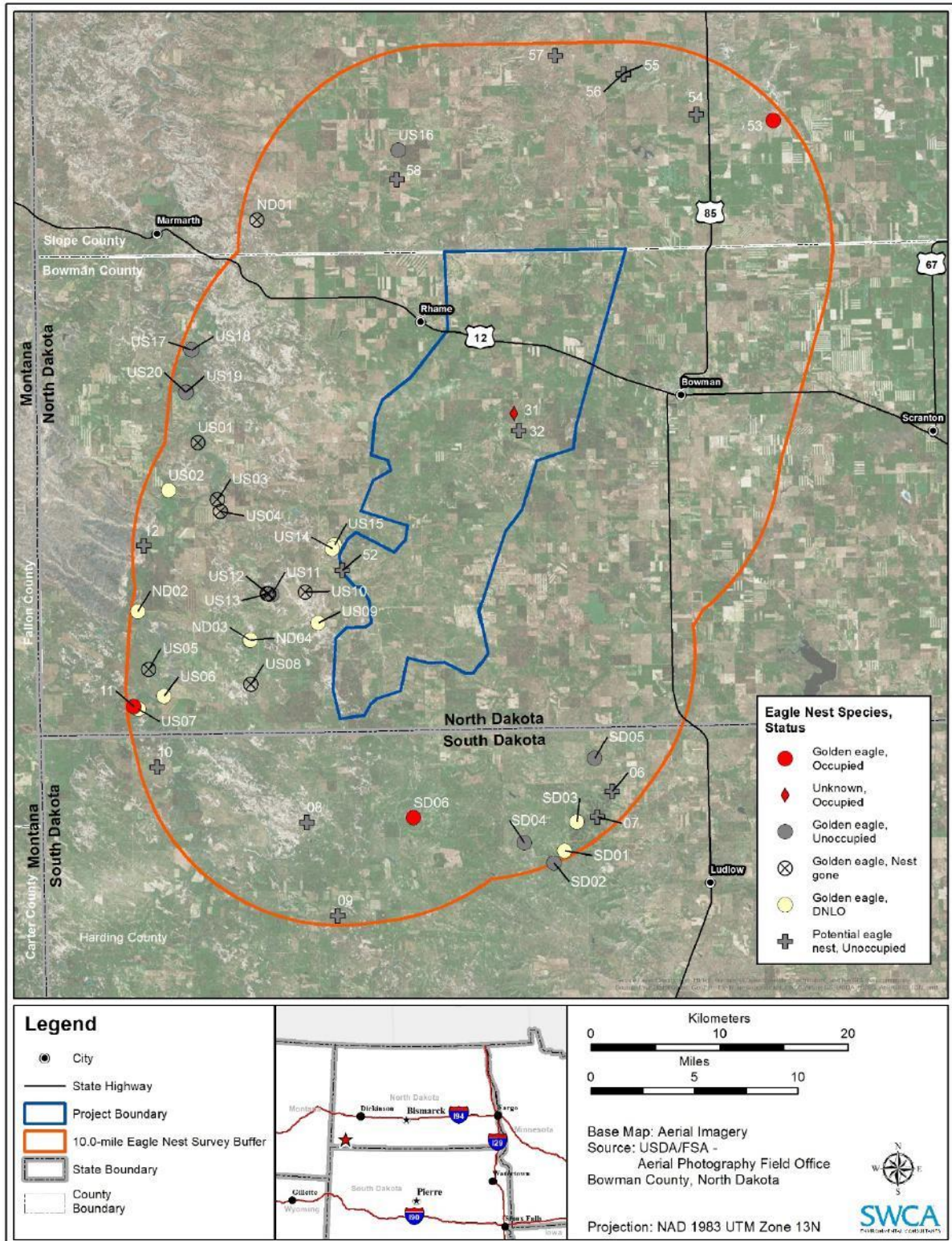


Figure 3. Eagle nest survey results for the proposed Bowman Wind Project.

CONCLUSIONS

Forty-five non-eagle raptor nests were documented within the Project Area and 1-mile survey buffer. Historic and current records indicate that great horned owl, red-tailed hawk (*Buteo jamaicensis*), Swainson's hawk (*Buteo swainsoni*), burrowing owl, and ferruginous hawk (*Buteo regalis*) species have nested within the Project Area and survey buffer. Only the great horned owl was observed nesting in the area during the March aerial survey.

No known bald eagle nests, 11 known golden eagle nests, and 14 potential eagle nests were documented within the Project Area and 10-mile survey buffer. No occupied golden eagle nests were documented within the Project area during the survey; however, one potential eagle nest was active, but species could not be determined. The nearest occupied golden eagle nest was approximately 5.5 miles south of the Project Area. The other three nests were 9.2 miles west, 9.5 miles northeast, and 9.7 miles southwest. Suitable nesting habitat for golden eagles was present in isolated patches throughout the Project Area and survey buffer, which included trees, hillsides, and cliff faces. Nesting habitat for bald eagles was present in isolated areas in the survey buffer, which included mature trees in wooded riparian areas. Historic and current records indicate that golden eagles have nested within the survey buffer.

LITERATURE CITED

Heimerl, C. 2018. South Dakota Documented Nesting Records of Raptors within 10-miles of the Proposed Project Area. South Dakota Game, Fish, and Parks. Unpublished. Datafile. (personnel communication – email).

Reinish, J.D. 2018. U.S. Fish & Wildlife Service Eagle Nests within 10-miles of the Bowman Wind Tower Project. U.S. Fish & Wildlife Service, North Dakota Field Office. Unpublished. Datafile. (personnel communication – email).

U.S. Fish and Wildlife Service (USFWS). 2012. *Land-Based Wind Energy Guidelines*. Wind Turbine Guidelines Advisory Committee. Washington, D.C.: Department of the Interior, U.S. Fish and Wildlife Service.

———. 2013. *Eagle Conservation Plan Guidance, Module 1 – Land-Based Wind Energy*, Version 2. Washington, D.C.: Department of the Interior, U.S. Fish and Wildlife Service, Division of Migratory Bird Management.

———. 2014. *Land-Based Wind Energy Guidelines*. Department of the Interior, U.S. Fish and Wildlife Service.

APPENDIX A

**Nest Data for the Bowman Wind Project Raptor/Eagle Nest Surveys Completed
March 2018**

Table A-1. Nest Data for the Bowman Wind Project Raptor Nest Survey, March 2018

Nest Label*	Substrate	Section, Township (T), Range (R)	UTM X	UTM Y	Distance	Survey Date	Species [‡]	Nest Status _s	Comment
			NAD 83, Zone 13N [†]		(miles) to Project Boundary				
01	Ground/ Hillside	30, 129N, 104W	597470.1	5091074.5	Inside	3/11/2018	UNK	DNLO	Snow covered
02	Tree	5, 131N, 103W	609650.6	5117614.1	Inside	3/9/2018	UNK	Unoccupied	–
03	Tree	4, 131N, 103W	610645.8	5116323.7	Inside	3/9/2018	UNK	Unoccupied	–
04	Tree	20, 131N, 103W	609582.8	5112506.2	Inside	3/9/2018	UNK	Unoccupied	–
05	Tree	31, 130N, 103W	608392.1	5100173.2	Inside	3/9/2018	UNK	Unoccupied	–
13	Tree	19, 132N, 102W	617683.6	5121613.3	Inside	3/9/2018	UNK	Unoccupied	–
14	Tree	6, 131N, 102W	617097.3	5117208.6	0.13	3/9/2018	UNK	Unoccupied	–
15	Tree	34, 133N, 102W	617429.7	5127731.9	0.89	3/9/2018	UNK	Unoccupied	–
16	Tree	7, 131N, 102W	616619.0	5114878.1	0.23	3/9/2018	UNK	Unoccupied	–
17	Tree	24, 132N, 103W	614667.4	5122165.1	Inside	3/9/2018	UNK	Unoccupied	–
18	Tree	35, 132N, 103W	614100.2	5118788.9	Inside	3/9/2018	UNK	Unoccupied	–
19	Tree	13, 132N, 103W	614663.8	5123098.7	Inside	3/9/2018	UNK	Unoccupied	–
20	Tree	13, 132N, 103W	615577.8	5124244.0	Inside	3/9/2018	UNK	Unoccupied	–
21	Tree	2, 131N, 103W	613582.0	5116949.4	Inside	3/9/2018	UNK	Unoccupied	–
22	Tree	14, 131N, 103W	614175.2	5113895.2	Inside	3/9/2018	UNK	Unoccupied	–
23	Tree	22, 132N, 103W	612299.2	5121285.3	Inside	3/9/2018	UNK	Unoccupied	–
24	Tree	1, 131N, 103W	612770.0	5115738.3	Inside	3/9/2018	GHOW	Occupied	Adult prone on nest; incubating
25	Tree	3, 130N, 103W	612452.7	5107074.1	0.45	3/9/2018	UNK	Unoccupied	–
26	Tree	9, 132N, 103W	611231.5	5125228.8	Inside	3/9/2018	UNK	Unoccupied	–
27	Tree	16, 131N, 103W	610663.2	5113842.0	Inside	3/9/2018	UNK	Unoccupied	–
28	Tree	16, 131N, 103W	610968.2	5113616.1	Inside	3/9/2018	UNK	Unoccupied	–
29	Tree	16, 131N, 103W	611112.4	5114603.6	Inside	3/9/2018	UNK	Unoccupied	–
30	Tree	9, 131N, 103W	610539.9	5114872.5	Inside	3/9/2018	UNK	Unoccupied	–
33	Tree	20, 132N, 103W	609508.0	5121171.0	Inside	3/9/2018	UNK	Unoccupied	–
34	Tree	5, 130N, 103W	609259.4	5108062.2	Inside	3/9/2018	UNK	Unoccupied	–
35	Tree	7, 131N, 103W	608143.7	5115747.1	Inside	3/9/2018	UNK	Unoccupied	–

Nest Label*	Substrate	Section, Township (T), Range (R)	UTM X	UTM Y	Distance	Survey Date	Species [‡]	Nest Status _s	Comment
			NAD 83, Zone 13N [†]		(miles) to Project Boundary				
36	Tree	29, 132N, 103W	608453.1	5120582.6	Inside	3/9/2018	UNK	Occupied	Species probable great horned owl
37	Tree	17, 132N, 103W	608829.2	5122756.1	Inside	3/9/2018	UNK	Unoccupied	–
38	Tree	19, 132N, 103W	607411.5	5121763.7	Inside	3/11/2018	UNK	Unoccupied	–
39	Tree	19, 132N, 103W	606633.3	5122196.3	Inside	3/11/2018	UNK	Unoccupied	–
40	Tree	1, 131N, 103W	606592.4	5116681.6	Inside	3/11/2018	UNK	Occupied	Species probable great horned owl
41	Tree	14, 129N, 104W	605297.4	5094043.7	0.05	3/11/2018	UNK	Unoccupied	–
42	Tree	1, 129N, 104W	605497.0	5097095.6	Inside	3/11/2018	UNK	Unoccupied	–
43	Tree	14, 129N, 104W	604527.6	5093691.9	0.25	3/11/2018	UNK	Unoccupied	–
44	Tree	22, 129N, 104W	603300.9	5093214.4	0.63	3/11/2018	UNK	Unoccupied	–
45	Tree	2, 129N, 104W	603728.1	5097049.5	Inside	3/11/2018	UNK	Unoccupied	–
46	Tree	14, 130N, 104W	603659.8	5103854.9	Inside	3/11/2018	UNK	Occupied	Species probable great horned owl
47	Tree	11, 130N, 104W	603730.4	5105803.1	Inside	3/11/2018	UNK	Unoccupied	–
48	Tree	10, 130N, 104W	602242.3	5106286.3	Inside	3/11/2018	UNK	Unoccupied	–
49	Tree	20, 129N, 104W	600320.6	5092164.5	Inside	3/11/2018	UNK	Unoccupied	–
50	Tree	29, 130N, 104W	600321.2	5100996.8	Inside	3/11/2018	UNK	Unoccupied	–
51	Tree	30, 130N, 104W	597352.1	5100960.8	0.13	3/11/2018	UNK	Occupied	Species probable great horned owl
ND05	Burrow	20, 131N, 104W	599436.3	5112085.8	0.28	3/11/2018	BUOW	Gone	No prairie dog colony at this location
ND06	Burrow	31, 132N, 103W	607368.8	5119443.8	Inside	3/11/2018	BUOW	Gone	No prairie dog colony at this location
ND07	Tree	3, 130N, 103W	612859.0	5107213.0	0.67	3/9/2018	SWHA	Gone	Broken branches and debris on ground at nest location
ND08	Tree	7, 130N, 104W	598584.3	5106425.8	0.29	3/11/2018	FEHA	Gone	No tree at location
ND09	Tree	12, 131N, 104W	606269.4	5114897.1	Inside	3/11/2018	FEHA	Gone	No nest in tree patch at this location
ND10	Ground/ Hillside	29, 132N, 102W	618063.6	5119924.7	0.25	3/9/2018	FEHA	DNLO	Snow covered
ND11	Tree	25, 130N, 105W	596169.8	5101089.2	0.81	3/9/2018	FEHA	Gone	No nest in tree at this location
ND12	Burrow	30, 132N, 102W	617562.9	5120750.0	Inside	3/9/2018	BUOW	Unoccupied	Prairie dog colony present

Nest Label*	Substrate	Section, Township (T), Range (R)	UTM X	UTM Y	Distance	Survey Date	Species [‡]	Nest Status [§]	Comment
			NAD 83, Zone 13N [†]		(miles) to Project Boundary				
ND13	Ground/ Hillside	33, 133N, 103W	606587.1	5127053.1	0.58	3/11/2018	FEHA	DNLO	Snow covered
ND14	Ground/ Hillside	12, 132N, 104W	605787.9	5125607.2	Inside	3/11/2018	FEHA	DNLO	
ND15	Tree	19, 132N, 103W	607316.4	5121455.8	Inside	3/11/2018	FEHA	Unoccupied	–
ND16	Tree	27, 131N, 104W	603277.4	5110146.9	Inside	3/11/2018	FEHA	Unoccupied	–
ND17	Burrow	29, 131N, 104W	599177.1	5110070.6	0.34	3/11/2018	BUOW	Gone	No prairie dog colony at this location
ND18	Tree	29, 130N, 103W	608554.7	5100936.7	Inside	3/9/2018	SWHA	DNLO	–
ND19	Tree	6, 130N, 103W	606804.4	5107023.3	Inside	3/11/2018	SWHA	Gone	No nest in tree patch at this location
ND20	Burrow	7, 130N, 104W	598479.5	5105391.6	0.41	3/11/2018	BUOW	Gone	No prairie dog colony at this location

* Nest labels were generated based on agency datasets (ND = North Dakota Game and Fish) and nest labels without preceding abbreviations were new nests documented during the March 2018 aerial survey.

† UTM locations were obtained during the aerial survey and corrected where possible using aerial photographs. These locations are approximations and should be ground-truthed to verify actual UTM location. ‡ BUOW = burrowing owl; FEHA = ferruginous hawk; GHOW = great horned owl; SWHA = Swainson's hawk; UNK = unknown raptor species.

§ Occupied = presence of adult prone on the nest or perched on the nest; Unoccupied = lack of incubating adult or eggs in the nest; Gone = agency notations that the nest was destroyed in a previous year or the nest was not at the location due to a lack of suitable substrate; DNLO = did not locate due to an inability to view the nest from the air.

Table A-2. Nest Data for the Bowman Wind Project Eagle Nest Surveys, March and June 2018

Nest Label*	Substrate	Section, Township Range (R)	(T),	UTM X	UTM Y	Distance	Survey Date	Species†	Nest Status§	Comment
				NAD 83, Zone 13N†		(miles) to Project Boundary				
06	Cliff	2, 22N, 5E		618416.0	5084103.7	8.81	3/9/2018	UNK	Unoccupied	
07	Cliff	10, 22N, 5E		617247.6	5082116.9	9.17	3/9/2018	UNK	Unoccupied	
08	Cliff	8, 22N, 3E		594698.5	5081670.3	5.28	3/9/2018	UNK	Unoccupied	Recent mudslide, nest filled with mud
09	Cliff	4, 21N, 3E		597114.1	5074394.7	9.55	3/9/2018	UNK	Unoccupied	Two golden eagles perched on hilltop near nest
10	Cliff	30, 23N, 2E		583041.1	5085960.2	9.16	3/9/2018	UNK	Unoccupied	
11	Cliff	29, 129N, 106W		581261.4	5090663.2	9.65	3/9/2018	GOEA	Occupied	Adult prone on nest; incubating/second adult nearby
12	Tree	16, 130N, 106W		582003.3	5103211.3	9.46	3/9/2018	UNK	Unoccupied	Two adult bald eagles perched in tree; nothing in nest
31	Tree	16, 131N, 103W		610772.5	5113487.4	Inside	3/9/2018	UNK	Occupied	Unoccupied during aerial surveys; 2 nestlings and an adult were observed at this nest site during June nest monitoring
32	Ground/ Hillside	21, 131N, 103W		611156.1	5112164.7	Inside	3/9/2018	UNK	Unoccupied	Unoccupied during June nest monitoring
52	Tree	30, 130N, 104W		597462.3	5101288.7	0.005	3/11/2018	UNK	Unoccupied	Unoccupied during June nest monitoring
53	Cliff	31, 133N, 100W		630932.0	5136289.5	9.45	3/21/2018	GOEA	Occupied	One adult at nest; second adult nearby
54	Tree	33, 134N, 101W		624972.1	5136756.5	7.34	3/21/2018	UNK	Unoccupied	
55	Cliff	23, 134N, 102W		619310.4	5139873.2	8.42	3/21/2017	UNK	Unoccupied	
56	Cliff	23, 134N, 102W		619283.0	5139892.7	8.43	3/21/2018	UNK	Unoccupied	
57	Tree	17, 134N, 102W		613967.8	5141325.6	9.37	3/21/2018	UNK	Unoccupied	Juvenile bald eagle perched in tree
58	Tree	13, 133N, 103W		601685.4	5131688.0	4.18	3/21/2018	UNK	Unoccupied	
ND01	Cliff	25, 133N, 105W		590823.4	5128537.6	9.19	3/21/2018	GOEA	Gone	
ND02	Cliff	4, 129N, 106W		581543.0	5098093.6	9.66	3/9/2018	GOEA	DNLO	
ND03	Cliff	8, 129N, 105W		590251.4	5095867.4	4.15	3/9/2018	GOEA	DNLO	Snow covered
ND04	Cliff	8, 129N, 105W		590302.3	5095852.8	4.12	3/9/2018	GOEA	DNLO	Snow covered

Nest Label*	Substrate	Section, Township (T), Range (R)	UTM X	UTM Y	Distance	Survey Date	Species [‡]	Nest Status _s	Comment
			NAD 83, Zone 13N [†]		(miles) to Project Boundary				
SD01	Cliff	20, 22N, 5E	614719.0	5079465.6	9.67	3/9/2018	GOEA	DNLO	–
SD02	Cliff	20, 22N, 5E	613874.5	5078516.5	9.98	3/9/2018	GOEA	Unoccupied	–
SD03	Cliff	9, 22N, 5E	615657.8	5081710.2	8.76	3/9/3018	GOEA	DNLO	–
SD04	Cliff	13, 22N, 5E	611574.4	5080085.8	8.58	3/9/2018	GOEA	Unoccupied	–
SD05	Cliff	27, 23N, 5E	617046.7	5086661.4	7.15	3/9/2018	GOEA	Unoccupied	–
SD06	Cliff	7, 22N, 4E	603012.7	5082035.8	5.50	3/9/2018	GOEA	Occupied	Two adults on nest
US01	Tree	24, 131N, 106W	586216.0	5111210.3	8.40	3/9/2018	GOEA	Gone	Broken branches and debris on ground at nest location
US02	Cliff	3, 130N, 106W	583943.5	5107491.7	8.82	3/9/2018	GOEA	DNLO	–
US03	Cliff	6, 130N, 105W	587744.5	5106787.3	6.47	3/9/2018	GOEA	Gone	Agency record – destroyed 2011
US04	Cliff	7, 130N, 105W	587981.2	5105888.8	6.12	3/9/2018	GOEA	Gone	Agency record – destroyed 2011
US05	Tree	16, 129N, 106W	582397.1	5093576.0	8.94	3/9/2018	GOEA	Gone	Broken branches and debris on ground at nest location
US06	Cliff	27, 129N, 106W	583597.2	5091514.5	8.16	3/9/2018	GOEA	DNLO	–
US07	Cliff	28, 129N, 106W	581594.9	5090496.6	9.45	3/9/2018	GOEA	DNLO	Recent erosion; rest of ridge snow covered
US08	Cliff	20, 129N, 105W	590337.7	5092434.8	3.97	3/9/2018	GOEA	Gone	Agency record – destroyed 2011
US09	Cliff	2, 129N, 105W	595590.0	5097203.9	1.12	3/9/2018	GOEA	DNLO	–
US10	Cliff	35, 130N, 105W	594580.6	5099597.9	2.04	3/9/2018	GOEA	Gone	Agency record – destroyed 2011
US11	Cliff	33, 130N, 105W	592016.9	5099423.3	3.58	3/9/2018	GOEA	Unoccupied	–
US12	Cliff	33, 130N, 105W	591739.8	5099443.9	3.74	3/9/2018	GOEA	Gone	Agency record – destroyed 2011
US13	Cliff	33, 130N, 105W	591609.2	5099464.1	3.82	3/9/2018	GOEA	Gone	Agency record – destroyed 2011
US14	Cliff	24, 130N, 105W	596672.8	5102979.0	0.45	3/11/2018	GOEA	DNLO	Snow covered
US15	Cliff	13, 130N, 105W	596878.2	5103266.5	0.42	3/11/2018	GOEA	DNLO	Snow covered
US16	Tree	12, 133N, 103W	601821.3	5133984.0	5.38	3/21/2018	GOEA	Unoccupied	–
US17	Tree	35, 132N, 106W	585661.4	5118467.1	9.50	3/9/2018	GOEA	DNLO	Not a second nest in this area
US18	Tree	35, 132N, 106W	585746.1	5118453.4	9.45	3/9/2018	GOEA	Unoccupied	–

Nest Label*	Substrate	Section, Township (T), Range (R)	UTM X	UTM Y	Distance	Survey Date	Species [‡]	Nest Status [§]	Comment
			NAD 83, Zone 13N [†]		(miles) to Project Boundary				
US19	Cliff	11, 131N, 106W	585297.0	5115154.8	9.22	3/9/2018	GOEA	Occupied	Two adults in area; one flushes to nest
US20	Cliff	11, 131N, 106W	585278.5	5115108.8	9.23	3/9/2018	GOEA	Unoccupied	–

* Nest labels were generated based on agency datasets (ND = North Dakota Game and Fish; SD = South Dakota Game, Fish, and Parks; US = USFWS) and nest labels without preceding abbreviations were new nests documented during the March 2018 aerial survey.

† UTM locations were obtained during the aerial survey and corrected where possible using aerial photographs. These locations are approximations and should be ground-truthed to verify actual UTM location.

‡ GOEA = golden eagle; UNK = unknown eagle species.

§ Occupied = presence of adult prone on the nest or perched on the nest; Unoccupied = lack of incubating adult or eggs in the nest; Gone = agency notations that the nest was destroyed in a previous year or the nest was not at the location due to a lack of suitable substrate; DNLO = did not locate due to an inability to view the nest from the air.

This page is intentionally left blank.

APPENDIX B

Eagle Nest Photographs



Figure B-1a. Nest 11, occupied golden eagle nest.

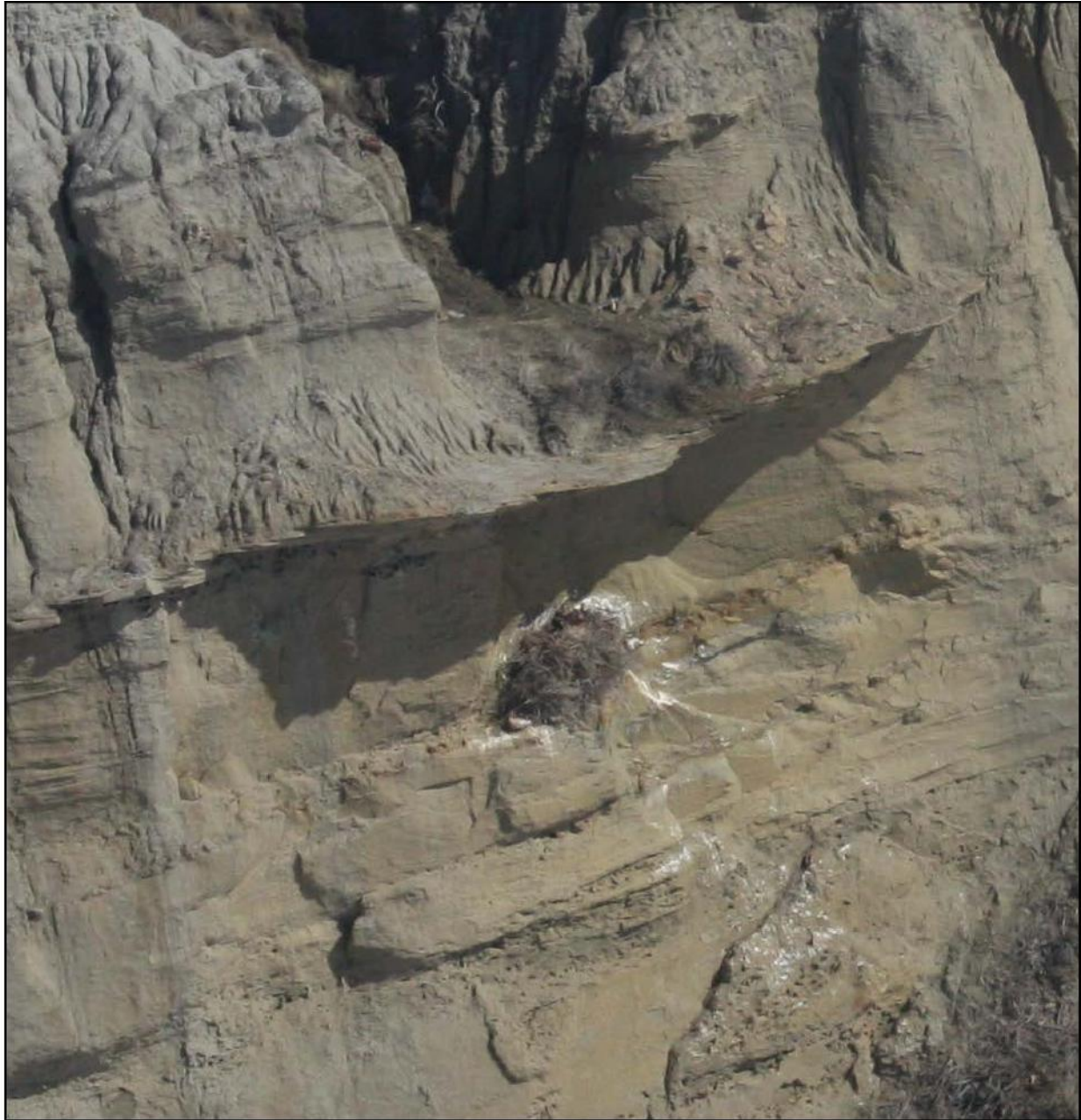


Figure B-1b. Nest 11, occupied golden eagle nest.



Figure B-2a. Nest 12, unoccupied eagle nest.



Figure B-2b. Nest 12, unoccupied eagle nest.



Figure B-3a. Nest SD06, occupied golden eagle nest.



Figure B-3b. Nest SD06, occupied golden eagle nest.



Figure 4. Nest US18, unoccupied eagle nest.



Figure 5. Nest US19, occupied golden eagle nest.



Figure 6. Nest US20, unoccupied eagle nest.



The logo for SWCA is positioned vertically on the left side of the page. It consists of the letters 'S', 'W', 'C', and 'A' in a large, stylized, light blue font. The letters are stacked vertically, with the 'S' at the bottom and the 'A' at the top. The 'W' and 'C' are in the middle, and they are all connected in a continuous, flowing manner.

GROUSE LEK SURVEY REPORT

BOWMAN WIND PROJECT,
BOWMAN COUNTY, NORTH DAKOTA

CONFIDENTIAL BUSINESS INFORMATION

JULY 2018

PREPARED BY

SWCA Environmental Consultants

GROUSE LEK SURVEY REPORT
BOWMAN WIND PROJECT,
BOWMAN COUNTY, NORTH DAKOTA

Prepared by

SWCA Environmental Consultants

116 North 4th Street, Suite 200
Bismarck, North Dakota, 58501
(701) 258-6622

www.swca.com

July 2018

Confidential Business Information

CONTENTS

Introduction 1

Methods..... 1

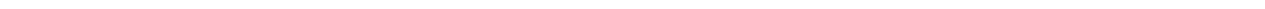
Results 1

Conclusions 4

Figures

Figure 1. Grouse lek survey results for the proposed Bowman Wind Project..... 3

This page is intentionally left blank.



INTRODUCTION

SWCA Environmental Consultants, LLC (SWCA) completed ground surveys of known prairie grouse leks located within the proposed Bowman Wind Project (Project) area and 1.0-mile survey buffer in Bowman County, North Dakota. All known greater sage-grouse (*Centrocercus urophasianus*) and sharp-tailed grouse (*Tympanuchus phasianellus*) lek locations within the Project area and 1.0-mile survey buffer were evaluated from the ground on two mornings during the lekking period. Leks were surveyed in accordance with North Dakota Game and Fish Census (NDGFD) Procedure: Count Techniques (personal communication, grouse census protocol provided to SWCA via email from the NDGFD, September 26, 2016). The purpose of the surveys was to document lek activity and the number of individuals attending each active lek in accordance with NDGFD recommendations.

METHODS

Prior to conducting the lek surveys, SWCA staff reviewed NDGFD lek data (personal communication, S. Johnson, June 1, 2017) for the Project area and 1.0-mile survey buffer. SWCA avian biologists checked the six greater sage-grouse and three sharp-tailed grouse leks documented within 1.0-mile of the Project area in the NDGFD lek dataset on April 11 and then again on April 23 and 24, 2018. Each lek was surveyed twice, separated by a minimum of 11 days. Surveys began half an hour before sunrise and ended no later than 2 hours after sunrise, per NDGFD survey protocol. SWCA biologists recorded any visual or auditory detections of grouse near the known leks. Lek surveys were conducted from public roads only, and observation points were selected that provided the best viewing of the general lek site area. Data recorded for each lek location included number of males and females if a visual observation was made. If a lek site or activity could not be seen from the observation location, SWCA biologists relied on auditory detection as outlined in NDGFD protocols.

RESULTS

Weather conditions for the first survey were light winds (less than 8 miles per hour [mph]), no precipitation, variable snow cover (between 15% and 60%), mostly cloudy (80%), and temperatures in the low 30s degrees Fahrenheit. Weather conditions for the second survey were light winds (less than 10 mph), no precipitation, variable snow cover (10% on April 23 and 90% on April 24), mostly cloudy (70%–80%), and temperatures between 30 and 40 degrees Fahrenheit.

Of the nine known lek locations evaluated, no grouse lekking activity was noted at six leks (five greater sage-grouse and one sharp-tailed grouse). Grouse lekking activity was recorded at one greater sage-grouse and two sharp-tailed grouse leks during the 2018 ground surveys (see Figure 1).

One displaying male and two female greater sage-grouse were seen in the proximity of lek 25085 on April 11. Drumming sharp-tailed grouse males were heard in the vicinity of lek 23640 on April 11, and drumming sharp-tailed grouse males were heard near lek 25129 on April 23. The number of sharp-tailed grouse at these lek locations could not be determined given the lack of visual observation; however, based on SWCA biologists' experience, both leks were considered to have low numbers of booming males (i.e., two to five). Data recorded at each lek site are provided in Table 1.

Table 1. Lek Survey Results for the Proposed Bowman Wind Project

Lek ID	Species	Date/Time	Male	Female	Unknown	Detection Type	Distance lek area was observed from
Confidential Business Information				2			
23640	Sharp-tailed grouse	4/11/2018 7:13	5	0	0	Auditory; approximate count	0.27 mile
		4/23/2018 6:42	0	0	0		0.27 mile
23681	Greater sage-grouse	4/11/2018 5:44	0	0	0		0.70 mile
		4/24/2018 6:20	0	0	0		0.70 mile
25067	Greater sage-grouse	4/11/2018 6:12	0	0	0		0.26 mile
		4/24/2018 5:57	0	0	0		0.26 mile
25085	Greater sage-grouse	4/11/2018 6:57	1	2	0	Visual	0.11 mile
		4/23/2018 6:19	0	0	0		0.11 mile
25086	Greater sage-grouse	4/11/2018 7:16	0	0	0		0.12 mile
		4/23/2018 5:48	0	0	0		0.12 mile
25087	Greater sage-grouse	4/11/2018 6:50	0	0	0		0.35 mile
		4/23/2018 5:24	0	0	0		0.32 mile
25129	Sharp-tailed grouse	4/11/2018 6:57	0	0	0		0.32 mile
		4/23/2018 6:30	2	0	0	Auditory; approximate count	0.32 mile
25152	Sharp-tailed grouse	4/11/2018 7:01	0	0	0		0.46 mile
		4/24/2018 5:23	0	0	0		0.46 mile
25530	Greater sage-grouse	4/11/2018 5:44	0	0	0		0.70 mile
		4/24/2018 6:20	0	0	0		0.70 mile

Grouse Lek Survey Report
Bowman Wind Project, Bowman County, North Dakota

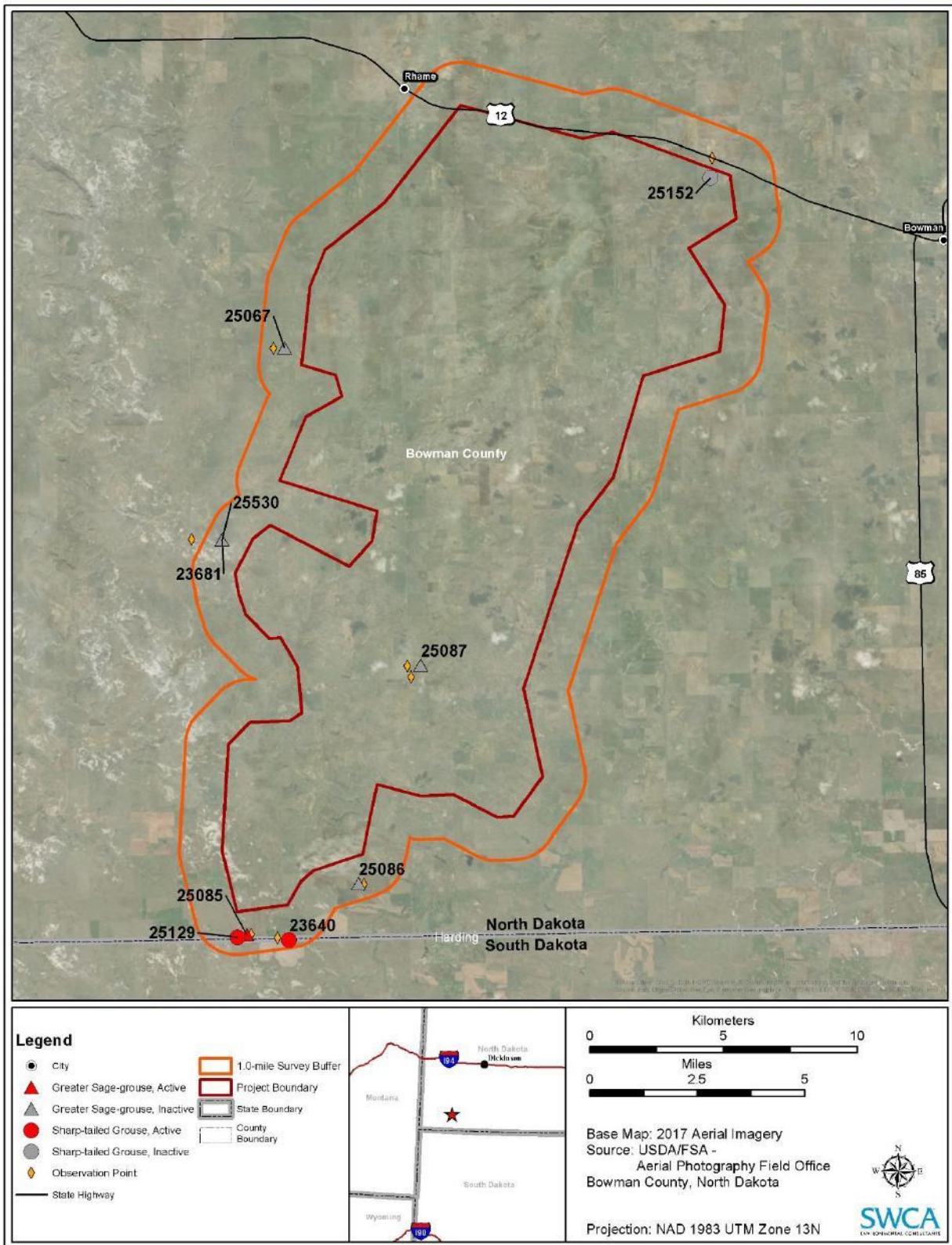


Figure 1. Grouse lek survey results for the proposed Bowman Wind Project.

CONCLUSIONS

Activity was recorded at one greater-sage grouse and two sharp-tailed grouse leks in spring 2018. All three leks were located south of the Project area within the 1.0-mile survey buffer. No grouse lek activity was documented at known lek sites within the Project area. *Confidential Business Information 4*

The logo for SWCA is positioned vertically on the left side of the page. It consists of the letters 'S', 'W', 'C', and 'A' in a large, light blue, stylized font. The 'S' and 'W' are connected, as are the 'C' and 'A'.

PRAIRIE DOG COLONY SURVEY REPORT
BOWMAN WIND PROJECT,
BOWMAN COUNTY, NORTH DAKOTA

CONFIDENTIAL BUSINESS INFORMATION

AUGUST 2018

PREPARED BY
SWCA Environmental Consultants

PRAIRIE DOG COLONY SURVEY REPORT
BOWMAN WIND PROJECT,
BOWMAN COUNTY, NORTH DAKOTA

Prepared by

SWCA Environmental Consultants

116 North 4th Street, Suite 200

Bismarck, North Dakota, 58501

(701) 258-6622

www.swca.com

August 2018

Confidential Business Information

CONTENTS

Introduction 1

Methods..... 1

Results 1

Figures

Figure 1. 2018 Prairie Dog Colony Survey Results for the Proposed Bowman Wind Project..... 2

This page is intentionally left blank.

INTRODUCTION

SWCA Environmental Consultants, LLC (SWCA) completed a ground survey for black-tailed prairie dog (*Cynomys ludovicianus*) colonies within accessible portions of the proposed Bowman Wind Project (Project) area in Bowman County, North Dakota. The purpose of the survey was to identify and map prairie dog colonies to inform siting of Project facilities. The Project area includes approximately 77,210 acres, and this report addresses the original Project area as provided to SWCA on July 4, 2017.

METHODS

On June 19 and 21, 2018, SWCA biologists conducted a road-based search using available roads and two-tracks within accessible parcels of the Project area. Areas were visually inspected to locate prairie dogs where present.

Because private land access was limited, SWCA biologist attempted to evaluate the areas with binoculars and spotting scopes (where possible). In general, topography dependent, an additional 500 meters were scanned from public roadways to locate sign of prairie dog colonies (mounds, devoid vegetation, prairie dogs). These additional areas were unable to be field verified at the time of survey.

Boundaries of prairie dog colonies were mapped using a handheld global positioning system by walking around the outer-most burrows of the colony. For the colony located on inaccessible lands, the boundary was estimated using aerial photos, topographic maps and ground features. Data recorded at each colony included activity status (i.e., active or inactive) depending on presence of prairie dogs, scat or evidence of recent use.

RESULTS

Three active colonies and no inactive colonies were located during the survey (Figure 1). Colony A was approximately 27.7 acres and located in the northern most portion of the Project area. Colony B was approximately 3.7 acres and was located the central portion of the Project area. Colony C was approximately 112.5 acres and located the southern portion of the Project area where ground access was not permitted. This colony was visible from a public roadway and the boundary was estimated (Figure 1). If the project moves forward, additional surveys are recommended.

Prairie Dog Colony Survey Report
Bowman Wind Project, Bowman County, North Dakota

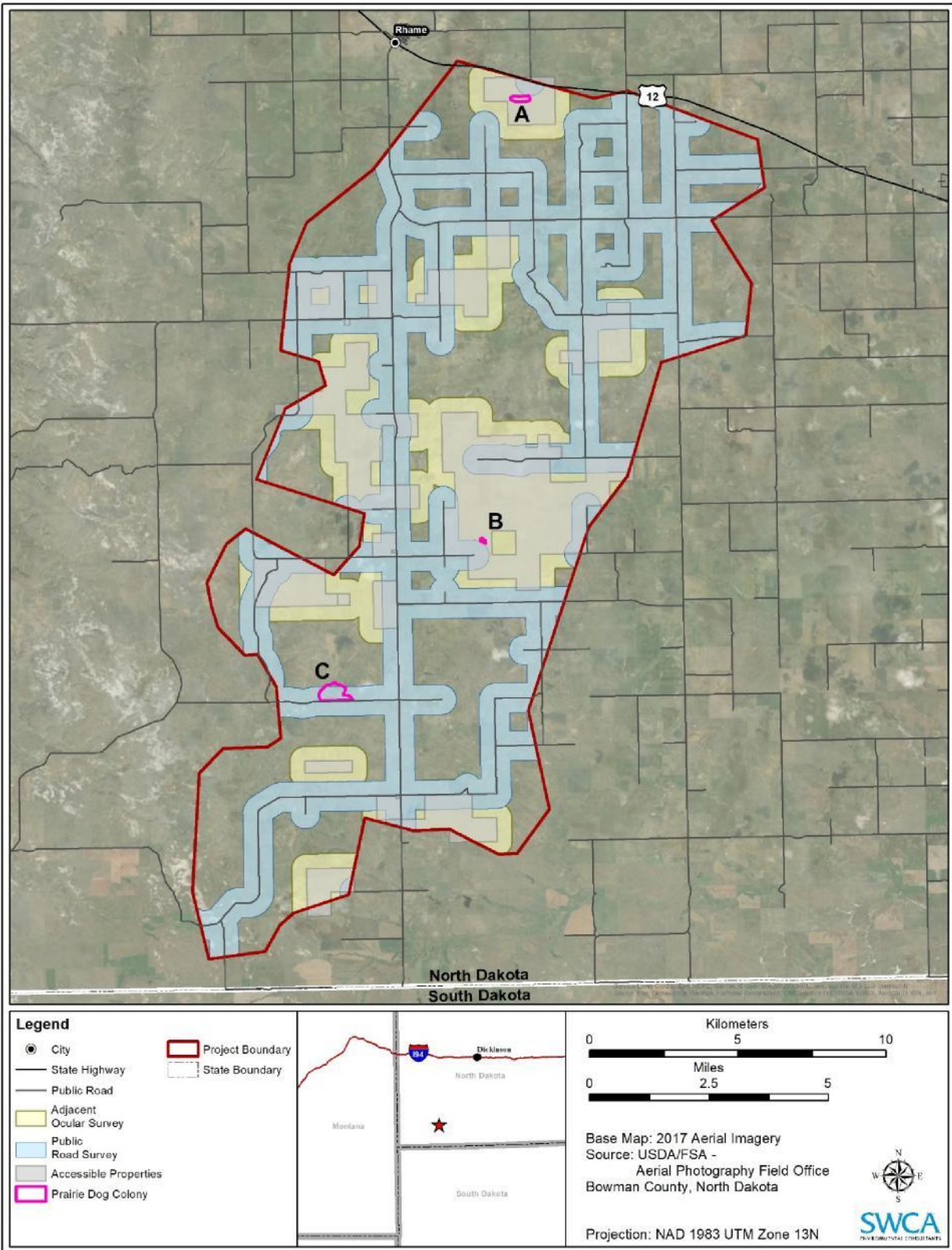


Figure 1. 2018 Prairie Dog Colony Survey Results for the Proposed Bowman Wind Project.

Eagle Environmental, Inc.



PRAIRIE DOG COLONY MAPPING REPORT
BOWMAN WIND, LLC
BOWMAN COUNTY, NORTH DAKOTA

Confidential Business Information

Prepared by
Eagle Environmental, Inc.
30 Fonda Road
Santa Fe, NM 87508
505-670-2138
www.eagleenvironmental.net

October 21, 2019

Introduction

Bowman Wind, LLC is evaluating the potential for wind energy development within the Bowman Wind Project (Project) in Bowman County, ND (Figure 1). In March 2019, Eagle Environmental, Inc. (EEI) opportunistically documented evidence of black-tailed prairie dog (*Cynomys ludovicianus*) towns during the aerial raptor nest survey. The survey was completed in conjunction with the aerial raptor nest surveys. The specific objective of the prairie dog survey was to identify their colonies as potential raptor, including eagles, prey sources within the Project area in accordance with previous North Dakota Game and Fish Department (NDGFD) and U.S. Fish and Wildlife Service (USFWS) agency consultation recommendations. The black-tailed prairie dog is not federally (USFWS 2019) or state-listed (NDGFD 2019) as threatened or endangered.

Survey Area Habitat

The Project area includes 212,446 acres, and the Project area and 1-mile buffer (Survey Area) totals 308,947 acres. Most of the Project area is managed as grazing lands for domesticated livestock, though it also included many agricultural fields. Pastures and fields were deemed possible sites for prairie dog towns.

Methods

EEI biologists Dale Stahlecker and Megan Ruehmann conducted an aerial survey on March 27, 2019, in a Roberts R-44 helicopter between the hours of 0800 to 1200. The sky was clear, and winds were light to moderate throughout the survey. The aerial survey was conducted by flying 0.75 to 1 mile wide transects (i.e., 0.5-mile viewed from either side of the helicopter) at an altitude of approximately 300 feet above ground level, depending on terrain and flight safety conditions. The Project area boundary was pre-established in ArcGIS software and loaded into the aircraft's global positioning system (GPS) unit for guidance during the survey. The pilot maintained proper distance between transects with his on-board GPS system; thus, pre-determined transects were not needed. Waypoints were taken when a series of mounds and holes typical of this species were observed. The objective of the survey was to locate prairie dog colonies. Therefore, colony boundaries were not mapped or demarcated during the aerial survey.

Results

Six black-tailed prairie-dog colony locations were documented within the Survey Area during the survey (Figure 1). Four of the colonies were observed within the Project area and two colonies were observed in the 1.0-mile buffer. Snow cover within some fields and pastures was moderate (~25%), which may have resulted in prairie dog colonies being missed. No active prairie dogs were observed above ground at the six colony locations. Of note, the black-tailed prairie dog does not hibernate like some of its congeners (Hoogland 1995).

Conclusions

Evidence of black-tailed prairie dog colonies was observed at six locations during the Survey Area. Prairie dogs may be a potential prey source for eagles, as this species occurs in concentrated densities and is easily visible to aerial predators. While

unoccupied dog towns will not attract raptors, they could become occupied again. Any active or inactive colony location should be used to inform Project siting of wind turbines and the transmission line.

Literature Cited

Hoogland, J. L. 1995. The black-tailed prairie dog: social life of a burrowing mammal. University of Chicago Press, Chicago, IL. 557 pp.

North Dakota Game and Fish. 2019. Threatened and Endangered Species.
<https://gf.nd.gov/wildlife/endangered>

United States Fish and Wildlife Service. 2019. Endangered Species/Mammals: Black-tailed Prairie Dog. <https://www.fws.gov/mountain-prairie/es/blackTailedPrairieDog.php>

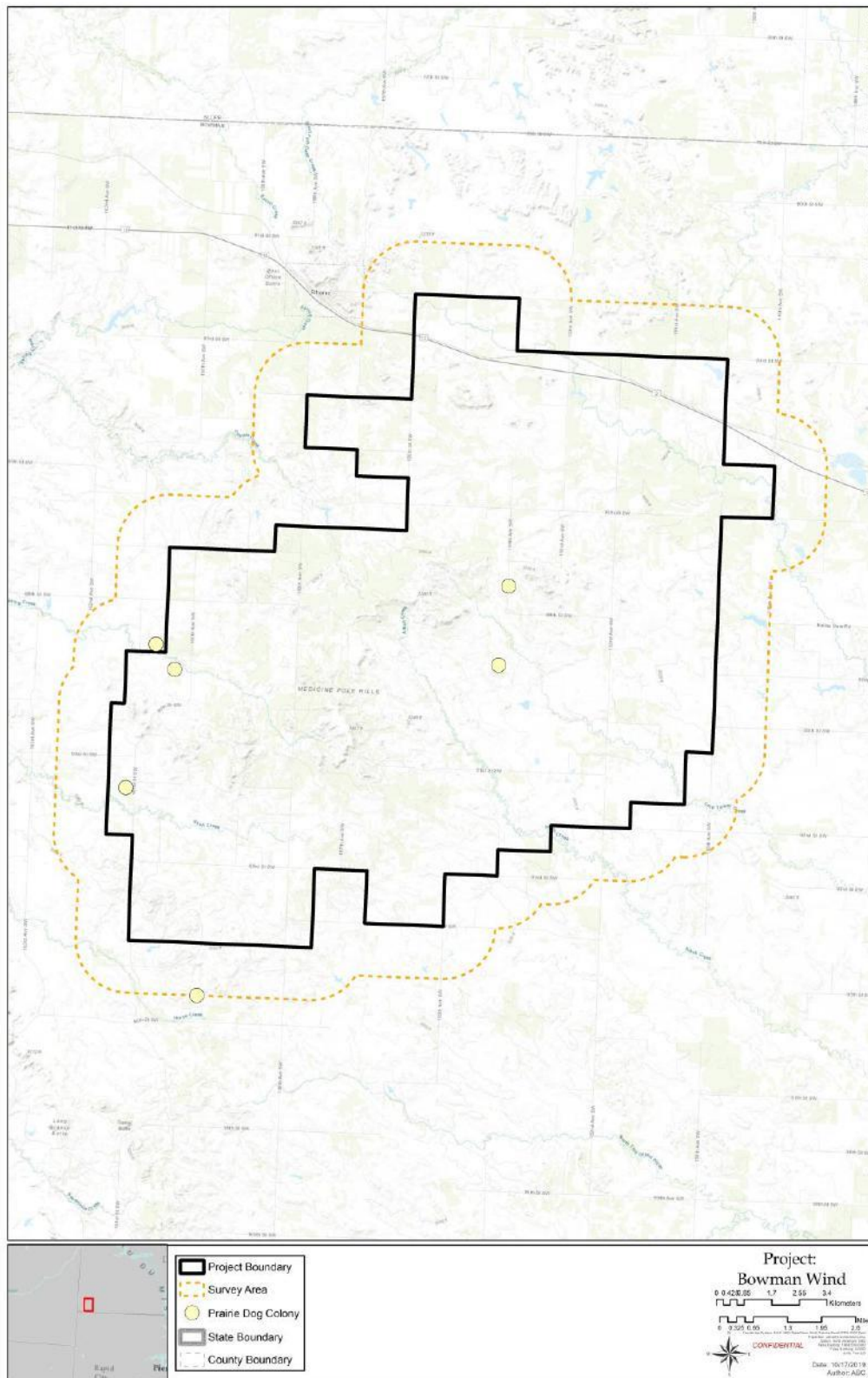


Figure 1. Locations of the proposed Bowman Wind Project and black-tailed prairie dog mounds/holes mapped during aerial surveys, Bowman County, North Dakota.

The logo for SWCA is positioned on the left side of the page, oriented vertically. It consists of the letters 'S', 'W', 'C', and 'A' in a large, stylized, light blue font. The letters are stacked vertically, with the 'S' at the bottom and the 'A' at the top.

BOWMAN WIND PROJECT GRASSLAND ASSESSMENT REPORT, BOWMAN COUNTY, NORTH DAKOTA

AUGUST 2018

Confidential Business Information

PREPARED BY

SWCA Environmental Consultants

BOWMAN WIND PROJECT DESKTOP GRASSLAND ASSESSMENT REPORT, BOWMAN COUNTY, NORTH DAKOTA

Confidential Business Information

Prepared by

SWCA Environmental Consultants

116 North 4th Street, Suite 200

Bismarck, North Dakota

(701) 258-6622

www.swca.com

August 2018

CONTENTS

Introduction 1

Background..... 1

Methods..... 2

Results 3

References Cited 4

Appendices

- Appendix A. Results Map
- Appendix B. Grassland Parcels Greater Than 160 Acres

This page intentionally left blank.

INTRODUCTION

SWCA Environmental Consultants (SWCA) completed a desktop assessment of grasslands within the proposed Bowman Wind Project (Project), located in Bowman County, North Dakota. The purpose of the assessment was to identify ‘unbroken’ grassland habitats greater than 160 acres in size within the area proposed for development (assessment area), as recommended by North Dakota Game and Fish Department (NDGFD) in a coordination meeting between the Project proponent and the NDGFD held on January 30, 2018.

BACKGROUND

For this assessment, unbroken grasslands include intact grassland areas that have either never been tilled/broken or that may have been tilled in the late nineteenth and early twentieth century where the plow did not cut deep enough to destroy the soil profile and/or change the landscape topography and grassland potential. NDGFD recommends avoiding or minimizing impacts to these areas due to their unique conservation value. The primary area of concern is intact grassland tracts of 160 acres or greater (personal communication, confidential client to SWCA on February 1, 2018).

The North Dakota State Wildlife Action Plan (SWAP) (Dyke et al 2015) identified nine primary Landscape Components and 21 Focus Areas. The nine Landscape Components encompass the major habitat types of North Dakota. In some cases, the SWAP identified Focus Areas within a particular Landscape Component. Focus Areas are highly variable in size and often represent an area of native vegetation or natural community type rare to North Dakota. The assessment area primarily lies within the western mixed-grass/short-grass prairie (Missouri Slope) Landscape Component. In addition to the Missouri Slope, the following three Landscape Components are present in the assessment area: 1) Planted or Tame Grassland; 2) Wetlands and Lakes; and 3) Rivers, Streams, and Riparian. Focus Areas located in the assessment area include the Sagebrush Shrub-Steppe and the Conservation Reserve Program (CRP).

Unbroken grassland in the assessment area is primarily located in the Missouri Slope Landscape Component, however these unbroken areas can also encompass areas of the Wetlands and Lakes and Rivers, Streams, and Riparian Landscape Components. The Sagebrush Shrub-Steppe Focus Area is found within the Missouri Slope Landscape Component and is generally dominated by unbroken grassland areas.

The Missouri Slope Landscape Component is located in the semiarid, unglaciated region of North Dakota which includes level to rolling plains topography with isolated sandstone buttes. Natural wetland basins are minimal, but small creeks and streams are abundant. Land-use is predominantly dryland farming and livestock grazing. A considerable amount of native vegetation remains in the Missouri Slope Landscape Component (Dyke et al. 2015). Grassland areas in the assessment area include mixed-grass prairie and short-grass prairie.

Mixed-grass prairie is a combination of tallgrass species found in eastern North Dakota and short-grass species found farther west. It is dominated by warm and cool season grasses as well as sedges (*Carex* spp.). Common grass species include prairie junegrass (*Koeleria macrantha*), western wheatgrass (*Pascopyrum smithii*), green needlegrass (*Nassella viridula*), needle-and-thread (*Hesperostipa comata*), blue grama (*Bouteloua gracilis*), little bluestem (*Schizachyrium scoparium*), and needleleaf sedge (*Carex duriuscula*). Other associated grasses include Canada wild-rye (*Elymus canadensis*), spike oats (*Danthonia* spp.), mat muhly (*Muhlenbergia richardsonis*), spikemoss (*Selaginella* spp.), plains reedgrass

(*Calamagrostis montanensis*), and buffalograss (*Bouteloua dactyloides*). Mixed-grass prairie is also known for a rich variety of forbs such as pasque flower (*Pulsatilla* sp.), western wallflower (*Erysimum asperum*), prairie smoke (*Geum triflorum*), Missouri milkvetch (*Astragalus missouriensis*), Indian breadroot (*Psoralea esculenta*), purple prairie clover (*Dalea purpurea*), gaura (*Gaura* spp.), harebell (*Campanula* spp.), blazing star (*Mentzelia* spp.), ball cactus (*Escobaria* spp.), purple coneflower (*Echinacea angustifolia*), yarrow (*Achillea millefolium*), and several species of goldenrods (*Solidago* spp.). Most of North Dakota is dominated by mixed-grass prairie (Dyke et al. 2015).

The short-grass prairie is found mostly in the elevated portions of the Missouri Slope Landscape Component of North Dakota; this grassland habitat is dominated by warm season species that can survive on little rainfall. Grass species mature at 6 to 12 inches in height and include spikemoss, blue grama, needleleaf sedge, threadleaf sedge (*Carex filifolia*), buffalograss, and needle-and-thread. Forbs include sandlily (*Leucocrinum montanum*), white wild onion (*Allium textile*), death camas (*Zigadenus* sp.), buffalo-bean (*Thermopsis rhombifolia*), purple loco (*Oxytropis lambertii*), silverleaf scurfpea (*Pediomelum argophyllum*), prickly pear (*Opuntia* sp.), phlox (*Phlox* spp.), beardtongue (*Penstemon* spp.), and fringed sage (*Artemisia frigida*) (Dyke et al. 2015).

The Sagebrush Shrub-Steppe Focus Area, within the Missouri Slope Landscape Component, is comprised of eroded buttes, scoria mounds, and salt pans that make this area similar to the badlands. This characteristic big sagebrush ecosystem has been altered by livestock grazing, conversion to cropland, and, in more recent years, oil development (Dyke et al. 2015).

The Wetlands and Lakes Landscape Component includes all wetlands and lakes distributed throughout the state. The Rivers, Streams, and Riparian Landscape Component includes all rivers, streams, and associated riparian areas distributed throughout the state.

METHODS

An SWCA grassland biologist, experienced in aerial imagery interpretation and familiar with Northern Great Plains ecology and remote sensing techniques, used aerial imagery and geospatial datasets to conduct a qualitative desktop assessment of the assessment area and identify the unbroken grassland areas. The assessment was completed within a geographic information system (GIS) database. The datasets were either publicly available (see references below) or provided by the Project proponent.

Listed below are the publicly available datasets used in the assessment.

- Color-infrared imagery (North Dakota Geographic Information System 2018)
- Current and historical aerial imagery (North Dakota Geographic Information System 2018)
- 2017 cropland data layer (National Agricultural Statistics Service 2018)
- 2010 National Gap Analysis Project (GAP) landcover (U.S. Geological Survey 2010)
- National Wetlands Inventory (U.S. Fish and Wildlife Service 2018)
- City and county roads (North Dakota Department of Transportation 2018)
- State and federal roads (North Dakota Department of Transportation 2017)

The following datasets were provided by the confidential client.

- Natural gas pipelines (Ventyx Energy LLC [Ventyx] 2012)
- Electric substations (Ventyx 2015a)

- Electric transmission lines (Ventyx 2015b)

The assessment focused on differentiating between two categorical areas: 1) broken, where the soil profile has been tilled or degraded; and 2) unbroken, areas where the soil profile is intact (including areas that may have received light tillage in the late nineteenth and early twentieth century where the plow did not cut deep enough to destroy the soil profile and/or change the landscape topography and grassland potential). Features in the broken category included cultivated areas, farmsteads and associated disturbed areas (i.e., road to homes, livestock facilities, outbuildings, etc.), county and state roads, pipeline scars, and oil and gas developments. Features in the unbroken category included all grassland areas with no identifiable history of plowing (including hayed areas that have no history of plowing), two-track roads that are primarily vegetated (including non-county section line roads), and undisturbed wetland, stream, and riparian areas.

After completing the assessment of grassland areas within the assessment area and identifying unbroken grassland polygons in the GIS database, the polygon layer was evaluated to identify those polygons that were 160 acres or greater.

RESULTS

Approximately 51,251 acres (50%) of the assessment area met the broken criteria, due to evidence of past cultivation or other disturbance (Attachment A).

Approximately 51,070 acres (50%) of the assessment area met the unbroken criteria. A total of 46,164 acres (90%) of the unbroken grassland areas were in parcels greater than 160 acres in size. These parcels consisted of 50 unbroken grassland polygons, ranging in size from 172.15 to 8,061.37 acres (Attachment B).

REFERENCES CITED

Dyke, S.R., S.K. Johnson, and P.T. Isakson. 2015. *North Dakota State Wildlife Action Plan*. Bismarck: North Dakota Game and Fish Department.

National Agricultural Statistics Service. 2018. Cropscape – Cropland Data Layer. U.S. Department of Agriculture. Available at: <https://nassgeodata.gmu.edu/CropScape/>. Accessed May 31, 2018.

North Dakota Department of Transportation. 2017. City and County Roads. January 1, 2018. Available at: <https://www.nd.gov/itd/statewide-alliances/gis/maps-and-data>. Accessed May 31, 2018.

———. 2018. State and Federal Roads. March 28, 2017. Available at: <https://www.nd.gov/itd/statewide-alliances/gis/maps-and-data>. Accessed May 31, 2018.

North Dakota Geographic Information Systems. 2018. GIS Hub Data Portal. Available at: <https://www.nd.gov/itd/statewide-alliances/gis/maps-and-data>. Accessed May 31, 2018.

U.S. Fish and Wildlife Service. 2018. The National Wetlands Inventory. U.S. Department of Interior. Available at: <https://www.fws.gov/wetlands/>. Accessed May 31, 2018.

U.S. Geological Survey. 2010. National Gap Analysis Project (GAP) land cover. U.S. Department of Interior. Available at: <https://gapanalysis.usgs.gov/gaplandcover/>. Accessed May 31, 2018.

Ventyx Energy LLC (Ventyx). 2012. Natural Gas Pipelines. EV Energy Map, Ventyx Energy LLC. Boulder, Colorado. February 28, 2012.

———. 2015a. Electric Substations. EV Energy Map, Ventyx Energy LLC. Boulder, Colorado. August 27, 2015.

———. 2015b. Electric Transmission Lines. EV Energy Map, Ventyx Energy LLC. Boulder, Colorado. August 27, 2015.

APPENDIX A

Results Map

APPENDIX B

Grassland Parcels Greater Than 160 Acres

A-1

Table 1. Grassland parcels greater than 160 acres in size identified during the 2018 grassland assessment for the proposed Bowman Wind Project in Bowman County, North Dakota.

Grassland Parcel ID	Acres	Location Township/Range(s)	Section(s)
1	178.05	T132N, R104W	12
2	847.46	T131N, R104W	1, 2, 35, 36
3	186.10	T131N, R104W	2
4	425.21	T131N, R103W	5, 6, 31, 32
5	356.46	T131N, R103W	3, 10
6	726.15	T131N, R102W	6, 7
		T131N, R103W	1 - 3, 12
		T131N, R103W	35, 36
7	203.35	T131N, R104W	11
8	339.51	T131N, R104W	3, 10, 11
9	220.90	T131N, R103W	13, 14, 23, 24
10	242.67	T131N, R103W	15, 16
11	617.32	T131N, R104W	9, 10, 15 - 17
12	214.91	T131N, R104W	14, 23, 24
13	278.72	T131N, R103W	16, 21
14	277.48	T131N, R103W	13, 23, 24
15	217.68	T131N, R103W	23, 26
16	664.30	T130N, R104W	3
		T131N, R104W	27, 28, 33, 34
		T130N, R103W	3 - 7
17	8,061.37	T130N, R104W	1, 2, 11, 12
		T131N, R103W	18 - 20, 27 - 34
		T131N, R104W	23 - 26, 35, 36
18	1,642.18	T130N, R104W	3 - 5, 8 - 10
19	797.77	T130N, R103W	7 - 9, 16, 17
20	252.01	T130N, R104W	14
21	385.00	T130N, R104W	10, 15
22	1,664.18	T130N, R103W	7, 17 - 20
		T130N, R104W	12, 13, 24
23	448.45	T130N, R104W	17 - 20
24	583.76	T130N, R104W	19, 20, 29 - 31, 34
		T130N, R105W	24
25	4,066.14	T129N, R104W	4, 5
		T130N, R104W	20 - 22, 27 - 29, 32 - 34
26	1,920.63	T129N, R104W	3 - 5, 8 - 10
27	2,095.06	T129N, R103W	7, 8, 17 - 19
		T129N, R104W	12 - 14, 24

Grassland Parcel ID	Acres	Location Township/Range(s)	Section(s)
28	403.04	T129N, R104W	17, 20
29	1,917.90	T129N, R104W	5 – 8, 17 - 19
		T129N, R105W	12, 13
30	629.54	T129N, R104W	18, 19, 30
		T129N, R105W	13, 24
31	499.26	T129N, R104W	19, 30
		T129N, R105W	24, 24
32	2,362.65	T129N, R104W	15 – 17, 20 – 22, 28 – 32
33	172.15	T129N, R104W	30, 31
		T129N, R105W	25, 36
34	3,894.38	T129N, R103W	6
		T129N, R104W	1, 2, 11, 12
		T130N, R103W	30, 31
		T130N, R104W	25, 26, 35, 36
35	450.32	T131N, R104W	10, 11, 14 – 16, 21
36	252.20	T130N, R104W	23, 24
37	562.60	T132N, R103W	30, 31
		T132N, R104W	25, 36
38	499.62	T131N, R103W	4 - 9
39	230.61	T131N, R103W	5 - 8
		T131N, R104W	12
40	374.00	T132N, R103W	11, 13, 14
41	260.74	T133N, R102W	31, 32
		T132N, R103W	2, 3, 9 – 11, 14, 36
42	961.60	T132N, R103W	14, 15, 22 – 24, 26, 27
43	600.25	T131N, R102W	6, 31
		T131N, R103W	1, 36
44	403.97	T132N, R103W	18, 19
		T132N, R104W	13, 24
45	567.28	T132N, R102W	18, 19
		T132N, R103W	13
46	334.22	T132N, R102W	19, 30
47	311.25	T132N, R103W	28 – 30, 32, 33
48	201.75	T132N, R103W	30, 31
		T132N, R104W	25
49	2,175.14	T132N, R103W	4, 5, 7 – 9, 16 – 18, 20, 21, 35
50	186.90	T132N, R102W	6, 7

**Raptor Nest Check Surveys
Bowman Wind Project
Bowman County, North Dakota**

Final Report



Prepared for:

Bowman Wind, LLC.

310 4th Street Northeast, Suite 200
Charlottesville, Virginia

Prepared by:

Kristen Chodachek

Western EcoSystems Technology Inc.
4007 State Street, Suite 109
Bismarck, North Dakota 58503

September 5, 2019



REPORT REFERENCE

Chodachek, K. 2018. Raptor Nest Check Surveys, Bowman Wind Project, Bowman County, North Dakota. Final Report. Prepared for Bowman Wind, LLC. Prepared by Western EcoSystems Technology, Inc. (WEST), Bismarck, North Dakota. September 5, 2019.

TABLE OF CONTENTS

INTRODUCTION	1
STUDY AREA	1
METHODS	3
RESULTS	4
REFERENCES	7

LIST OF TABLES

Table 1. Land Cover types, acreage, and percent (%) composition within the proposed Bowman Wind Project, Bowman County, North Dakota.	3
Table 2. Raptor nest checks conducted October 15, 2018 within the Bowman Wind Project, Bowman County, North Dakota.	6

LIST OF FIGURES

Figure 1. Location of the proposed Bowman Wind Project in Bowman County, North Dakota.	2
Figure 2. Raptor nest check results conducted October 15, 2018 within the Bowman Wind Project, Bowman County, North Dakota.	5

9.0 INTRODUCTION

Western EcoSystems Technology, Inc. (WEST) completed a ground nest check survey to evaluate **three raptor nests** (nest IDs 31, 32, and 52) **located during the spring 2018 aerial raptor nest surveys conducted within the Bowman Wind Project (Project) in the southwest corner of Bowman (Figure 1)**. The principal objectives of the raptor nest check surveys were to: 1) **determine whether the raptor nests exhibited the key characteristics of an eagle nest** and 2) provide background information that could be used to assess risk to eagles and raptors from operation of the proposed Project.

10.0 STUDY AREA

The proposed Project is located in the Missouri Plateau and Sagebrush Steppe Level IV Ecoregions within the Northwestern Great Plains Level III Ecoregion (US Environmental Protection Agency 2018). The Missouri Plateau ecoregion was largely unaffected by glaciation, retaining its original soils and complex stream drainage patterns which now support a mosaic of spring wheat, alfalfa, and grazing lands. The Sagebrush Steppe ecoregion is characterized by minimal rainfall, erode buttes, scoria mounds, sparse human inhabitants, and minimal cultivation. According to the National Land Cover Database (Yang et al. 2018, Multi-Resolution Land Characteristics 2019), the dominant land cover type in the Project area is herbaceous, which covers 54.7% of the total area (120,772 acres [ac]; Table 1, Figure 2). Cultivated crops is the second most common land cover type and covers 29.5% (65,184 ac) of the Project area. Only a small portion of the Project area consists of land cover types that provide potentially suitable foraging and roosting habitat for NLEB, including woody wetlands (0.3%), evergreen forest (<0.1%; 81 ac), deciduous forest cover (<0.1%; 78 ac), and mixed forest (<0.1%; 12 ac; Table 1; Figure 2).

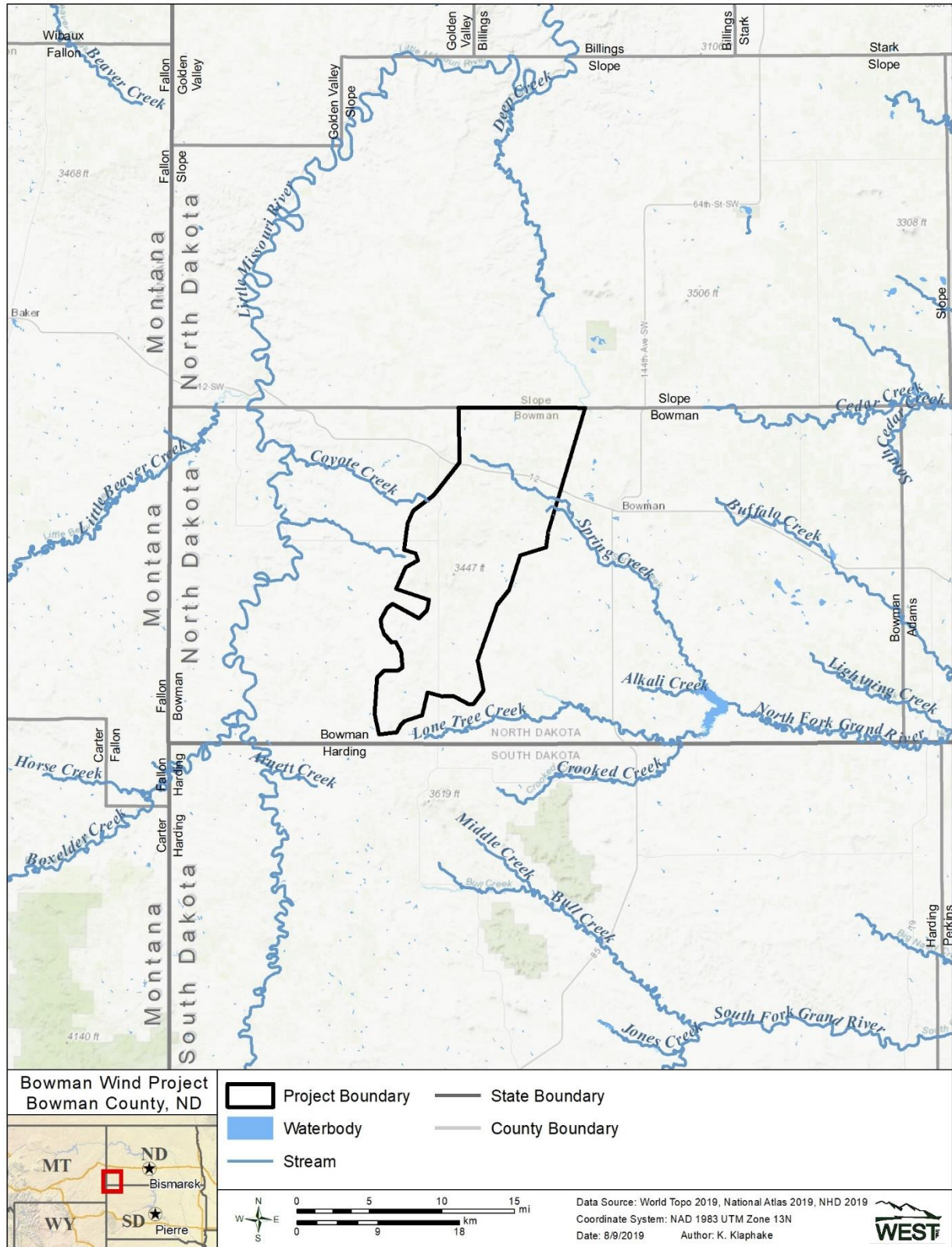


Figure 1. Location of the proposed Bowman Wind Project in Bowman County, North Dakota.

Table 1. Land Cover types, acreage, and percent (%) composition within the proposed Bowman Wind Project, Bowman County, North Dakota.

Land Cover/Land Use Type	Acres	% Composition
Herbaceous	120,772	54.7
Cultivated Crops	65,184	29.5
Shrub/Scrub	16,128	7.3
Hay/Pasture	9,418	4.3
Developed, Open Space	6,229	2.8
Open Water	919	0.4
Developed, Low Intensity	828	0.4
Woody Wetlands	754	0.3
Emergent Herbaceous Wetlands	377	0.2
Evergreen Forest	81	<0.1
Deciduous Forest	78	<0.1
Barren Land	57	<0.1
Developed, Medium Intensity	17	<0.1
Mixed Forest	12	<0.1
Developed, High Intensity	<1	<0.1
Total	220,854	100

Sources: Yang et al. 2018, Multi-Resolution Land Characteristics 2019.

Sums may not total values shown due to rounding.

Land use in bold signifies habitats that could be potentially used by NLEB.

11.0 METHODS

On October 15, 2018, one experienced WEST biologist conducted a follow-up ground nest check survey to determine if three nests (nest ID 31, 32, and 52; Figure 2) identified during the spring 2018 raptor nest survey (SWCA 2018) were consistent with an eagle nest. Due to no access, nest 52 was not evaluated. The biologist walked to each nest to review substrate, nest type, nest condition, and nest location to determine if the nest was consistent with an eagle nest (Buehler 2000, Pagel et al. 2010).

The substrate in which a nest was observed was recorded to further aid in determining raptor species.

Nest type describes the size and material used for nesting. General nest types include:

- Small Stick – roughly eight to 10 inches (20 to 25 centimeters [cm]) in diameter, bowl-shaped, comprised of small sticks, grasses, mud and other material, and typical of nests used by accipiter species.
- Medium Stick - typically 10 to 20 inches (25 to 51 cm) in diameter, bowl-shaped, comprised of larger sticks, and typical of nests used by buteo species.
- Large Stick/Extra Large – typically greater than 20 inches in diameter, large bowl or flat platform-shaped, comprised of intertwined large to extra-large sticks from trees, or other scrub species (i.e., big sagebrush), and typical of nests used by eagles or osprey (*Pandion haliaetus*).

Nest condition was subjectively categorized using descriptions ranging from poor to excellent. Nests in poor to fair condition appear in disrepair, sloughing, or sagging heavily, and would require some level of effort to rebuild in order to be suitable for successful nesting. Nests in good to excellent condition are those that appear to have been well maintained, have a well-defined bowl shape, are not sagging or sloughing, and appear to be suitable for nesting. Due to the timing of the nest check, the status of the nest was not evaluated.

The location of each nest was confirmed using a hand-held Global Positioning System unit; coordinates were set at Universal Transverse Mercator (UTMs) North American Datum (NAD) 83 unit.

12.0 RESULTS

Nest 31

Nest 31 is located in the center of the Project area in a wind row adjacent to an active farmstead (Figure 2). The nest was in good condition and no raptors were present at the time of the nest check (Table 2). Based on the size, shape, stick size, and tree size, this nest is not consistent with an eagle nest (Appendix A).

Nest 32

Nest 32 is located in the center of the Project area within a rocky outcrop south of an active farmstead (Figure 2). Upon closer inspection there is no nest present at the current location or on any nearby rocky outcrops (Table 2). The current location has some woody vegetation present and lots of white wash present on an adjacent rock (Appendix A). When walking up to the nest, an adult golden eagle was perched on the rock and flew off to the grasslands to the west of the rocky outcrop. It is likely with the grasslands below that this is a commonly used perching point.

Nest 52

Nest 52 is located in the southwestern portion of the Project area in a wind row adjacent to an active farmstead (Figure 2). Site access was not granted to the check Nest 52.

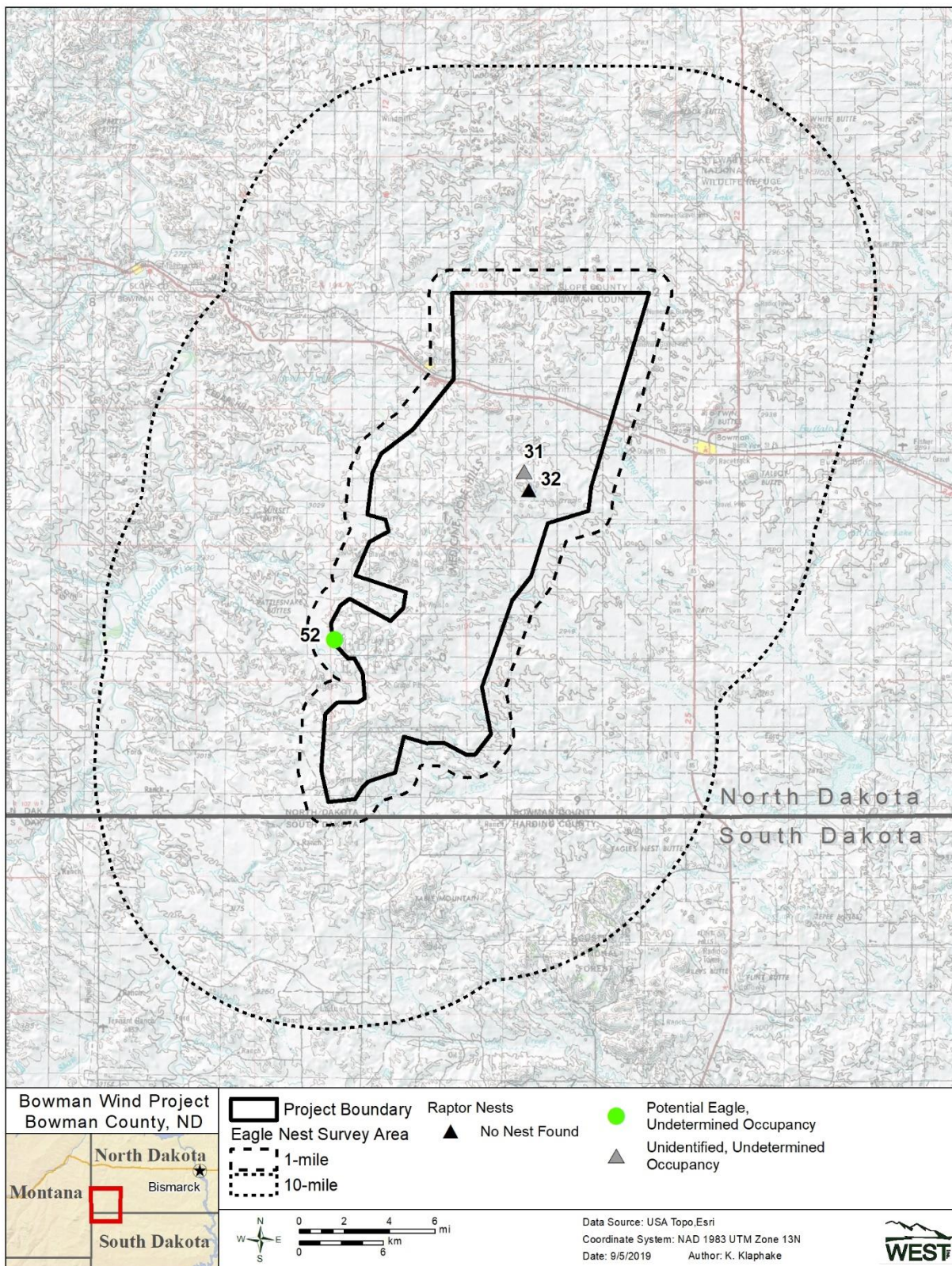


Figure 2. Raptor nest check results conducted October 15, 2018 within the Bowman Wind Project, Bowman County, North Dakota.

Table 2. Raptor nest checks conducted October 15, 2018 within the Bowman Wind Project, Bowman County, North Dakota.

ID	Species	Easting	Northing	Status at Time of Survey	Condition	Substrate	Consistent With an Eagle Nest	Comments
31	Undetermined	610772	5113487	Unoccupied - Inactive	Good	Medium sized Deciduous Tree	No	Nest is a medium to large and is built with smaller branches and is located mid-canopy in the tree
32	---	611156	5112164	---	---	Rocky Outcrop	---	Nest does not exist; no nest present at current location or in the vicinity, matted down vegetation
51*	Undetermined	597462	5101289	Undetermined	Undetermined	Deciduous Tree	Undetermined	

* - Site access not granted, nest check was not conducted

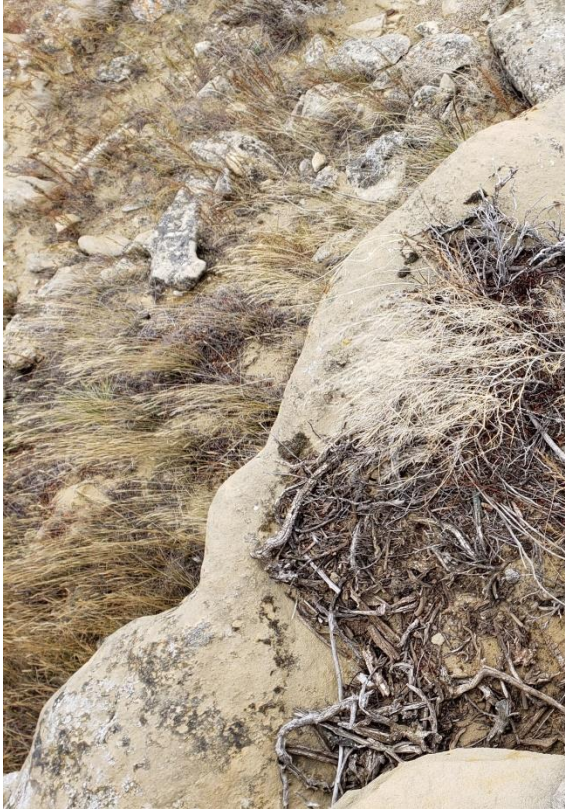
13.0 REFERENCES

- Buehler, D. A. 2000. Bald Eagle (*Haliaeetus leucocephalus*), Number 506 in A. Poole and F. Gill, editors, The Bird of North America. The Birds of North America, Inc. Philadelphia, Pennsylvania.
- Multi-Resolution Land Characteristics (MRLC). 2019. National Land Cover Database (NLCD) 2011. Multi-Resolution Land Characteristics (MRLC) Consortium. US Geological Survey (USGS) Earth Resources Observation and Science (EROS) Center, MRLC Project, Sioux Falls, South Dakota. May 10, 2019. Information online: <https://www.mrlc.gov/data>
- Pagel, J.E., D.M. Whittington, and G.T. Allen. 2010. Interim Golden Eagle Technical Guidance: Inventory and Monitoring Protocols; and Other Recommendations in Support of Golden Eagle Management and Permit Issuance. US Fish and Wildlife Service (USFWS). February 2010. Available online at: http://steinadlerschutz.lbv.de/fileadmin/www.steinadlerschutz.de/terimGoldenEagleTechnicalGuidanceProtocols25March2010_1_.pdf
- US Environmental Protection Agency (USEPA). 2018. Level Iii and Level Iv Ecoregions of the Continental United States. Ecosystems Research, USEPA. Last updated February 8, 2017. Information and maps online: <https://www.epa.gov/eco-research/level-iii-and-iv-ecoregions-continental-united-states>
- US Environmental Protection Agency (USEPA). 2013. Level Iii and Iv Ecoregions of the Continental United States. Map scale 1:3,000,000. USEPA National Health and Environmental Effects Research Laboratory, Corvallis, Oregon. Accessed May 2015. Information and downloads available online at: https://archive.epa.gov/wed/ecoregions/web/html/level_iii_iv-2.html
- Yang, L., S. Jin, P. Danielson, C. Homer, L. Gass, S. M. Bender, A. Case, C. Costello, J. Dewitz, J. Fry, M. Funk, B. Granneman, G. C. Liknes, M. Rigge, and G. Xian. 2018. A New Generation of the United States National Land Cover Database: Requirements, Research Priorities, Design, and Implementation Strategies. ISPRS Journal of Photogrammetry and Remote Sensing 146: 108-123. doi: 10.1016/j.isprsjprs.2018.09.006.

**Appendix A. Images of Raptor Nests Checked on October 15, 2018 within the
Bowman Wind Project, Bowman County, North Dakota**



Appendix A. Nest 31 located within the Bowman Wind Project, Bowman County, North Dakota.





**Appendix A. Nest 32 located within the
Bowman Wind Project, Bowman
County, North Dakota.**

Eagle Environmental, Inc.



Expertise in Natural Resource Science

2019 RAPTOR NEST REPORT
BOWMAN WIND, LLC
BOWMAN COUNTY, NORTH DAKOTA

Confidential Business Information

Prepared by
Eagle Environmental, Inc.
30 Fonda Road
Santa Fe, NM 87508
505-670-2138
www.eagleenvironmental.net

October 21, 2019

Introduction

Eagle Environmental, Inc. (EEI) completed raptor nest surveys for the proposed Bowman Wind, LLC Project (Project) in March 2019. The Project is located approximately five miles west of the town of Bowman, Bowman County, North Dakota (Figure 1). The purpose of the surveys was to identify bald eagle (*Haliaeetus leucocephalus*) and golden eagle (*Aquila chrysaetos*) nests in or within 10 miles of the Project, and all raptor nests in or within one mile of the Project (Figure 2). The survey was completed in accordance with North Dakota Game and Fish Department (NDGFD) and U.S. Fish and Wildlife Service (USFWS) agency consultation and recommendations in the USFWS *Land-Based Wind Energy Guidelines* (USFWS 2012) and *Eagle Conservation Plan Guidance* (USFWS 2013). No federally listed raptors are known to nest in North Dakota, and North Dakota has no state-endangered species list (North Dakota Game and Fish 2019).

Survey Area Habitat

The survey area contained grazing lands for domesticated livestock along with agricultural fields. Suitable nesting habitat, including cliffs attractive to golden eagles, occurs primarily west of the Project area. Drainages were mostly intermittent and larger trees (i.e., eastern cottonwoods [*Populus deltoides*]) were found along drainages, including the Little Missouri River, approximately 7.5-10 miles from Project area on the western side of the survey area. Planted tree shelterbelts also occur in some agricultural fields and may provide potential nesting habitat for raptors. The Project area did not contain any suitable cliffs that would likely attract nesting golden eagles. However, ridges or bluffs associated with the Little Missouri River cliffs occur approximately 8-10 miles north and west of the Project area. The Project area contained some large hills, which may provide suitable sites for ground nesting ferruginous hawks (*Buteo regalis*) and possibly golden eagles. Pastures and fields were possible sites for black-tailed prairie dog colonies, which may attract eagles as a potential prey source.

Methods

EEI biologists Dale Stahlecker and Megan Ruehmann conducted an aerial survey on March 26 and 27, 2019, in a Roberts R-44 helicopter between the hours of 1730 and 1830 on March 26, and 0800 to 1500 on March 27, 2019. Surveys were completed during daylight hours with weather conditions were favorable for flying and locating nests during both survey days. Prior to conducting the aerial survey, all potentially suitable eagle nesting habitat was identified within the Project Area and a 10-mile buffer and used to inform and guide survey efforts. Potential eagle nesting habitat was defined as including cliff bands, rock outcrops, wooded riparian corridors, utility structures, and stands of large trees capable of supporting the weight of an eagle nest. Locations of these features were used for guidance during the aerial survey.

Aerial Raptor Nest Survey

The Project area and 1-mile buffer were flown on transects spaced 0.75 to 1 mile transects (i.e., 0.5-mile viewed from either side of the helicopter) at an altitude of approximately 300 feet above ground level, depending on terrain and flight safety conditions (Figure 2). The Project area boundary was pre-established in ArcGIS software and loaded into the aircraft's global positioning system (GPS) unit for guidance during the survey. The pilot maintained proper distance between transects with his on-board GPS system; thus, pre-determined transects were not needed. In addition, 45 historical nest sites were previously documented with the Project area and 1-mile survey buffer area and were checked during the survey.

Aerial Eagle Nest Survey

The aerial eagle nest survey within the 10-mile buffer was conducted by flying a generalized pattern at about 300 feet above ground level and looking for nest structures suitable for supporting an eagle nest (Figure 2). If potential or historical eagle nesting habitat (i.e., as previously described) was observed, the helicopter was piloted closer to the nest structure until it could be determined if it was occupied or unoccupied.

Data

Data recorded at each nest location included nest substrate (e.g., tree, cliff or human-made structure), status (e.g., occupied or unoccupied), raptor species using occupied nests, number of adults, eggs, and/or nestlings, if observed, and GPS location. The following criteria were used to label a nest as occupied: 1) an adult observed in an incubating posture (lying rather than standing), 2) eggs, 3) nestlings (including fledglings near a nest with obvious recent use, 4) a raptor pair, sometimes including subadults, at or near a nest through at least the time period when incubation normally occurs, and 5) a newly constructed or refurbished stick nest in the area where territorial behavior of a raptor has been seen early during the breeding season, or 6) a recently repaired nest with fresh sticks (clean breaks) or fresh boughs (greenery) on top, and/or droppings and/or molted feathers on its rim or underneath (Postupalsky 1974, U. S. Fish and Wildlife Service 2013, U.S. Fish and Wildlife Service 2016, Steenhof et al. 2017). During the survey options of 1-3 and 6 (greenery or other fresh lining) as discussed above were most possible to be seen and used to determine nest occupancy. Option 4 could occur, and Option 5 was difficult due to a lack of historical data in this area.

Results

Aerial Raptor Nest Survey

A total of 35 raptor nests were observed within the Project and 1-mile buffer during surveys. In addition, there were nine Buteo or Corvus nests, one ferruginous hawk, one great horned owl, one Swainson's hawk and six unknown raptor species nests that were historically known but not located during surveys. Of the observed 35 raptor nests, 27 were historical nests or previously known, and eight were previously undocumented. Nine of the nests were occupied and 26 were unoccupied; three of the unoccupied nests had the potential to be golden eagle nests, though they were likely built by Buteos. Of the nine occupied nests, six were occupied by great horned owls (*Bubo virginianus*) and three were occupied by ferruginous hawks (*Buteo regalis*) (Table 1; Figure 3).

Table 1. Spring 2019 aerial raptor nest survey results, raptors only, for the proposed Bowman Wind Project in Bowman County, North Dakota.

Species	Nest Status	Nest Substrate	Longitude	Latitude
Buteo or Corvus	Unoccupied	Tree	-103.517703	46.146979
Buteo or Corvus	Unoccupied	Tree	-103.555155	46.116427
Buteo or Corvus	Unoccupied	Tree	-103.560644	46.205906
Buteo or Corvus	Unoccupied	Tree	-103.628194	46.114048
Buteo or Corvus	Unoccupied	Tree	-103.581126	46.157541
Buteo or Corvus	Unoccupied	Tree	-103.598106	46.186621
Buteo or Corvus	Unoccupied	Tree	-103.579211	46.203077
Buteo or Corvus	Unoccupied	Tree	-103.57972	46.235161
Buteo or Corvus	DNLO	NA	-103.589563	46.248196
Buteo or Corvus	Unoccupied	Tree	-103.58902	46.245869
Buteo or Corvus	Unoccupied	Tree	-103.60513	46.232594
Buteo or Corvus	Unoccupied	Tree	-103.6288	46.181762
Buteo or Corvus	Unoccupied	Tree	-103.662975	46.137264
Buteo or Corvus	Unoccupied	Tree	-103.658356	46.097295
Buteo or Corvus	Unoccupied	Tree	-103.566105	46.191498
Buteo or Corvus	DNLO	Tree	-103.598992	46.046547
Buteo or Corvus	Unoccupied	Tree	-103.461016	46.197033
Buteo or Corvus	Unoccupied	Tree	-103.482305	46.198379
Buteo or Corvus	DNLO	Tree	-103.520759	46.213105
Buteo or Corvus	DNLO	Tree	-103.527917	46.196644
Buteo or Corvus	DNLO	Tree	-103.520964	46.169064
Buteo or Corvus	Unoccupied	Tree	-103.54489	46.107978
Buteo or Corvus	Unoccupied	Tree	-103.56256	46.167083
Buteo or Corvus	DNLO	Tree	-103.560463	46.175945
Buteo or Corvus	DNLO	Tree	-103.567819	46.178455
Buteo or Corvus	Unoccupied	Tree	-103.593535	46.230167
Buteo or Corvus	Unoccupied	Tree	-103.703112	46.055187
Buteo or Corvus	DNLO	Tree	-103.741484	46.055293
Buteo or Corvus	Unoccupied	Tree	-103.623123	46.17936
Buteo or Corvus	DNLO	Tree	-103.596718	46.053391
Ferruginous Hawk	Unoccupied	Ground	-103.610776	46.115546
Ferruginous Hawk	Occupied	Tree	-103.628234	46.17997
Ferruginous Hawk	Occupied	Other	-103.689144	46.152792
Ferruginous Hawk	Occupied	Tree	-103.56646	46.169166
Ferruginous Hawk	Unoccupied	Ground	-103.56047	46.153996
Ferruginous Hawk	DNLO	Cliff	-103.724429	46.10429
Golden Eagle or Buteo	Unoccupied	Cliff	-103.747225	46.076128
Golden Eagle or Buteo	Unoccupied	Other	-103.739997	46.05838
Golden Eagle or Buteo	Unoccupied	Tree	-103.585967	46.11739
Great Horned Owl	Occupied	Tree	-103.521037	46.14364
Great Horned Owl	Occupied	Tree	-103.540849	46.10955
Great Horned Owl	Occupied	Tree	-103.566671	46.165911
Great Horned Owl	Occupied	Tree	-103.617885	46.195016
Great Horned Owl	Occupied	Tree	-103.676654	46.102223
Great Horned Owl	Occupied	Tree	-103.659177	46.080832
Great Horned Owl	DNLO	Tree	-103.538729	46.185883
Swainson's Hawk	DNLO	NA	-103.618831	46.107832
Unknown (non eagle)	Missed	Tree	-103.489074	46.177496
Unknown (non eagle)	Missed	Tree	-103.606765	46.240958
Unknown (non eagle)	Missed	Tree	-103.616764	46.244978
Unknown (non eagle)	Missed	Other	-103.712223	46.155096
Unknown (non eagle)	Missed	Other	-103.607851	46.220092
Unknown (non eagle)	Missed	Other	-103.60807	46.238206

DNLO = Did Not Locate

Aerial Eagle Nest Survey

Golden Eagle

No occupied golden eagle nests occurred within the Project area, and two occupied nests were observed within the 10-mile survey buffer (Figure 4). The closest occupied nest was 8.2 miles and the other occupied nest occurred 9.1 miles from the Project area.

Two historical golden eagle nests from agency files were 1 mile of the Project area and five more historical agency nests were within four miles to the southwest of the Project area (Figure 4) in badland escarpments, as reported from the federal and state agencies. Only two of these seven nests were found in 2019; since golden eagles have not repaired them, it is likely these nests/territories are not currently occupied.

Bald Eagle

No bald eagle nests occurred within the Project area and one occupied bald eagle nest was found along the Little Missouri River, approximately 9.1 miles from the Project area (Figure 4). In addition, no historical records of bald eagle nests were reported from the agencies.

Table 2. Spring 2019 aerial raptor nest survey results, eagles only, for the proposed Bowman Wind Project in Bowman County, North Dakota.

Species	Nest Status	Nest Substrate	Distance to Project (Miles)	Longitude	Latitude
Bald Eagle	Occupied	Tree	9.1	-103.87933	46.222319
Golden Eagle	Unoccupied	Cliff	1.0	-103.750099	46.073648
Golden Eagle	Unoccupied	Cliff	2.7	-103.777674	46.043400
Golden Eagle	Unoccupied	Cliff	4.3	-103.810908	46.042439
Golden Eagle	Unoccupied	Cliff	3.0	-103.765865	46.021650
Golden Eagle	Unoccupied	Tree	8.5	-103.677206	46.351624
Golden Eagle	Occupied	Tree	9.1	-103.887878	46.214298
Golden Eagle	Unoccupied	Cliff	8.7	-103.894313	46.185039
Golden Eagle	Unoccupied	Cliff	8.6	-103.913852	46.115899
Golden Eagle	Occupied	Cliff	8.2	-103.9042	46.103572
Golden Eagle	DNLO	Tree	7.7	-103.886148	46.148308
Golden Eagle	DNLO	Cliff	7.3	-103.834108	45.982647
Golden Eagle	DNLO	Cliff	6.1	-103.834231	46.010433
Golden Eagle	DNLO	Cliff	6.1	-103.833575	46.010296
Golden Eagle	DNLO	Cliff	6.3	-103.864584	46.10902
Golden Eagle	Missed	Cliff	6.2	-103.861695	46.100905
Golden Eagle	DNLO	Cliff	4.4	-103.814314	46.042418
Golden Eagle	DNLO	Cliff	4.5	-103.816001	46.04262

DNLO = Did Not Locate

Conclusions

Six occupied great horned owl and three occupied ferruginous hawk nests were recorded within the Project Area and 1-mile buffer. Twenty-one unoccupied nests also within 1-mile of the Project were likely built by *Buteos* or Corvids. This would include resident but not yet nesting red-tailed hawks (*Buteo jamaicensis*), migrant Swainson's hawks (*Buteo swainsonii*) that were not yet present in March, and resident/migrant Common Ravens (*Corvus corax*) and American crows (*Corvus americana*). Nests of the two hawk species were previously documented by agencies (Heimerl *in lit.*, Reinish *in lit.*, SWCA 2018).

The 2019 survey was timed to best document nesting eagles, but was conducted too early to document nests of some raptor species. These 21 unoccupied nests are unlikely candidates for future golden eagle occupancy. Six large unoccupied nests likely built by ferruginous hawks on hilltops or in trees and one historical golden eagle nest, would be somewhat more likely than the other 21 nests to be occupied by golden eagles, if a pair were to form in the Project or 1-mile buffer. Golden eagles have occasionally been documented taking over both ground and tree nests initially built by ferruginous hawks (Wallace, *in lit.*, Kochert et al. 2002). Any nesting attempts by golden eagles in the previously built nests would also require proximal suitable prey densities and other localized habitat variables.

No occupied eagle nests were identified in the Project area. One occupied bald eagle and two occupied golden eagle nests were documented within the Survey Area, with the nearest occupied golden eagle nest 8.2 miles from the Project. The other occupied golden eagle nest occurred approximately 9.2 miles from the Project. Most cliffs attractive to nesting golden eagles occurs more than 8 miles from the Project, though the three occupied eagle nests occur all along the western boundary of the Survey Area adjacent to the Little Missouri River. The likelihood of these territorial adults visiting the Project area is probably low. However, the presence of these occupied eagle nests may warrant siting consideration and evaluation of eagle use to allow for the assessment of the potential risk (i.e., dispersing juveniles) of the proposed Project to eagles.

Literature Cited

Kochert, M. N., K. Steenhof, C.L. McIntyre, and E. H. Craig. 2002. Golden Eagle (*Aquila chrysaetos*). In A. Poole and F. Gill (Eds), The Birds of North America Online, no. 684. Cornell Lab. of Ornithology, Ithaca, NY.

<http://bna.birds.cornell.edu/species/684> (last accessed 22 August 2019)

North Dakota Game and Fish Department. 2019. Threatened and Endangered Species.

<https://gf.nd.gov/wildlife/endangered>

Postupalsky, S. 1974. Raptor reproductive success: some problems with methods, criteria, and terminology. Pages 21-31 in F. N. Hamerstrom, Jr., B. E. Harrell, and R. R. Olendorff (Eds), Management of Raptors, Raptor Research Foundation, Vermillion, SD U.S.A.

Steenhof, K., M. N. Kochert, C. L. McIntyre, and J. L. Brown. 2017. Coming to terms about describing Golden Eagle reproduction. Journal Raptor Research 51:378-390.

United States Fish and Wildlife Service. 2012. Land-Based Wind Energy Guidelines.

United States Fish and Wildlife Service. April 2013. Eagle Conservation Plan Guidance: Module 1 – Land-based Wind Energy; Version 2.

United States Fish and Wildlife Service. 2016. Eagle Conservation Plan Guidance: Module 1 – Land-based Wind Energy; Version 3.

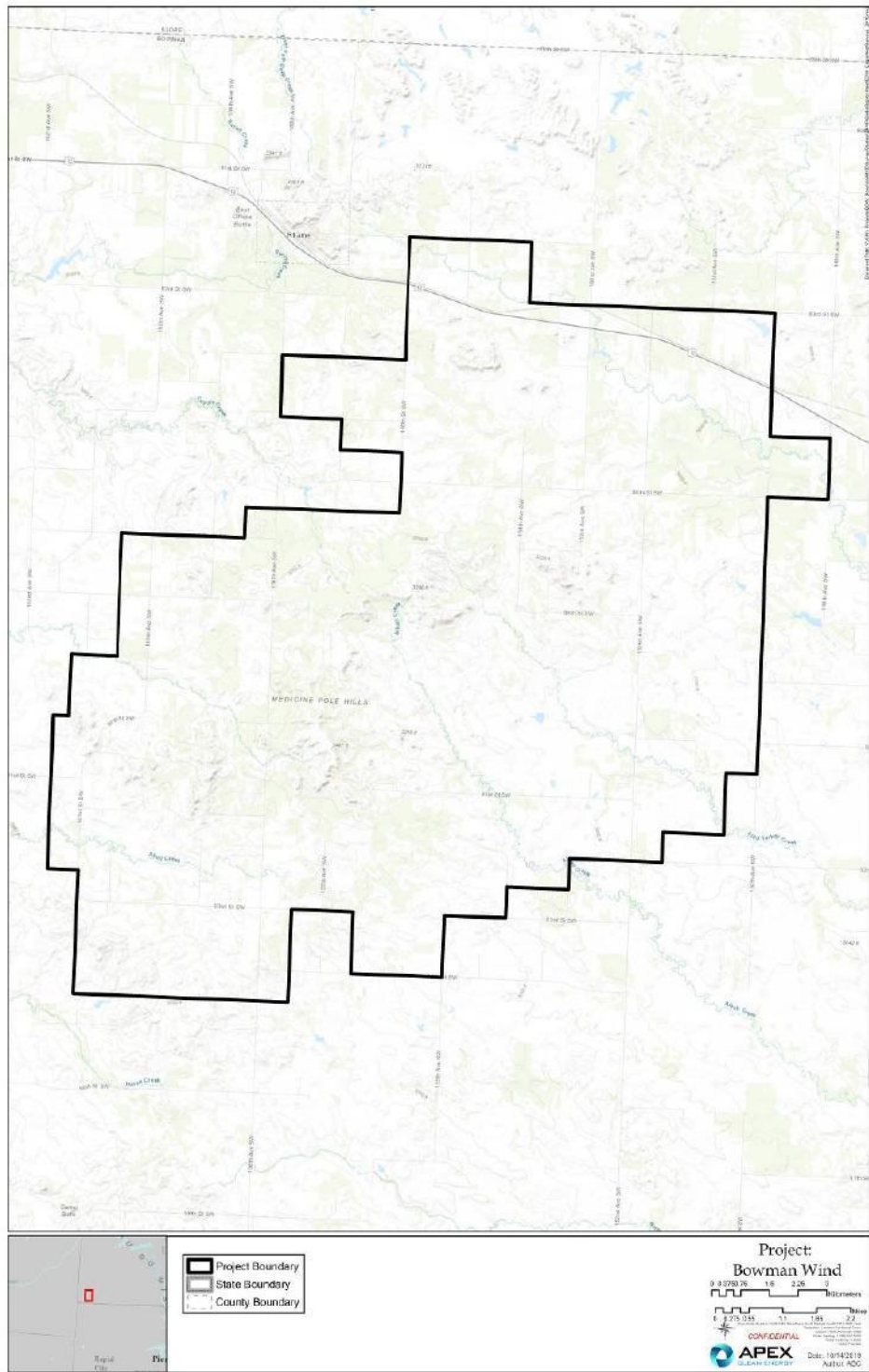


Figure 1. The proposed Bowman Wind LLC Project, Bowman County, North Dakota.

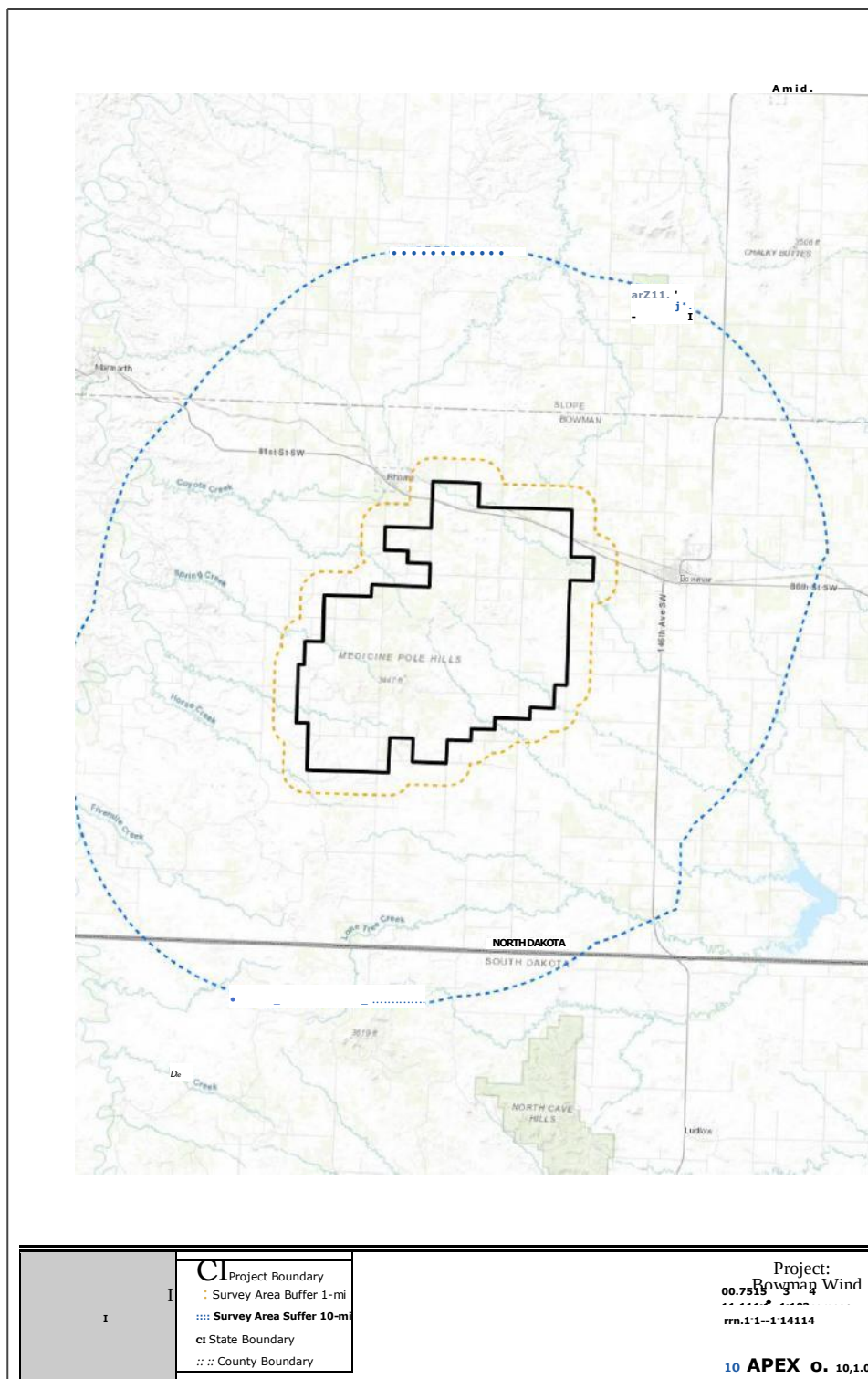


Figure 2. 2019 1-mile buffer for all raptors and 10-mile buffer Survey Area for eagles, the proposed Bowman Wind LLC Project, Bowman County, North Dakota.

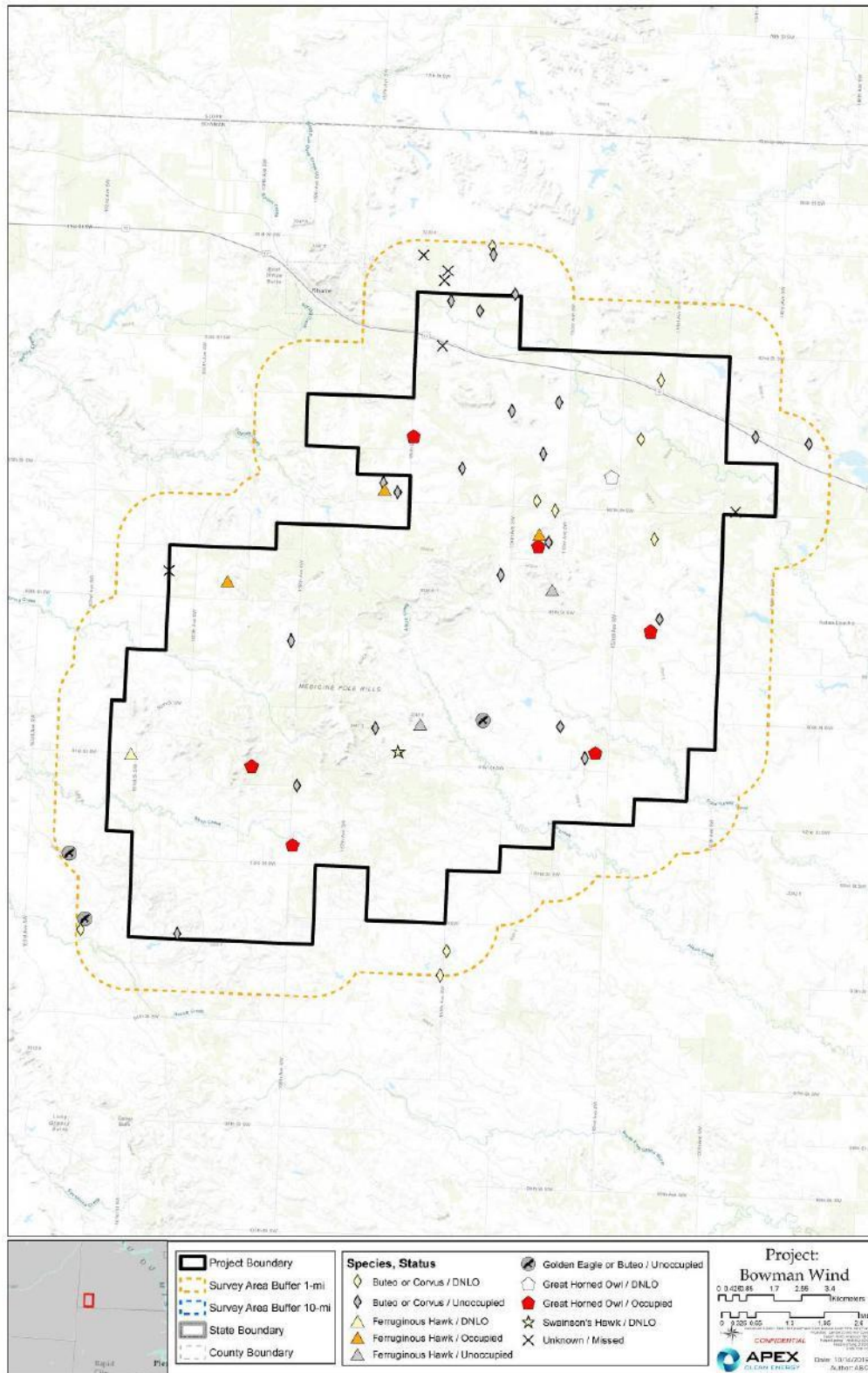


Figure 3. Raptor nests encountered in 2019 in the proposed Bowman Wind Project area and the 1-mile buffer, Bowman County, North Dakota.

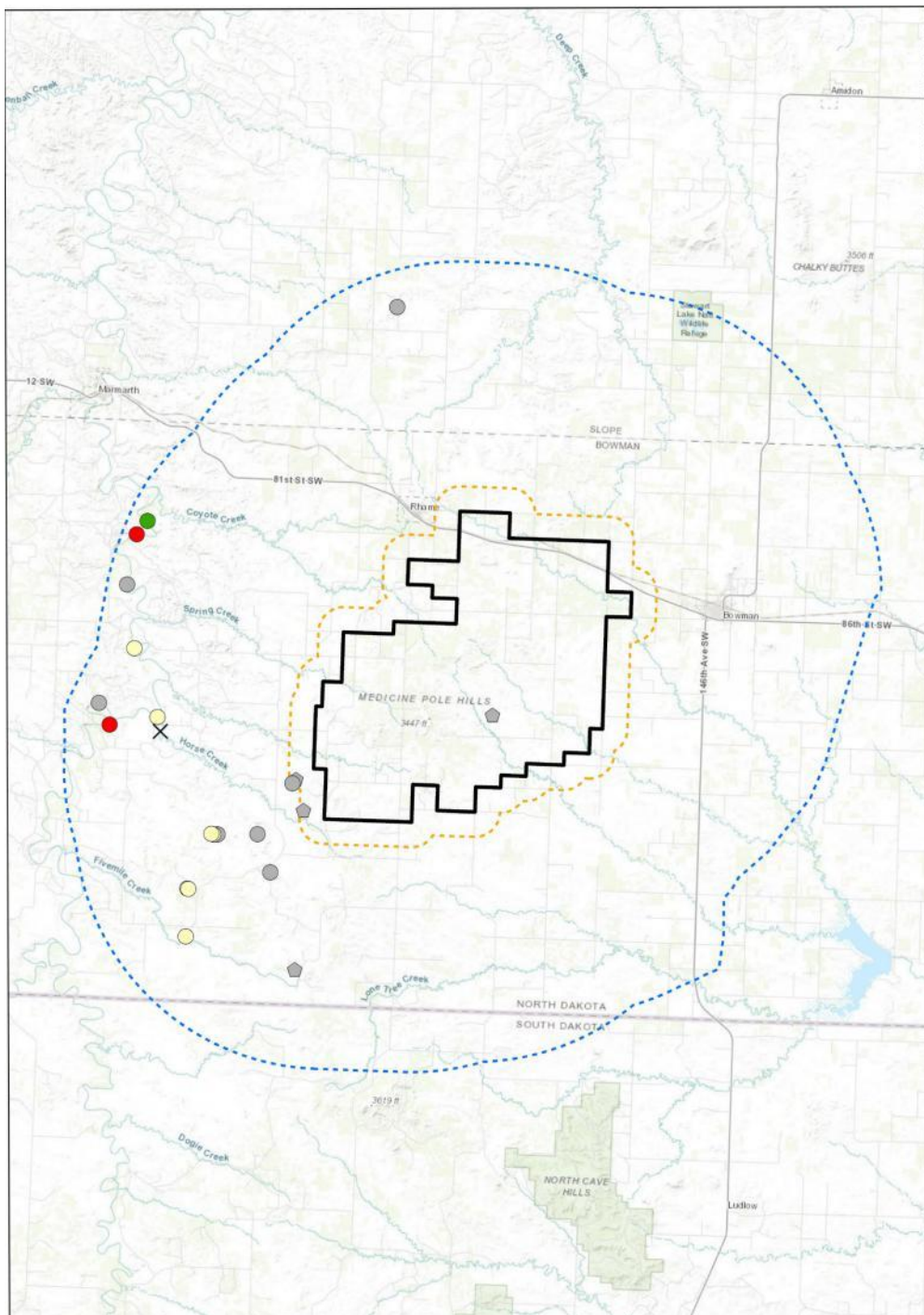
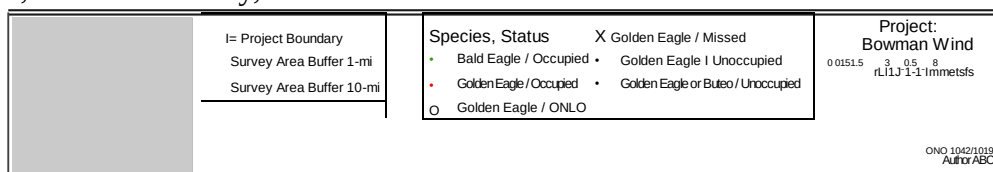


Figure 4. Eagle nests within the 10-mile Survey Area in 2019 for the proposed Bowman Wind Project, Bowman County, North Dakota.



Prairie Grouse Lek Monitoring Surveys

Bowman Wind Project

Bowman County, North Dakota

Final Report

April 2019

Prepared for:

Bowman Wind, LLC

310 4th Street NE, Suite 300
Charlottesville, Virginia 22902

Prepared by:

Kristen Chodachek

Western EcoSystems Technology, Inc.
4007 State Street, Suite 109
Bismarck, North Dakota 58503

August 2, 2019



STUDY PARTICIPANTS

Kristen Chodachek	Project Manager
Chad LeBeau	Project Manager, Reviewer
Kristen Klaphake	GIS Specialist
Julia Preston-Fulton	Technical Editor
Kimberly Bailey	Reviewer
Sarah Rosche	Field Biologist

REPORT REFERENCE

Chodachek, K. 2019. Prairie Grouse Lek Monitoring Surveys, Bowman Wind Project, Bowman County, North Dakota. Final Report: April 2019. Prepared for Bowman Wind, LLC, Charlottesville, Virginia. Prepared by Western EcoSystems Technology, Inc. (WEST), Bismarck, North Dakota. August 1, 2019.

TABLE OF CONTENTS

INTRODUCTION	1
METHODS	3
RESULTS	3
CONCLUSIONS.....	6
REFERENCES	7

LIST OF TABLES

Table 1. Activity recorded at known greater sage-grouse and sharp-tailed grouse leks surveyed during ground based lek monitoring surveys conducted from April 2 – April 24, 2019, within the proposed Bowman Wind Project in Bowman County, North Dakota, and associated 1.0-mile (mi; 1.6-kilometer) buffer.	4
--	---

LIST OF FIGURES

Figure 1. Survey locations for ground based lek monitoring surveys conducted from April 2 – 24, 2019, within the proposed Bowman Wind Project in Bowman County, North Dakota, and associated 1.0-mile (1.6-kilometer) buffer.	2
Figure 2. Location of greater sage-grouse and sharp-tailed grouse leks surveyed during ground based lek monitoring surveys conducted from April 2 – April 24, 2019, within the proposed Bowman Wind Project in Bowman County, North Dakota, and associated 1.0-mile (1.6-kilometer) buffer.	26

1) INTRODUCTION

Western EcoSystems Technology, Inc. (WEST) completed ground-based lek monitoring surveys at the proposed Bowman Wind, LLC Project (Project) in Bowman County, North Dakota (Figure 1). Lek monitoring surveys were completed to record activity at all known greater sage-grouse (*Centrocercus urophasianus*) and sharp-tailed grouse (*Tympanuchus phasianellus*) leks within the proposed Project area and associated 1.0-mile (mi; 1.6-kilometer) buffer to assist in Project siting. This report presents the results of the ground based lek monitoring surveys completed April 2 – 24, 2019.

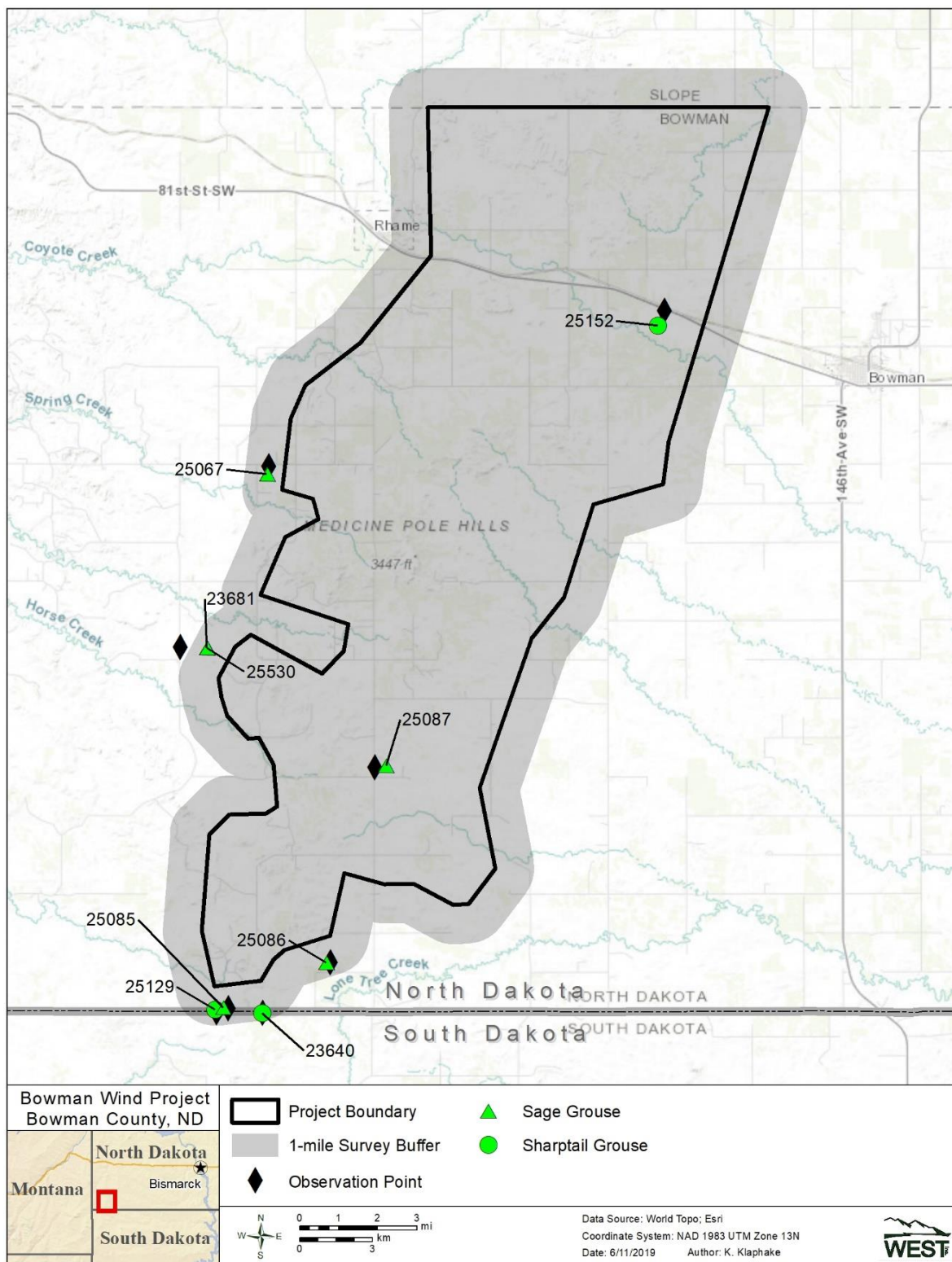


Figure 1. Survey locations for ground based lek monitoring surveys conducted from April 2 – 24, 2019, within the proposed Bowman Wind Project in Bowman County, North Dakota, and associated 1.0-mile (1.6-kilometer) buffer.

2) METHODS

Prior to conducting the lek surveys, existing sharp-tailed grouse and greater sage-grouse leks were reviewed and plotted within the Project area and 1.0-mi (1.6-km) survey buffer. Following the guidelines of the North Dakota Game and Fish Department, two rounds of ground-based lek monitoring surveys were completed within the Project area and 1.0-mi buffer for the seven greater sage-grouse and three sharp-tailed grouse leks during the lekking period. Round 1 was conducted April 2 – 12, 2019 and Round 2 was conducted April 12 – 24, 2019. Each lek was surveyed twice, separated by a minimum of seven days. Monitoring surveys were completed from a vehicle from public roads only, with the observer located at an optimal viewing location to observe each lek (Figure 2). Surveys began approximately one half hour before sunrise and continued until two hours after sunrise. Data recorded for each lek included lek location and total number of males and females observed visually or through auditory detection. Weather conditions and time of day were also be recorded for each survey.

3) RESULTS

Lekking activity was observed at Lek Identification (ID) 23640 on April 11, 2019 where a total of two male sharp-tailed grouse were visually observed displaying and Lek ID 25129 on April 24, 2019 where a total of two male sharp-tailed grouse were auditory observations (Table 1; Figure 2). No grouse lekking activity was recorded at Lek IDs 23681, 25067, 25085, 25086, 25087, 25152, or 25530. No incidental observations of greater sage-grouse or sharp-tailed grouse were recorded within the Project area or associated 1.0-mi buffer during the 2019 lek monitoring surveys.

Table 1. Activity recorded at known greater sage-grouse and sharp-tailed grouse leks surveyed during ground based lek monitoring surveys conducted from April 2 – April 24, 2019, within the proposed Bowman Wind Project in Bowman County, North Dakota, and associated 1.0-mile (mi; 1.6-kilometer) buffer.

Lek ID	Type ¹	Survey Round	Date	Total # of Males	Total # of Females	Total # of Unknown	Total # of Birds	Detection Type	Distance lek was Observed from (miles)
23640	STGR	1	4/11/2019	2	0	0	2	visual	0.02 mi north of historic lek location
		2	4/24/2019	0	0	0	0	---	
23681	GRSG	1	4/2/2019	0	0	0	0	---	0.70 mi west of historic lek location
		2	4/12/2019	0	0	0	0	---	
25067	GRSG	1	4/2/2019	0	0	0	0	---	0.20 mi northwest of historic lek location
		2	4/11/2019	0	0	0	0	---	
25085	GRSG	1	4/11/2019	0	0	0	0	---	0.11 mi east of historic lek location
		2	4/24/2019	0	0	0	0	---	
25086	GRSG	1	4/11/2019	0	0	0	0	---	0.09 mi east of historic lek location
		2	4/24/2019	0	0	0	0	---	
25087	GRSG	1	4/2/2019	0	0	0	0	---	0.30 mi west of historic lek location
		2	4/11/2019	0	0	0	0	---	
25129	STGR	1	4/11/2019	0	0	0	0	---	0.10 mi south of historic lek location
		2	4/24/2019	2	0	0	2	Auditory, approx. count	
25152	STGR	1	4/12/2019	0	0	0	0	---	0.40 mi northeast of historic lek location
		2	4/24/2019	0	0	0	0	---	
25530	GRSG	1	4/2/2019	0	0	0	0	---	0.70 mi west of historic lek location
		2	4/12/2019	0	0	0	0	---	

¹ STGR = sharp-tailed grouse; GRSG = greater sage-grouse.

= number; Approx. = approximately.

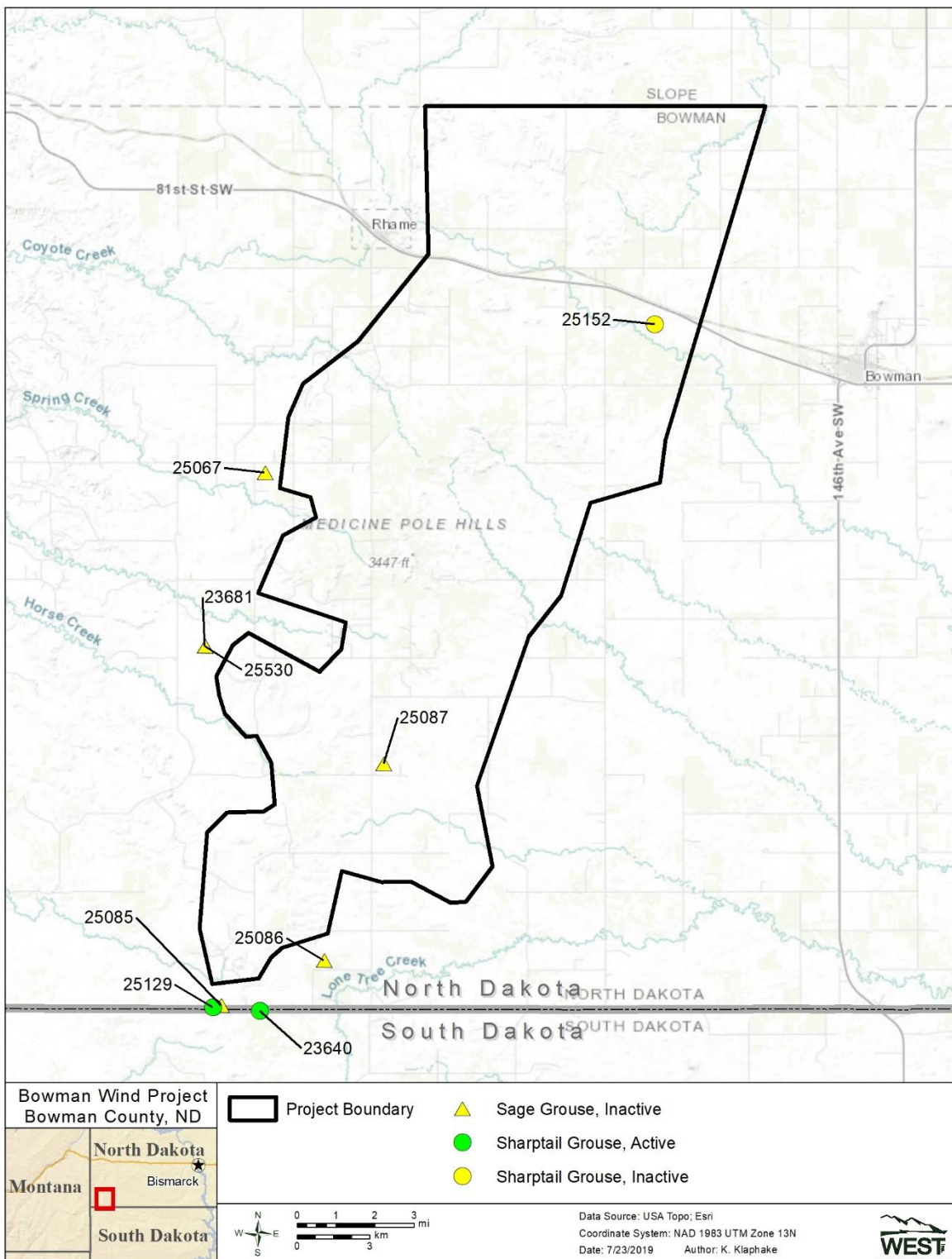


Figure 2. Location of greater sage-grouse and sharp-tailed grouse leks surveyed during ground based lek monitoring surveys conducted from April 2 – April 24, 2019, within the proposed Bowman Wind Project in Bowman County, North Dakota, and associated 1.0-mile (1.6-kilometer) buffer.

4) CONCLUSIONS

Two sharp-tailed grouse leks were active during monitoring surveys. Both leks were located south of the Project area but within the 1.0-mi (1.6-km) survey buffer. No greater sage-grouse leks were active during monitoring surveys within the Project area and associated 1.0-mi (1.6-km) buffer. No grouse lek activity was documented at known lek sites within the Project area.

5) REFERENCES

- ESRI. 2018, 2019. World Imagery and Aerial Photos. (World Topo). ArcGIS Resource Center. Environmental Systems Research Institute (ESRI), producers of ArcGIS software. Redlands, California. Information online: <http://www.arcgis.com/home/webmap/viewer.html?useExisting=1>
- Multi-Resolution Land Characteristics (MRLC). 2019. National Land Cover Database (NLCD) 2011. Multi-Resolution Land Characteristics (MRLC) Consortium. US Geological Survey (USGS) Earth Resources Observation and Science (EROS) Center, MRLC Project, Sioux Falls, South Dakota. May 10, 2019. Information online: <https://www.mrlc.gov/data>
- North American Datum (NAD). 1983. NAD83 Geodetic Datum.
- US Department of Agriculture (USDA). 2012. Imagery Programs - National Agriculture Imagery Program (NAIP). USDA - Farm Service Agency (FSA). Aerial Photography Field Office (APFO), Salt Lake City, Utah. Last updated July 3, 2012. <http://www.fsa.usda.gov/FSA/apfoapp?area=home&subject=landing&topic=landing>
- US Environmental Protection Agency (USEPA). 2017. Ecoregion Download Files by State - Region 5: North Dakota. Ecoregions of the United States, Ecosystems Research, USEPA. Last updated February 8, 2017. Accessed June 2019. Information and maps online: <https://www.epa.gov/eco-research/ecoregion-download-files-state-region-8#pane-32>
- US Geological Survey (USGS). 2018a. 3d Elevation Program (3DEP). 3D elevation data from light detection and ranging (lidar) data: conterminous United States, Hawaii, and the US territories. USGS, Reston, Virginia. Accessed November 2018. Information online: <https://www.usgs.gov/core-science-systems/ngp/3dep>
- US Geological Survey (USGS). 2018b. USGS Topographic Maps. Accessed June 2019. Information online: <https://nationalmap.gov/ustopo/index.html>
- Yang, L., S. Jin, P. Danielson, C. Homer, L. Gass, S. M. Bender, A. Case, C. Costello, J. Dewitz, J. Fry, M. Funk, B. Granneman, G. C. Liknes, M. Rigge, and G. Xian. 2018. A New Generation of the United States National Land Cover Database: Requirements, Research Priorities, Design, and Implementation Strategies. ISPRS Journal of Photogrammetry and Remote Sensing 146: 108-123. doi: 10.1016/j.isprsjprs.2018.09.006.

**Northern Long-Eared Bat Habitat Assessment
Bowman Wind Project
Bowman County, North Dakota**

Final Report



Prepared for:

Bowman Wind, LLC.

310 4th Street Northeast, Suite 200
Charlottesville, Virginia

Prepared by:

Kristen Chodachek and Larisa Bishop-Boros

Western EcoSystems Technology, Inc.
4007 State Street, Suite 109
Bismarck, ND 58503

September 9, 2019



Draft Pre-Decisional Document - Privileged and Confidential - Not For Distribution

STUDY PARTICIPANTS

Kristen Chodachek	Western EcoSystems Technology, Inc.	Project Manager/Report Reviewer
Grant Gardner		GIS Specialist
Larisa Bishop-Boros		Report Writer
Sofia Agudelo		Technical Editor

REPORT REFERENCE

Chodachek, K. and C. Bishop-Boros. 2018. Northern Long-Eared Bat Habitat Assessment, Bowman Wind Project, Bowman County, North Dakota. Final Report. Prepared for Bowman Wind, LLC. Prepared by Western EcoSystems Technology, Inc. (WEST), Bismarck, North Dakota. September 9, 2019.

TABLE OF CONTENTS

INTRODUCTION	1
NORTHERN LONG-EARED BAT BACKGROUND AND ECOLOGY	1
PROJECT AREA	2
METHODS	5
RESULTS	5
CONCLUSIONS	5
LITERATURE CITED	7

LIST OF TABLES

Table 1. Land Cover types, acreage, and percent (%) composition within the proposed Bowman Wind Project, Bowman County, North Dakota.....	3
---	---

LIST OF FIGURES

Figure 1. Location of the proposed Bowman Wind Project. Bowman County, North Dakota.....	1
Figure 2. Land cover types and coverage in the proposed Bowman Wind Project, Bowman County, North Dakota.	4
Figure 3. Forested habitat areas within the proposed Bowman Wind Project, Bowman County, North Dakota and a 1,000-foot (305-meter) project area buffer (Assessment Area Boundary).	6

14.0 INTRODUCTION

Western EcoSystems Technology, Inc. (WEST) completed a Phase I Bat Habitat Desktop Assessment for the federally threatened northern long-eared bat (NLEB; *Myotis septentrionalis*) for the proposed Bowman Wind Project (Project) located in the southwest corner of Bowman County, North Dakota (Figure 1). The purpose of the desktop assessment was to identify potentially suitable NLEB summer habitat (roosting and foraging) within the Project and 1,000-foot (ft; 305-meter [m]) buffer to inform turbine siting. The desktop assessment was completed in accordance with the recommendations provided by the USFWS *Range-Wide Indiana Bat Survey Guidelines* (USFWS 2019), which also applies to NLEB, and the North Dakota Game and Fish Department (NDGFD) during early project coordination.

14.1 NORTHERN LONG-EARED BAT BACKGROUND AND ECOLOGY

The NLEB is currently listed as threatened under the ESA (USFWS 2015; 80 Fed. Reg. 17,934 (2015); however, the final 4(d) Rule for the species published January 14, 2016 (81 Fed. Reg. 1,900 (2016); USFWS 2016), exempts the incidental take of NLEB resulting from most otherwise lawful activities, including incidental take due to the operation of wind turbines, from ESA Section 9 take prohibitions.

The NLEB favors summer maternity habitat located in intact, interior forests with late successional characteristics (Timpone et al. 2010, Carter and Feldhamer 2005). Although the NLEB tends to favor intact forests, this species also can use relatively small forest patches connected by shelterbelts (Henderson and Broders 2008). The NLEB is a roost generalist, using a much broader array of roost types (e.g. cavities, crevices, exfoliating bark, stumps, artificial structures), smaller roost trees (as small as three inches [in] diameter breast high [DBH]; USFWS 2019), and more tree species than other bat species (Carter and Feldhamer 2005, Lacki et al. 2009, USFWS 2014). NLEBs use roosts with greater canopy cover and typically greater clutter than other similar bat species, usually requiring 56–84% canopy cover around roosts (Carter and Feldhamer 2005, Sasse and Perkins 1996, Foster and Kurta 1999, Lacki and Schwierjohann 2001, Timpone et al. 2010). Linear forested features, including shelterbelts and other loose aggregates of trees with variable amount of canopy closure, may also represent suitable habitat for NLEB if within proximity (1,000 ft [305 m] of suitable habitat (USFWS 2019). The NLEB tends to be an interior forest specialist, and stays close to forest features while foraging (Henderson and Broders 2008) preferring to forage in upland, mature forest above or below the canopy, but can also use forest clearings, riparian forest, forested ponds, and forested flyways (Foster and Kurta 1999, Amelon and Burhans 2006).

Based on current records for North Dakota, NLEBs are considered rare in North Dakota (Dyke et al. 2015). Recent research by North Dakota State University found that presence is unlikely throughout the state, except for potential presence in the badlands of North Dakota in the extreme western edge of the State (Dr. E. Gillam, pers. com).

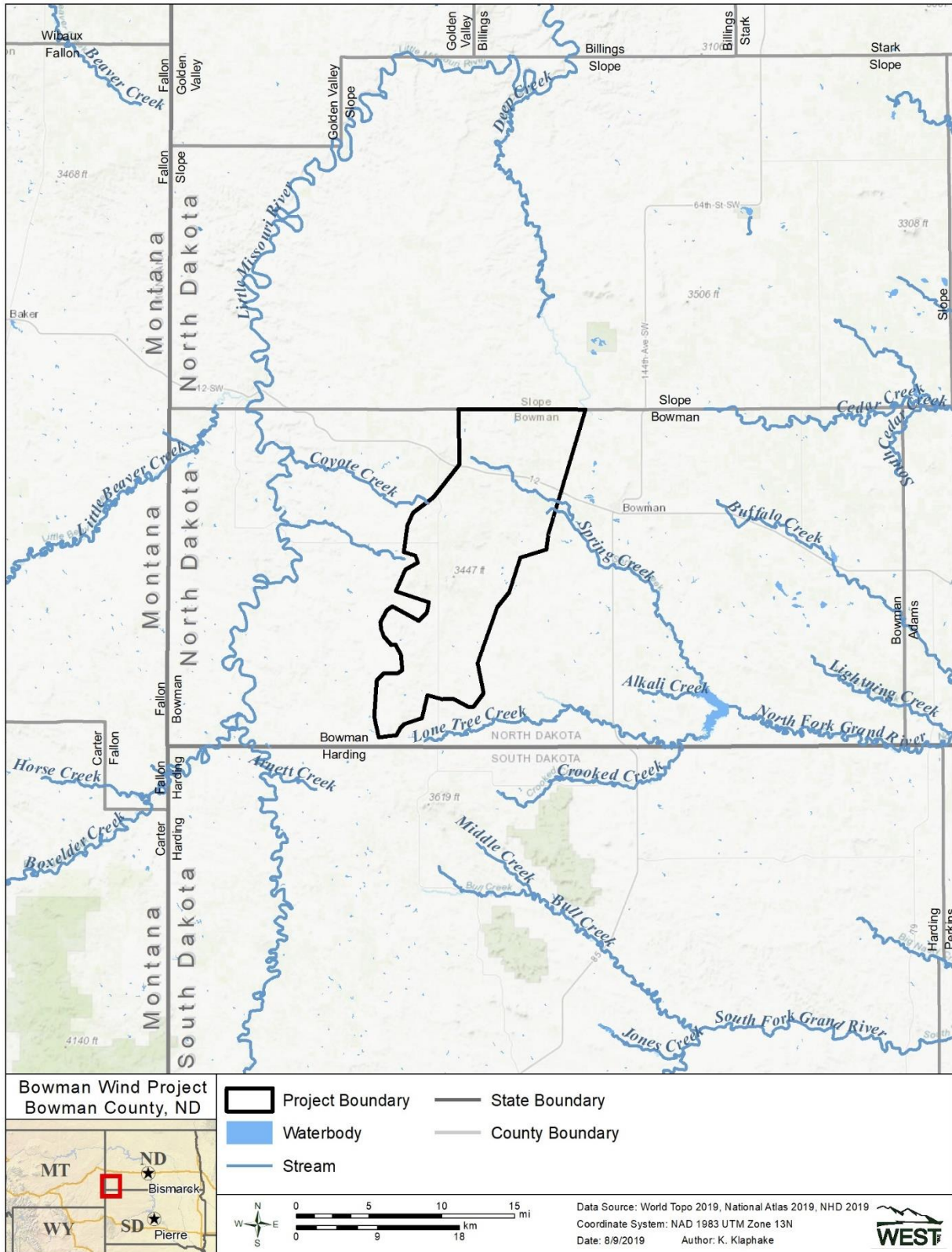


Figure 1. Location of the proposed Bowman Wind Project. Bowman County, North Dakota.

15.0 PROJECT AREA

The proposed Project is located in the Missouri Plateau and Sagebrush Steppe Level IV Ecoregions within the Northwestern Great Plains Level III Ecoregion (US Environmental Protection Agency (EPA) 2018). The Missouri Plateau ecoregion was largely unaffected by glaciation, retaining its original soils and complex stream drainage patterns which now support a mosaic of spring wheat, alfalfa, and grazing lands. The Sagebrush Steppe ecoregion is characterized by minimal rainfall, erode buttes, scoria mounds, sparse human inhabitants, and minimal cultivation (EPA 2018).

Two named streams are present within the Project area and include portions of Spring Creek and Coyote Creek (Figure 1). The Little Missouri River is approximately 6.5 miles (mi; 10.5 kilometers [km]) west of the Project area (Figure 1). The Project area is characterized by flat to gently rolling topography dominated by pastureland (US Geological Survey [USGS] Digital Elevation Model 2016).

According to the National Land Cover Database (Yang et al. 2018, Multi-Resolution Land Characteristics 2019), the dominant land cover type in the Project area is herbaceous, which covers 54.7% of the total area (120,772 acres [ac]; Table 1, Figure 2). Cultivated crops is the second most common land cover type and covers 29.5% (65,184 ac) of the Project area. Only a small portion of the Project area consists of land cover types that provide potentially suitable foraging and roosting habitat for NLEB, including woody wetlands (0.3%), evergreen forest (<0.1%; 81 ac), deciduous forest cover (<0.1%; 78 ac), and mixed forest (<0.1%; 12 ac), which total approximately 0.5% of Project area (Table 1; Figure 2).

Table 1. Land Cover types, acreage, and percent (%) composition within the proposed Bowman Wind Project, Bowman County, North Dakota.

Land Cover/Land Use Type	Acres	% Composition
Herbaceous	120,772	54.7
Cultivated Crops	65,184	29.5
Shrub/Scrub	16,128	7.3
Hay/Pasture	9,418	4.3
Developed, Open Space	6,229	2.8
Open Water	919	0.4
Developed, Low Intensity	828	0.4
Woody Wetlands	754	0.3
Emergent Herbaceous Wetlands	377	0.2
Evergreen Forest	81	<0.1
Deciduous Forest	78	<0.1
Barren Land	57	<0.1
Developed, Medium Intensity	17	<0.1
Mixed Forest	12	<0.1
Developed, High Intensity	<1	<0.1
Total	220,854	100

Sources: Yang et al. 2018, Multi-Resolution Land Characteristics 2019.

Sums may not total values shown due to rounding.

Land use in bold signifies habitats that could be potentially used by NLEB.

16.0 METHODS

The desktop review of potentially suitable NLEB summer habitat within the Project area and 1,000-ft (305-m) Project boundary buffer (Assessment Area) was completed by reviewing the NLCD (Yang et al. 2018, Multi-Resolution Land Characteristics 2019), delineating potential suitable habitat types (i.e., deciduous forest, evergreen forest, mixed forest, and woody wetlands) using ESRI Software (ArcGIS 10.3.1). This habitat delineation was then cross-checked and edited based on the most recent publicly available aerial imagery from the National Agriculture Imagery Program (US Department of Agriculture National Agriculture Imagery Program 2018).

Any forested woodlots or woody wetlands that were larger than 15 ac (6 ha; Foster and Kurta 1999; Henderson and Broders 2008), were considered NLEB summer habitat. In addition, linear forested features, including shelterbelts and other loose assemblages of trees within 1,000.0 ft (305 m; USFWS 2014) of these forested woodlots were also considered habitat (USFWS 2019). Isolated trees and isolated forest stands of less than 15 ac in size and greater than 1,000 ft away from potentially suitable forested areas were not considered suitable habitat for NLEB, as per supporting research (Foster and Kurta 1999, USFWS 2019, Henderson and Broders 2008).

17.0 RESULTS

A total of 171 ac (66.5 ha) of forested habitat were identified using NLCD within the Project area and Assessment area during the desktop review. However, the largest woodlot or forest patch was 9.3 ac (3.8 ha) and therefore determined to be unsuitable for NLEB summer habitat (Figure 3). Additionally, 754 ac (305 ha) of woody wetlands were identified by NLCD and four of these patches were determined to be greater than 15 ac (6 ha); however, upon review of the most updated aerial photography, two of the four woody wetlands were cropland and the other two were ditches with few unsuitable trees for NLEB. In summary, the Assessment Area contained limited isolated forested hedgerows, none of sufficient size to constitute suitable NLEB summer habitat (Figure°3). Pasturelands, cropland, and undeveloped land, which contained no forested habitat, were discernible on aerial photographs and dominated almost the entirety of the Assessment Area.

18.0 CONCLUSIONS

This assessment revealed that no potentially suitable summer NLEB habitat exists within the Project area or Assessment Area, therefore potential risk to this species in summer is considered minimal.

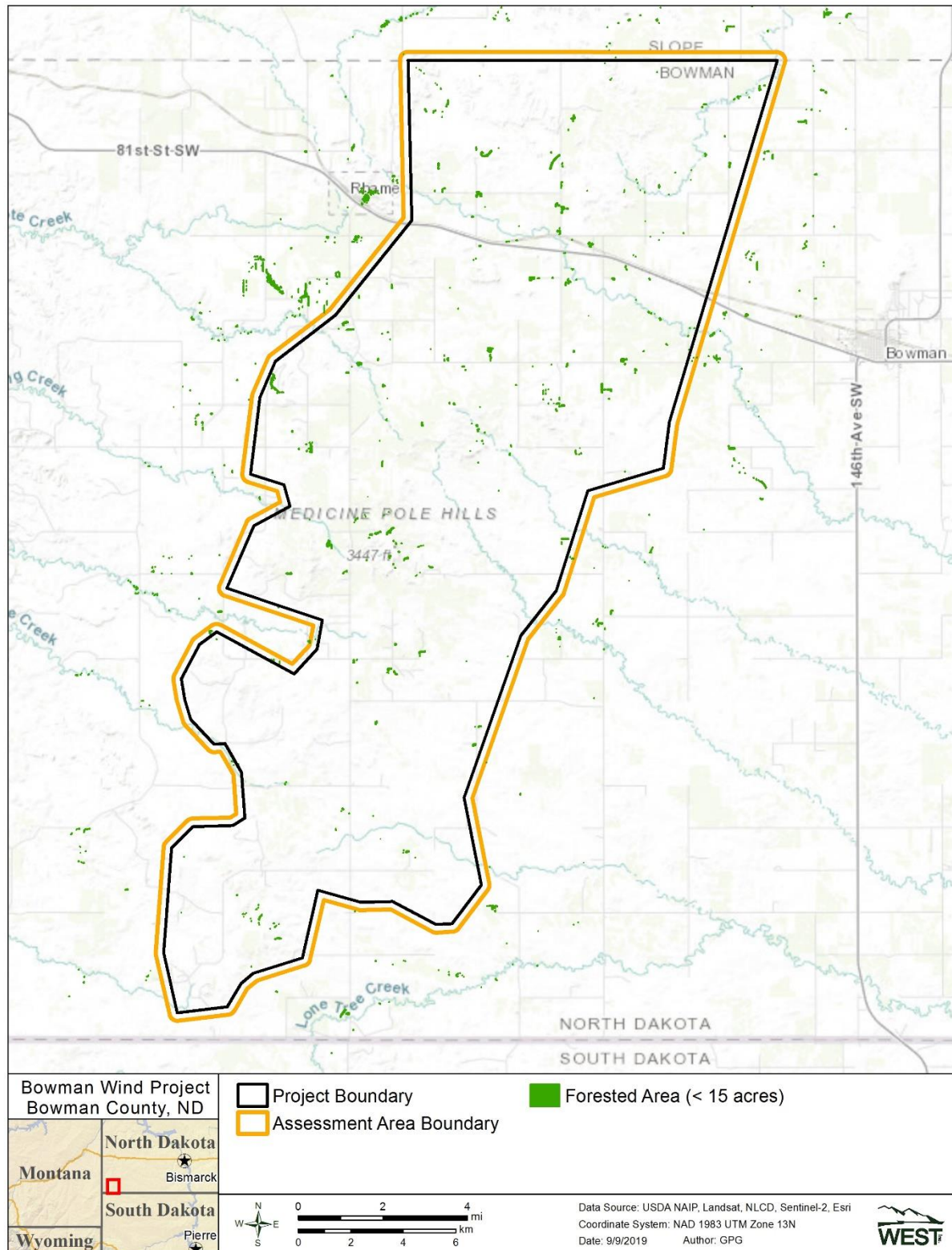


Figure 3. Forested habitat areas within the proposed Bowman Wind Project, Bowman County, North Dakota and a 1,000-foot (305-meter) project area buffer (Assessment Area Boundary).

19.0 LITERATURE CITED

- Amelon, S. and D. Burhans. 2006. Conservation Assessment: *Myotis septentrionalis* (Northern Long-Eared Bat) in the Eastern United States. Pp. In: F. R. Thompson, III, ed. Conservation Assessments for Five Forest Bat Species in the Eastern United States. General Technical Report Nc-260. US Department of Agriculture, Forest Service, North Central (NC) Research Station, St. Paul, Minnesota.
- ArcGIS. Arcgis Version 10.3. Gis Software. ESRI, Redlands, California.
- Carter, T. C. and G. A. Feldhamer. 2005. Roost Tree Use by Maternity Colonies of Indiana Bats and Northern Long-Eared Bats in Southern Illinois. *Forest Ecology and Management* 219: 259-268.
- ESRI. 2013. World Topographic Map. ArcGIS Resource Center. ESRI, producers of ArcGIS software. ESRI, Redlands, California. Last modified June 6, 2018. Available online: <http://www.arcgis.com/home/item.html?id=30e5fe3149c34df1ba922e6f5bbf808f>
- Foster, R. W. and A. Kurta. 1999. Roosting Ecology of the Northern Bat (*Myotis Septentrionalis*) and Comparisons with the Endangered Indiana Bat (*Myotis Sodalis*). *Journal of Mammalogy* 80(2): 659-672.
- Henderson, L. E. and H. G. Broders. 2008. Movements and Resource Selection of the Northern Long-Eared *Myotis* (*Myotis Septentrionalis*) in a Forest-Agriculture Landscape. *Journal of Mammalogy* 89: 952-963.
- Lacki, M. J. and J. H. Schwierjohann. 2001. Day-Roost Characteristics of Northern Bats in Mixed Mesophytic Forest. *Journal of Wildlife Management* 65(3): 482-488.
- Lacki, M. J., D. R. Cox, and M. B. Dickinson. 2009. Meta-Analysis of Summer Roosting Characteristics of Two Species of *Myotis* Bats. *American Midland Naturalist* 162: 318-326.
- Multi-Resolution Land Characteristics (MRLC). 2019. National Land Cover Database (NLCD) 2011. Multi-Resolution Land Characteristics (MRLC) Consortium. US Geological Survey (USGS) Earth Resources Observation and Science (EROS) Center, MRLC Project, Sioux Falls, South Dakota. May 10, 2019. Information online: <https://www.mrlc.gov/data>
- North American Datum (NAD). 1983. Nad83 Geodetic Datum.
- Sasse, D. and P. J. Perkins. 1996. Summer Roosting Ecology of Northern Long-Eared Bats (*Myotis septentrionalis*) in the White Mountain National Forest. Presented at the Bats and Forest Symposium, Victoria, British Columbia. October 19-21, 1995. Available online: https://www.researchgate.net/publication/282353546_Summer_roosting_ecology_of_northern_long-eared_bats_Myotis_septentrionalis_in_the_White_Mountain_National_Forest
- Timpone, J. C., J. G. Boyles, K. L. Murray, D. P. Aubrey, and L. W. Robbins. 2010. Overlap in Roosting Habitats of Indiana Bat (*Myotis Sodalis*) and Northern Bats (*Myotis septentrionalis*). *American Midland Naturalist* 163(1): 115-123.
- US Department of Agriculture (USDA). 2018. Imagery Programs - National Agriculture Imagery Program (Naip). USDA, Farm Service Agency (FSA), Aerial Photography Field Office (APFO), Salt Lake City, Utah. Accessed January 2018. Information online: <https://www.fsa.usda.gov/programs-and-services/aerial-photography/imagery-programs/index>

- US Environmental Protection Agency (USEPA). 2018. Level Iii and Level Iv Ecoregions of the Continental United States. Ecosystems Research, USEPA. Last updated February 8, 2017. Information and maps online: <https://www.epa.gov/eco-research/level-iii-and-iv-ecoregions-continental-united-states>
- US Environmental Protection Agency (USEPA). 2013. Level Iii and Iv Ecoregions of the Continental United States. Map scale 1:3,000,000. USEPA National Health and Environmental Effects Research Laboratory, Corvallis, Oregon. Accessed May 2015. Information and downloads available online at: https://archive.epa.gov/wed/ecoregions/web/html/level_iii_iv-2.html
- U.S. Fish and Wildlife Service (USFWS). 2014. Northern Long-eared Bat Interim Conference and Planning Guidance. USFWS Regions 2, 3, 4, 5, and 6. January 6, 2014. Available online at: <http://www.fws.gov/northeast/virginiafield/pdf/NLEBinterimGuidance6Jan2014.pdf>
- US Fish and Wildlife Service (USFWS). 2015. Endangered and Threatened Wildlife and Plants; Threatened Species Status for the Northern Long-Eared Bat with 4(D) Rule; Final Rule and Interim Rule. Department of the Interior, Fish and Wildlife Service, 50 CFR Part 17. 80 Federal Register (FR) 63: 17974-18033. April 2, 2015.
- U.S. Fish and Wildlife Service (USFWS). 2016. Endangered and Threatened Wildlife and Plants; 4(d) Rule for the Northern Long-Eared Bat; Final Rule. Department of the Interior, Fish and Wildlife Service, 50 C.F.R. 17. 81 Federal Register (FR) 9: 1900-1922. January 14, 2016.
- US Fish and Wildlife Service (USFWS). 2019. Range-Wide Indiana Bat Summer Survey Guidelines. USFWS Region 3, Bloomington, Indiana. April 2019. 63 pp. including appendices. Available online: https://www.fws.gov/midwest/endangered/mammals/inba/surveys/pdf/2019_Rangewide_IBat_Survey_Guidelines.pdf
- US Geological Survey (USGS) Digital Elevation Model (DEM). 2016. Digital Elevation Model (Dem) Imagery.
- Yang, L., S. Jin, P. Danielson, C. Homer, L. Gass, S. M. Bender, A. Case, C. Costello, J. Dewitz, J. Fry, M. Funk, B. Granneman, G. C. Liknes, M. Rigge, and G. Xian. 2018. A New Generation of the United States National Land Cover Database: Requirements, Research Priorities, Design, and Implementation Strategies. ISPRS Journal of Photogrammetry and Remote Sensing 146: 108-123. doi: 10.1016/j.isprsjprs.2018.09.006.

Bat Acoustic Activity Survey for the Proposed Bowman Wind Project Bowman County, North Dakota

July 8 – October 28, 2020



**Prepared for:
Bowman Wind, LLC**

**Prepared by:
Larisa Bishop-Boros and Kristen Chodachek**

Western EcoSystems Technology, Inc.
1610 East Reynolds Street
Laramie, Wyoming 82072

November 22, 2020



Privileged and Confidential - Not For Distribution

20.0 EXECUTIVE SUMMARY

Western EcoSystems Technology, Inc. (WEST) completed a bat acoustic survey from July 8 – October 28, 2020, for the proposed Bowman Wind Project (Project) located in Bowman County, North Dakota. The purpose of the survey was to evaluate bat activity during the late summer and fall period within the Project.

WEST biologists completed acoustic surveys at two meteorological (met) towers with two acoustic stations in grassland habitat representative of potential turbine locations. One ultrasonic microphone for Wildlife Acoustics SM3 detectors was placed at each met tower near the ground at 5.0 feet (1.5 meters). A total of 216 detector-nights were sampled across both stations.

A total of 976 bat passes were recorded during 216 detector-nights at both stations. The majority of the bat passes (66.6%) were classified as high frequency (HF) bat passes (calls 30 kilohertz [kHz] or greater; e.g., eastern red bat, little brown bat, and western small-footed bat). Low-frequency (LF) bat passes (calls ≤ 30 kHz; e.g., big brown bat, hoary bat, and silver-haired bat) composed 33.4% of the total bat passes. Kaleidoscope potentially detected calls from the federally threatened northern long-eared bat on three nights overall. Qualitative identification of these calls by a qualified biologist determined that these calls were not produced by this species.

The average bat activity rate ($\pm$ the standard error) was 4.43 ± 0.62 bat passes per detector-night across all detectors, which is relatively low compared to other projects in the Midwest that have completed similar studies of bat activity. Overall, weekly bat activity increased from the beginning of the survey to a peak in late July and early August, largely driven by HF bat activity, with a secondary peak in late August driven by LF bat activity.

The nearest wind energy facility with publicly available fatality data is the Prairie Winds ND1 wind facility (PW ND1). It is located approximately 167 miles (268 kilometers) northeast of the Project and has a similar land cover dominated by cattle ranching and farming. PW ND1 reported a relatively low bat fatality rate (2.13 bat fatalities per megawatt (MW) per year). Due to a similarity in land cover and proximity in North Dakota, the Project may have similarly low bat fatality rates. However, the Project will have larger but fewer turbines than Prairie Winds per MW, which may influence fatality rates per turbine but will likely have similar rates per MW.

STUDY PARTICIPANTS

Western EcoSystems Technology, Inc.

Chad LeBeau	Senior Project Manager
Kristen Chodachek	Project Manager
Larisa Bishop-Boros	Field Supervisor, Bat Biologist, Call Analyst, Report Writer
Kristina Hammond	Bat Biologist Reviewer
Kim Bailey	Client Report Reviewer
Tom Prebyl	Statistician
Ann Dahl	Specialist
Sarah Martinson	Bat Acoustic Activity Project Tracking
Andrea Palochak	Technical Editor
Alex Brazeal	Field Technician

REPORT REFERENCE

Bishop-Boros, L. and K. Chodachek. 2020. Bat Acoustic Activity Survey for the Proposed Bowman Wind Project, Bowman County, North Dakota: July 8 – October 28, 2020. Prepared for Bowman Wind LLC. Prepared by Western EcoSystems Technology, Inc. (WEST), Laramie, Wyoming. November 22, 2020.

TABLE OF CONTENTS

EXECUTIVE SUMMARY	i
INTRODUCTION	1
PROJECT AREA	1
Overview of Bat Diversity	4
METHODS	4
Bat Acoustic Surveys	4
Survey Stations	4
Survey Schedule	5
Data Collection and Call Analysis.....	5
Data Analysis	6
RESULTS	7
Bat Acoustic Surveys	7
Federally-listed Species	7
Spatial Variation	7
Seasonal Variation	9
DISCUSSION AND CONCLUSIONS	11
REFERENCES	12

LIST OF TABLES

Table 1. Land cover types, coverage, and percent (%) composition in the proposed Bowman Wind Project in Bowman County, North Dakota.....	1
Table 2. Bat species with potential to occur within the proposed Bowman Wind Project in Bowman County, North Dakota, categorized by echolocation call frequency*.....	4
Table 3. Results of the acoustic bat surveys conducted at the proposed Bowman Wind Project in Bowman County, North Dakota from July 8 – October 28, 2020.	7
Table 5. Periods of peak activity for high-frequency (HF), low-frequency (LF), and all bats at the proposed Bowman Wind Project in Bowman County, North Dakota from July 8 – October 28, 2020.....	9

LIST OF FIGURES

Figure 1. Location of the proposed Bowman Wind Project in Bowman County, North Dakota.	2
Figure 2. Land cover types and acoustic survey locations within the proposed Bowman Wind Project, in Bowman County, North Dakota.....	3
Figure 3. Number of high-frequency (HF) and low-frequency (LF) bat passes per detector- night recorded at acoustic monitoring stations within the proposed Bowman Wind Project in Bowman County, North Dakota from July 8 – October 28, 2020. (The bootstrapped standard errors are represented by the black error bars on the “All Bats” columns.).....	8
Figure 4. Weekly patterns of bat activity (average bat passes/detector-night/week) by high- frequency (HF), low-frequency (LF), and all bats at acoustic monitoring stations within the proposed Bowman Wind Project in Bowman County, North Dakota for the survey period July 8 – October 28, 2020.....	10

21.0 INTRODUCTION

Western EcoSystems Technology, Inc. (WEST) completed a bat acoustic survey to assess bat activity at the proposed Bowman Wind Project (Project) in Bowman County, North Dakota (Figure 1). The survey was based on recommendations from the US Fish and Wildlife Service (USFWS) and is consistent with approaches recommended in the USFWS *Land-Based Wind Energy Guidelines* (USFWS 2012). The purpose of the survey was to determine bat activity during the late summer and fall migration periods, which are generally the periods of highest bat use at most Projects.

22.0 PROJECT AREA

The proposed Project encompasses 61,325 acres (24,817 hectares) in the Missouri Plateau Level IV Ecoregion within the Northwestern Great Plains Level III Ecoregion of North Dakota (US Environmental Protection Agency 2017). The Missouri Plateau Ecoregion was largely unaffected by glaciation, retaining its original soils and complex stream drainage patterns that now support a mosaic of spring wheat (*Triticum* spp.), alfalfa (*Medicago sativa*), and grazing lands. Elevations within the Project range from approximately 2,940 feet ([ft; 896 meters [m]) to 3,448 ft (1,051 m; US Geological Survey 2019), with the greater topographic relief associated with the Medicine Pole Hills in the center of the Project.

According to the National Land Cover Database (NLCD; 2016), the dominant land cover type in the Project is shrub/scrub (43.8%), followed by herbaceous/grassland (31.9%), and cultivated crops (19.7%; Table 1, Figure 2). The remaining land cover types account for less than 3.0% of the Project, individually (Table 1, Figure 2).

Table 1. Land cover types, coverage, and percent (%) composition in the proposed Bowman Wind Project in Bowman County, North Dakota.

Land Cover Type	Coverage (Acres)*	Composition (%)*
Shrub/Scrub	26,877	43.8
Herbaceous/Grassland	19,589	31.9
Cultivated Crops	12,073	19.7
Developed	1,266	2.1
Hay/Pasture	1,118	1.8
Emergent Herbaceous Wetlands	164	0.3
Open Water	106	0.2
Woody Wetlands	46	<0.1
Evergreen Forest	45	<0.1
Deciduous Forest	31	<0.1
Mixed Forest	7	<0.1
Barren Land	2	<0.1
Total¹	61,325	100

Data from National Land Cover Database (NLCD) 2016.

* ¹ Sums can differ from values shown due to rounding.

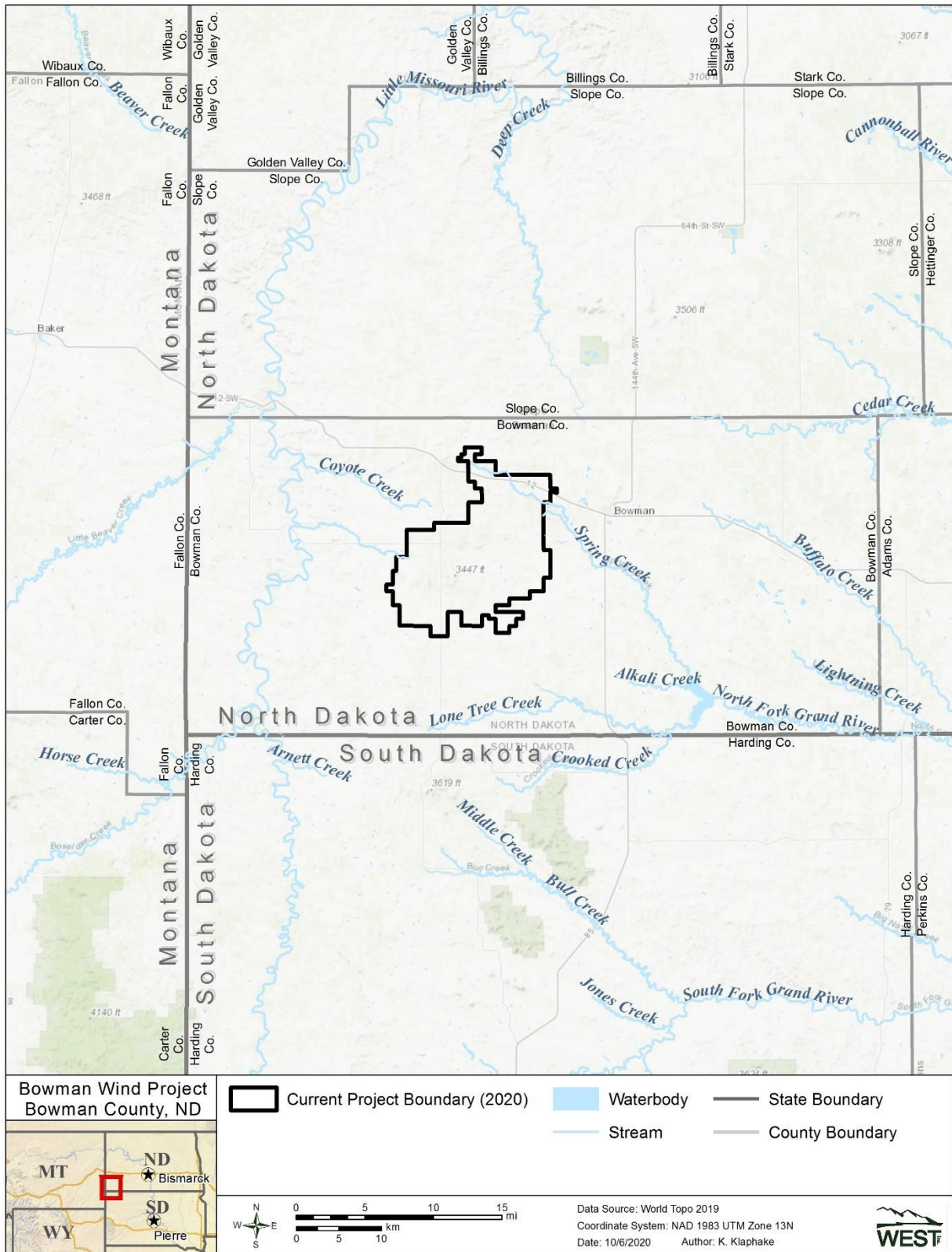


Figure 1. Location of the proposed Bowman Wind Project in Bowman County, North Dakota.

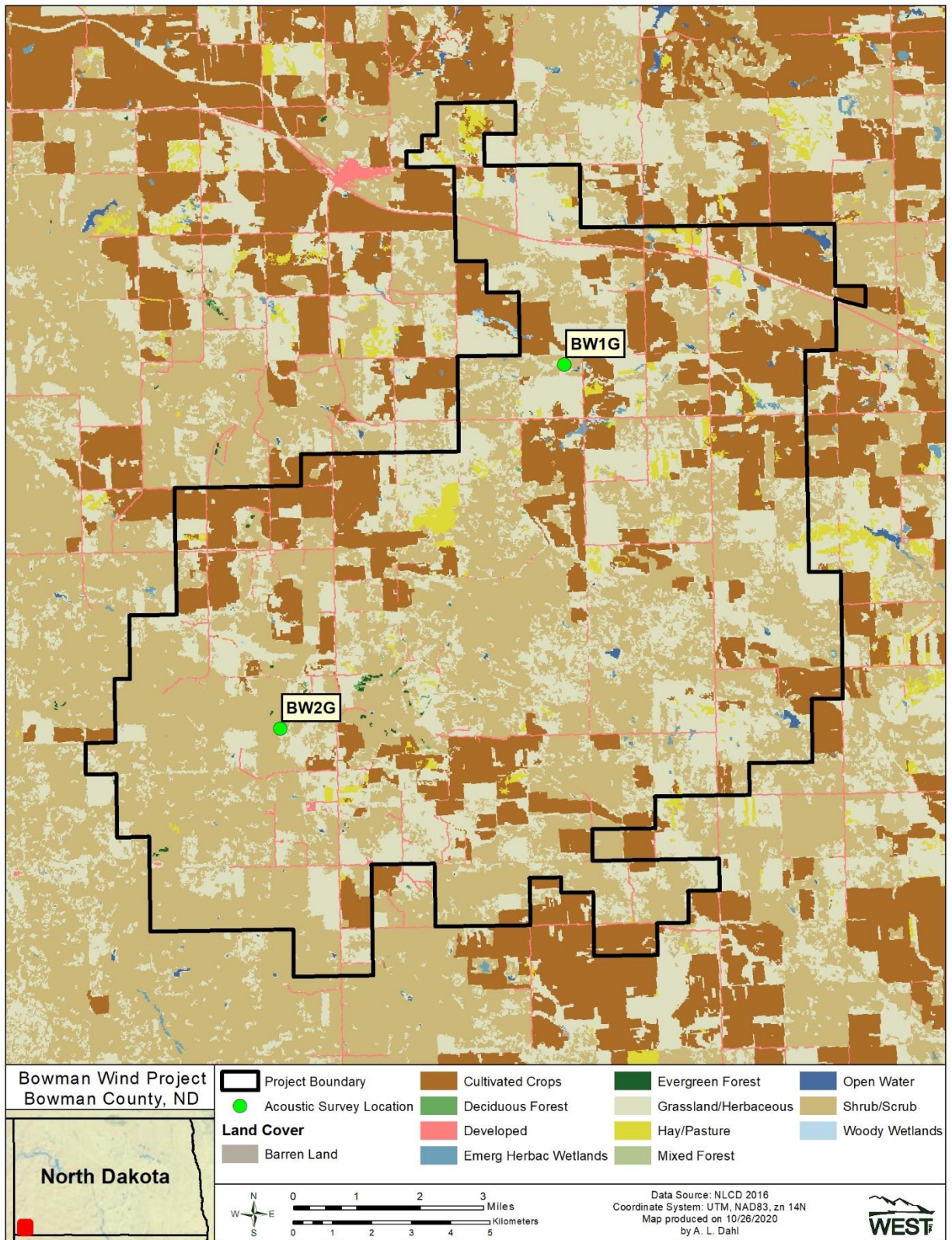


Figure 2. Land cover types and acoustic survey locations within the proposed Bowman Wind Project, in Bowman County, North Dakota.

22.1 Overview of Bat Diversity

Ten bat species have the potential to occur within the Project (Table 2; International Union for Conservation of Nature 2020, USFWS 2019). Nine of the 10 bat species have been documented as fatalities at operating wind energy facilities (Table 2). The northern long-eared bat (*Myotis septentrionalis*) is the only species listed as federally threatened with a 4D rule, which allows incidental take of this species for this region (USFWS 2015). The state of North Dakota does not have an endangered or threatened species list; however, North Dakota identifies and maintains a list of the 100 Species of Conservation Priority (SCP) in its State Wildlife Action Plan (SWAP) (Dyke et al. 2015). Big brown bat (*Eptesicus fuscus*), little brown bat (*Myotis lucifugus*), northern long-eared bat, and Townsend's big-eared bat (*Corynorhinus townsendii*) are listed as level I species. Level I species either have declining population and have a high conservation priority or North Dakota constitutes part of their core breeding range.

Table 2. Bat species with potential to occur within the proposed Bowman Wind Project in Bowman County, North Dakota, categorized by echolocation call frequency*.

Common Name	Scientific Name
High-Frequency (≥ 30 kHz)	
eastern red bat ^{1,2}	<i>Lasiurus borealis</i>
little brown bat ^{1, 4}	<i>Myotis lucifugus</i>
long-legged bat ¹	<i>Myotis volans</i>
northern long-eared bat ^{1,3, 4}	<i>Myotis septentrionalis</i>
western long-eared bat ¹	<i>Myotis evotis</i>
western small-footed bat ¹	<i>Myotis ciliolabrum</i>
Low-Frequency (≤ 30 kHz)	
big brown bat ^{1, 4}	<i>Eptesicus fuscus</i>
hoary bat ^{1,2}	<i>Lasiurus cinereus</i>
silver-haired bat ^{1,2}	<i>Lasionycteris noctivagans</i>
Townsend's big-eared bat ⁴	<i>Corynorhinus townsendii</i>

¹ Species found as fatalities at operating wind energy facilities (reported by Anderson et al. 2004 and American Wind Wildlife Institute 2018)

² Long-distance migrant

³ Federally threatened species

⁴ Species listed as Level I Species of Conservation Priority by North Dakota Game and Fish Department (NDGFD)

kHz = kilohertz

* Sources: (International Union for Conservation of Nature 2020, US Fish and Wildlife Service 2019, Dyke et al. 2015)

23.0 METHODS

23.1 Bat Acoustic Surveys

23.1.1 Survey Stations

Two full-spectrum Song Meter SM3BAT (SM3) ultrasonic detectors (Wildlife Acoustics, Maynard, Massachusetts) were used during the survey. Each SM3 detector was placed at a meteorological (met) tower within the Project, with a single microphone detecting near the ground level ('ground station'; approximately 5.0 feet [ft; 1.5 meters (m)] above ground level; Figure 2). Microphones at

ground stations likely detect a more complete sample of the bat species present within the Project. Both stations were located in herbaceous/grassland habitat, which is one of the dominant land cover types (Table 1) and is representative of potential turbine locations within the Project area.

The SM3 microphones are weatherproof and were secured atop a wooden pole at ground stations with a metal grounding wire attached to both the microphone and external battery. Audio cables connected microphones to the SM3 detector at the base of the met tower. The SM3 microphones have a variable detection distance (approximately 98 ft [30 m]), which is influenced by atmospheric attenuation (e.g., changes with humidity, temperature, air pressure), surrounding vegetation, and wind, as well as the bat's call frequency, amplitude, and direction.

23.1.2 Survey Schedule

Acoustic surveys were conducted from July 8 – October 28, 2020. The detectors were programmed to record from approximately 30 minutes before sunset until 30 minutes after sunrise each night throughout the survey period.

23.2 Data Collection and Call Analysis

The SM3 is a full-spectrum bat detector that records complete acoustic waveforms by sampling sound waves at a rate of 256 kilohertz (kHz). This high sampling rate enables the detector to make high-resolution recordings of sound amplitude data at all frequencies up to 128 kHz. Full-spectrum data were transformed into zero-crossing data using the program Kaleidoscope Pro version 5.1.0 (Wildlife Acoustics), allowing data to be viewed in AnaLook software as digital sonograms that show changes in echolocation call frequency over time. Frequency versus time displays were used to separate bat calls from other types of ultrasonic noise (e.g., wind, rain, insects) and to determine the call frequency category.

For each survey location, bat passes were sorted into two groups based on their minimum call frequency. A bat pass was defined as a sequence of at least two echolocation calls (pulses) produced by an individual bat with no pause between calls of more than one second (Fenton 1980, Gannon et al. 2003). High-frequency (HF) bats, such as eastern red bat (*Lasiurus borealis*) and *Myotis* species, generally have minimum frequencies equal to or greater than 30 kHz. Low-frequency (LF) bats, such as big brown bat, silver-haired bat (*Lasionycteris noctivagans*), and hoary bat (*Lasiurus cinereus*), typically emit echolocation calls with minimum frequencies equal to or below 30 kHz. The HF and LF species that potentially occur in the Project area are listed in Table 2.

Calls (zero cross) confirmed to be bat passes were then run through the automated identification feature in Kaleidoscope Pro using the Bats of North America classifier 5.1.0 (Wildlife Acoustics) at the neutral sensitivity setting to complete initial identification of potentially occurring species. These settings and versions are approved by the USFWS for acoustic analysis of sensitive species¹. Despite the capabilities of Kaleidoscope Pro, many bat passes cannot be identified with

¹ This version of Kaleidoscope Pro is approved by the USFWS for the identification of the Indiana bat (*Myotis sodalis*) and northern long-eared bat in the eastern United States (USFWS 2020).

absolute certainty. This is because only call fragments were recorded due to the distance between the bat and microphone, or because many bat species produce similar calls with overlapping call characteristics, depending on the type of activity that the bat was doing and presence of other species, that are often indistinguishable between species. Therefore, automated call identification is imperfect, and each identification has an associated error rate (USFWS 2013, USFWS and US Geological Survey 2019). In addition, the error rates associated with Kaleidoscope Pro identifications of unknown bat calls have not been characterized. For these reasons, the results of the Kaleidoscope Pro analysis can be inaccurate or false positives and should be viewed with caution or verified by a qualified biologist. Only files confirmed as bat passes by a bat biologist were included in the Kaleidoscope. Additionally, a qualified bat biologist reviewed all calls identified as potential northern long-eared bat calls by Kaleidoscope.

23.3 Data Analysis

The number of bat passes per detector-night was used as an index of bat activity. The number of bat passes was determined by an experienced bat acoustic analyst using AnalookW software to view recorded call files. A detector-night was defined as one detector operating for one entire night (at least within one hour of sunrise). Bat passes per detector-night were calculated for all bats, HF bats, and LF bats. Using detector-nights as a metric for calculating bat activity controlled for differences in sampling effort among individual detectors and provided unbiased estimates for the deployed nights. Bat pass rates represent indices of bat activity and do not represent numbers of individuals. Mean bat activity was calculated for each station and overall (overall averages were calculated as an unweighted average of total activity at each individual detector).

The period of peak sustained bat activity was defined as the 7-day period with the highest average bat activity. If multiple 7-day periods equaled the peak sustained bat activity rate, all dates in these 7-day periods were reported. This and all multi-detector averages in this report were calculated as an unweighted average of total activity at each detector.

Mean bat activity was also calculated for a standardized Fall Migration Period (FMP), defined here as July 30 – October 14. WEST defined the FMP as a standard for comparison with activity from other wind projects. During the FMP, bats begin moving toward wintering areas, and many species of bats initiate reproductive behaviors (Cryan 2008). This period of increased landscape-scale movement and reproductive behavior is often associated with increased levels of bat fatalities at operational wind energy facilities (Arnett et al. 2008, Cryan 2008, Arnett and Baerwald 2013, Barclay et al. 2017).

24.0 RESULTS

24.1 Bat Acoustic Surveys

Stations were surveyed for a total of 216 detector-nights from July 8 – October 28, 2020. Overall, stations operated for 95.6% of the sampling period. The cause of lost data was detector malfunction at Station BW2g. Stations recorded a combined total of 976 bat passes², for a mean ($\pm$ standard error) of 4.43 ± 0.62 bat passes per detector-night across all units during the study period (Table 3). At all stations, 66.6% of bat passes were classified as HF (e.g., eastern red bat, little brown bat, western small-footed bat [*Myotis ciliolabrum*]), and 33.4% of bat passes were classified as LF (e.g., big brown bat, hoary bat, and silver-haired bat; Table 3).

Table 3. Results of the acoustic bat surveys conducted at the proposed Bowman Wind Project in Bowman County, North Dakota from July 8 – October 28, 2020.

Station	Bat Passes			Detector-Nights	Mean Bat Passes/Night ($\pm$ Standard Error) ¹
	High Frequency	Low Frequency	Total		
BW1g	551	157	708	113	6.27 $\pm$ 1.05
BW2g	99	169	268	103	2.60 $\pm$ 0.30
Total (%)	650 (66.6)	326 (33.4)	976	216	4.43$\pm$0.62

¹ $\pm$ bootstrapped standard error.

24.1.1 Federally-listed Species

Kaleidoscope potentially detected calls from the federally threatened northern long-eared bat on three nights overall (Table 4). . It is important to note that Kaleidoscope Pro identifications may be viewed as evidence of potential presence for a particular bat species, and presence/ absence surveys in accordance with the USFWS guidelines were not conducted. However, species should not be considered present (or absent) at a station until a qualitative review is conducted to confirm the Kaleidoscope Pro results for each bat species. Qualitative identification of these calls by a qualified biologist determined that these calls were not produced by this species and therefore northern long-eared bat was not detected at the Project.

24.1.2 Spatial Variation

Overall, activity was highest at Station BW1g and lowest at Station BW2g. Activity at BW1g was predominantly comprised of HF bat passes (77.8%) and activity at BW2g was comprised of LF (63.1%) (Table 3, Figure 3).

² Between 30 minutes prior to sunset and 30 minutes after sunset during fully operational nights.

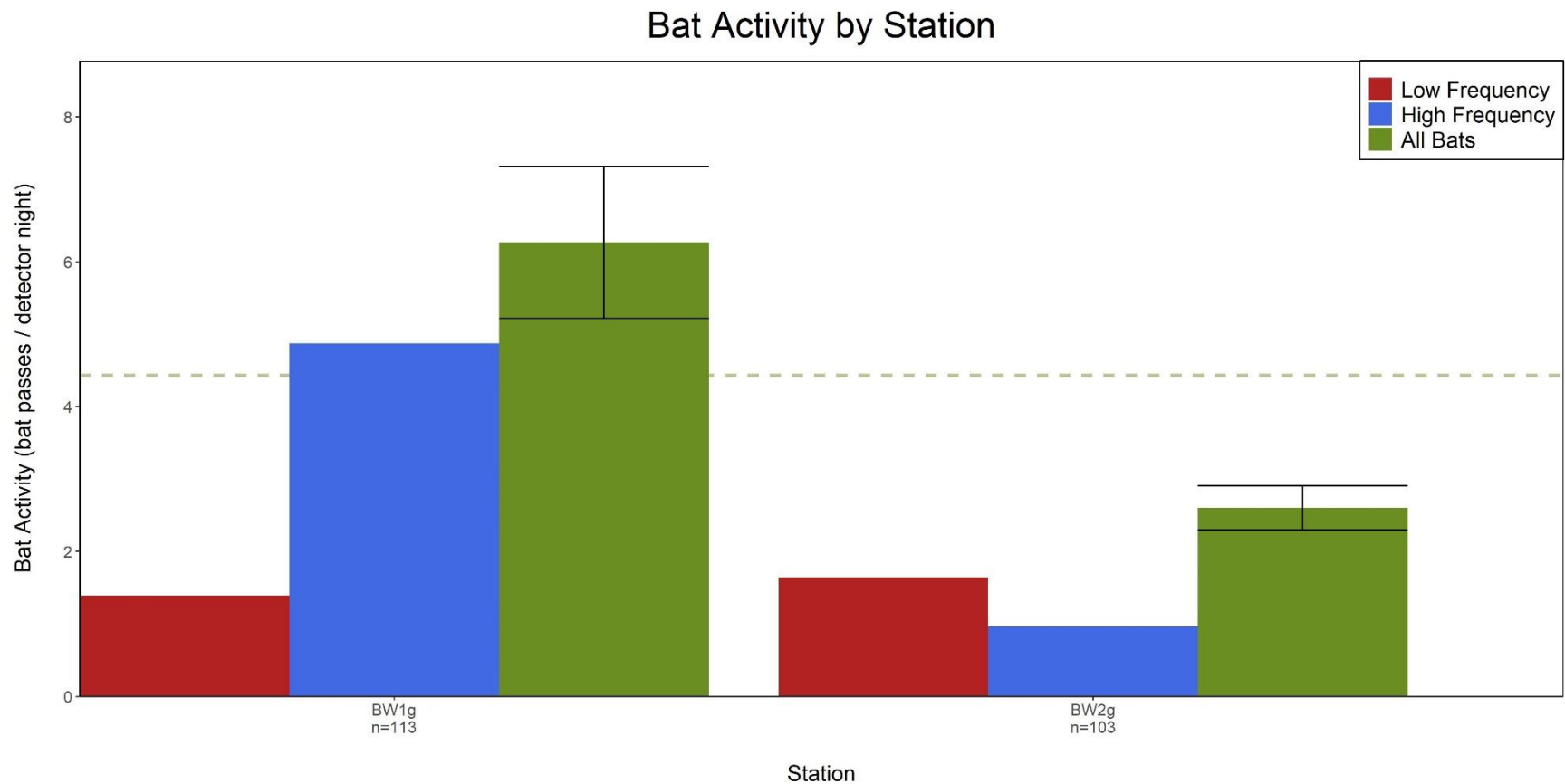


Figure 3. Number of high-frequency (HF) and low-frequency (LF) bat passes per detector-night recorded at acoustic monitoring stations within the proposed Bowman Wind Project in Bowman County, North Dakota from July 8 – October 28, 2020. (The bootstrapped standard errors are represented by the black error bars on the “All Bats” columns.)

24.1.3 Seasonal Variation

Overall weekly bat activity increased from the beginning of the survey (Figure 4) to a peak (16.7 bat passes per detector-night) from July 27 – August 2, 2020, and rapidly decreased after the first week of August. The peak in activity which was mainly driven by HF bat activity or little brown activity at BW1g, but also other species such as (Table 5). LF bat activity peaked (5.4 bat passes per detector-night) one month later, from August 22 – 28, 2020, and was mainly comprised of species (Table 5, Figure 4). Overall bat activity decreased after August through the end of the study period. (Figure 4). Overall bat activity during the FMP was 4.42 ± 0.78 bat passes per detector-night.

Table 5. Periods of peak activity for high-frequency (HF), low-frequency (LF), and all bats at the proposed Bowman Wind Project in Bowman County, North Dakota from July 8 – October 28, 2020.

Species Group	Start Date of Peak Activity	End Date of Peak Activity	Bat Passes per Detector-Night
HF	July 27	August 2	15.1
LF	August 22	August 28	5.4
All Bats	July 27	August 2	16.7

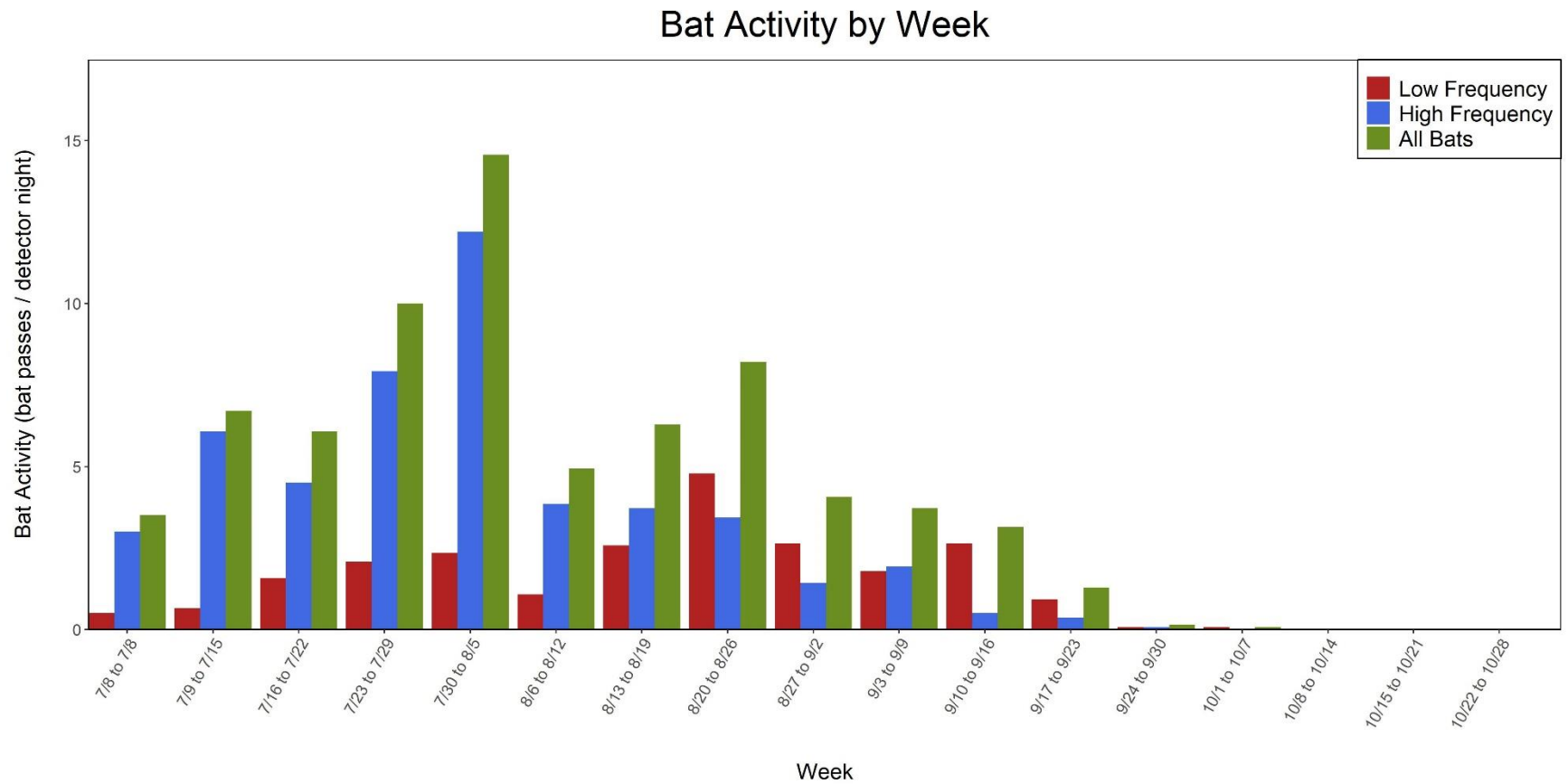


Figure 4. Weekly patterns of bat activity (average bat passes/detector-night/week) by high-frequency (HF), low-frequency (LF), and all bats at acoustic monitoring stations within the proposed Bowman Wind Project in Bowman County, North Dakota for the survey period July 8 – October 28, 2020.

25.0 DISCUSSION AND CONCLUSIONS

Acoustic monitoring stations were located in open herbaceous grassland and cropland habitat, which are representative of areas where turbines may be sited. Open habitat typically results in decreased bat activity relative to habitat near open water, forested, or riparian habitats that have the tendency to attract bats for foraging and roosting opportunities (Brooks and Ford 2005). Overall bat activity during the FMP (4.42 ± 0.78 bat passes per detector-night) was lower than other published pre-construction bat acoustic activity rates in the Midwest (WEST 2019, AWWI 2018). In addition, the rates recorded at the Project by SM3 detectors are likely higher because SM3 detectors typically record two to three times more bat passes per detector-night than AnaBat (Titley Scientific, Columbia, Missouri) detectors (Bishop-Boros et al. 2020) and the majority of published FMP activity estimates (WEST 2019) are based on AnaBat data. Acoustic surveys for bats were first recommended as a risk assessment tool soon after large-scale bat fatality events at wind facilities were first documented (Arnett et al. 2005). The timing of highest bat activity was consistent with peak fatality periods at operating wind energy facilities (Johnson et al. 2004, Arnett et al. 2008), and it was assumed the magnitude of pre-construction bat activity would similarly predict the magnitude of post-construction bat fatalities (Kunz et al. 2007). However, recent research has found pre-construction bat activity does not predict post-construction bat fatality rates (Hein et al. 2013, Solick et al. 2020). Although pre-construction bat activity rates are not strongly correlated with post-construction bat fatality rates (Solick et al. 2020), pre-construction acoustic surveys still provide useful information about spatial use in the development area, seasonal activity peaks, and potential species composition.

Kaleidoscope potentially detected calls from the federally threatened northern long-eared bat on three nights overall (Table 4). Qualitative identification of these calls by a qualified biologist determined that these calls were not produced by this species.

Bat activity was relatively low throughout the study period and peaked from late July through August which is consistent with the timing of peak fatalities for most wind energy facilities in the US (AWWI 2018). Fatality rates at the Project are more likely to be predicted by fatality rates from nearby wind projects, especially if habitat is similar. The nearest publicly available wind energy facility is the Prairie Winds ND1 wind facility (PW ND1), located approximately 167 miles (268 kilometers) northeast of the Project, which has similar land cover dominated by cattle ranching followed by farming. PW ND1 reported a relatively low bat fatality rate (2.13 bat fatalities/megawatt (MW)/study period; Derby et al. 2011). Due to similarity in land cover and the proximity in North Dakota, the Project may have similarly low bat fatality rates. However, the Project will have larger but fewer turbines per MW, which may influence fatality rates per MW and make the comparison to PW ND1 less meaningful (Electric Power Research Institute 2020).

26.0 REFERENCES

- American Wind Wildlife Institute (AWWI). 2018. AWWI Technical Report: A Summary of Bat Fatality Data in a Nationwide Database. AWWI, Washington, D. C. July 25, 2018. Available online: <https://tethys.pnnl.gov/sites/default/files/publications/AWWI-2018-Bat-Fatality-Database.pdf>
- Anderson, R., N. Neuman, J. Tom, W. P. Erickson, M. D. Strickland, M. Bourassa, K. J. Bay, and K. J. Sernka. 2004. Avian Monitoring and Risk Assessment at the Tehachapi Pass Wind Resource Area, California. Period of Performance: October 2, 1996 - May 27, 1998. NREL/SR-500-36416. September 2004. National Renewable Energy Laboratory, Golden, Colorado. Available online: <http://www.nrel.gov/docs/fy04osti/36416.pdf>
- AnaLook. 2004. Bat call analysis program. © 2004, C. Corben.
- AnaLookW. 2015. Bat call analysis program. Titley Scientific, Columbia, Missouri. Information online: <https://www.titley-scientific.com/us/downloads-support/firmware-software>
- Arnett, E. B. and E. F. Baerwald. 2013. Impacts of Wind Energy Development on Bats: Implications for Conservation. Pp. 435-456. *In*: R. A. Adams and S. C. Pederson, eds. Bat Ecology, Evolution and Conservation. Springer Science Press, New York.
- Arnett, E. B., W. P. Erickson, J. Kerns, and J. Horn. 2005. Relationships between Bats and Wind Turbines in Pennsylvania and West Virginia: An Assessment of Fatality Search Protocols, Patterns of Fatality, and Behavioral Interactions with Wind Turbines. Prepared for the Bats and Wind Energy Cooperative. March 2005.
- Arnett, E. B., K. Brown, W. P. Erickson, J. Fiedler, B. L. Hamilton, T. H. Henry, A. Jain, G. D. Johnson, J. Kerns, R. R. Koford, C. P. Nicholson, T. O'Connell, M. Piorkowski, and R. Tankersley, Jr. 2008. Patterns of Bat Fatalities at Wind Energy Facilities in North America. *Journal of Wildlife Management* 72(1): 61-78.
- Barclay, R. M. R., E. F. Baerwald, and J. Rydell. 2017. Bats. Pp. 191-221. *In*: M. Perrow, ed. Wildlife and Wind Farms - Conflicts and Solutions, Volume 1. Onshore: Potential Effects. Pelagic Publishing, United Kingdom.
- Bishop-Boros, L., K. Murray, K. Russell, A. Tredennick, R. Clark, and A. Matteson. 2020. Bat Acoustic Activity Comparison between Anabat SD1 and SD2 Detectors versus SM3BAT and SM4BAT Detectors at Wind Energy Facilities in the United States and Canada. Presentation recorded September 11, 2020. The Wildlife Society (TWS) 27th Annual Conference, Louisville, Kentucky. September 28 - October 2, 2020.
- Brooks, R. T. and W. M. Ford. 2005. Bat Activity in a Forest Landscape of Central Massachusetts. *Northeastern Naturalist* 12(4): 447-462.
- Cryan, P. M. 2008. Mating Behavior as a Possible Cause of Bat Fatalities at Wind Turbines. *Journal of Wildlife Management* 72(3): 845-849. doi: 10.2193/2007-371.
- Derby, C., K. Chodachek, T. Thorn, K. Bay, and S. Nomani. 2011. Post-Construction Fatality Surveys for the Prairie Winds ND1 Wind Facility, Basin Electric Power Cooperative, March - November 2010. Prepared for Basin Electric Power Cooperative, Bismarck, North Dakota. Prepared by Western EcoSystems Technology, Inc. (WEST), Bismarck, North Dakota. August 2, 2011.
- Dyke, S. R., S. K. Johnson, and P. T. Isakson. 2015. North Dakota State Wildlife Action Plan. North Dakota Game and Fish Department, Bismarck, North Dakota. Available online: <https://gf.nd.gov/wildlife/swap>

- Endangered Species Act (ESA). 1973. 16 United States Code (USC) §§ 1531-1544, Public Law (PL) 93-205, December 28, 1973, as amended, PL 100-478 [16 USC 1531 et seq.]; 50 Code of Federal Regulations (CFR) 402.
- Electric Power Research Institute (EPRI). 2020. Relationship between Bat Fatality Rates and Turbine Size at Wind Farms across the Continental U.S. and Southern Canada: An Investigation into the Occurrence of Bat Fatalities in Relation to Turbine Size. Prepared by Western EcoSystems Technology, Inc. (WEST). Report No. 3002017927. EPRI, Palo Alto, California. June 2020.
- Esri. 2009. World Terrain Base. ArcGIS Resource Center. Environmental Systems Research Institute (Esri), producers of ArcGIS software, Redlands, California. Basemap created July 1, 2009. Accessed October 2020. Information online: <https://www.arcgis.com/home/item.html?id=c61ad8ab017d49e1a82f580ee1298931>
- Esri. 2013. World Topographic Map. ArcGIS Resource Center. Environmental Systems Research Institute (Esri), producers of ArcGIS software, Redlands, California. Created June 13, 2013. Updated October 14, 2020. Accessed November 2020. Information online: <https://www.arcgis.com/home/item.html?id=30e5fe3149c34df1ba922e6f5bbf808f>
- Esri. 2020. World Imagery and Aerial Photos. (World Topo). ArcGIS Resource Center. Environmental Systems Research Institute (Esri), producers of ArcGIS software, Redlands, California. Last updated October 14, 2020. Information online: <https://www.arcgis.com/home/webmap/viewer.html?useExisting=1&layers=10df2279f9684e4a9f6a7f08febac2a9>
- Fenton, M. B. 1980. Adaptiveness and Ecology of Echolocation in Terrestrial (Aerial) Systems. Pp. 427-446. *In*: R. G. Busnel and J. F. Fish, eds. Animal Sonar Systems. Plenum Press, New York.
- Gannon, W. L., R. E. Sherwin, and S. Haymond. 2003. On the Importance of Articulating Assumptions When Conducting Acoustic Studies of Habitat Use by Bats. *Wildlife Society Bulletin* 31: 45-61.
- Hein, C. D., J. Gruver, and E. B. Arnett. 2013. Relating Pre-Construction Bat Activity and Post-Construction Bat Fatality to Predict Risk at Wind Energy Facilities: A Synthesis. A report submitted to the National Renewable Energy Laboratory (NREL), Golden Colorado. Bat Conservation International (BCI), Austin, Texas. March 2013. Available online: http://batsandwind.org/pdf/Pre-%20Post-construction%20Synthesis_FINAL%20REPORT.pdf
- International Union for Conservation of Nature (IUCN). 2020. IUCN Red List of Threatened Species: North Dakota Bat Species. Version 2020-2. Accessed August 2020. Information online: www.iucnredlist.org
- Johnson, G. D., M. K. Perlik, W. P. Erickson, and M. D. Strickland. 2004. Bat Activity, Composition and Collision Mortality at a Large Wind Plant in Minnesota. *Wildlife Society Bulletin* 32(4): 1278-1288.
- Kunz, T. H., E. B. Arnett, B. M. Cooper, W. P. Erickson, R. P. Larkin, T. Mabey, M. L. Morrison, M. D. Strickland, and J. M. Szewczak. 2007. Assessing Impacts of Wind-Energy Development on Nocturnally Active Birds and Bats: A Guidance Document. *Journal of Wildlife Management* 71(8): 2449-2486. doi: 10.2193/2007-270.
- Murray, K. L., E. R. Britzke, and L. W. Robbins. 2001. Variation in the Search-Phase Calls of Bats. *Journal of Mammalogy* 82(3): 728-737. doi: 10.1644/1545-1542(2001)082<0728:VISPCO>2.0.CO;2.

National Land Cover Database (NLCD). 2016. *As cited* includes:

Yang, L., S. Jin, P. Danielson, C. Homer, L. Gass, S. M. Bender, A. Case, C. Costello, J. Dewitz, J. Fry, M. Funk, B. Granneman, G. C. Liknes, M. Rigge, and G. Xian. 2018. A New Generation of the United States National Land Cover Database: Requirements, Research Priorities, Design, and Implementation Strategies. *ISPRS Journal of Photogrammetry and Remote Sensing* 146: 108-123. doi: 10.1016/j.isprsjprs.2018.09.006.

and

Multi-Resolution Land Characteristics (MRLC). 2019. National Land Cover Database (NLCD) 2016. Multi-Resolution Land Characteristics (MRLC) Consortium. US Geological Survey (USGS) Earth Resources Observation and Science (EROS) Center, MRLC Project, Sioux Falls, South Dakota. May 10, 2019. Information online: <https://www.mrlc.gov/data>

North American Datum (NAD). 1983. NAD83 Geodetic Datum.

North Dakota Game and Fish Department (NDGFD). 2020. Big Brown Bat. Fact Sheet. Accessed November 2020. NDGFD, Bismarck, North Dakota. Available online: <https://gf.nd.gov/wildlife/id/bats/big-brown-bat>

North Dakota Game and Fish Department (NDGFD). 2015. Threatened and Endangered Species. NDGFD, Bismarck, North Dakota. May 2015. Available online: <https://gf.nd.gov/wildlife/endangered>

O'Farrell, M. J. and W. L. Gannon. 1999. A Comparison of Acoustic versus Capture Techniques for the North American Datum (NAD). 1983. NAD83 Geodetic Datum. Inventory of Bats. *Journal of Mammalogy* 80(1): 24-30.

Solick, D., D. Pham, K. Nasman, and K. Bay. 2020. Bat Activity Rates Do Not Predict Bat Fatality Rates at Wind Energy Facilities. *Acta Chiropterologica* 22(1): 135-146. doi: 10.3161/15081109ACC2020.22.1.012.

US Environmental Protection Agency (USEPA). 2017. Ecoregion Download Files by State - Region 5: North Dakota. Ecoregions of the United States, Ecosystems Research, USEPA. Last updated February 8, 2017. Accessed June 2019. Information online: <https://www.epa.gov/eco-research/ecoregion-download-files-state-region-8#pane-32>

US Fish and Wildlife Service (USFWS). 2012. Land-Based Wind Energy Guidelines. March 23, 2012. 82 pp. Available online: http://www.fws.gov/cno/pdf/Energy/2012_Wind_Energy_Guidelines_final.pdf

US Fish and Wildlife Service (USFWS). 2013. Acoustic Bat Identification Software Testing Criteria – Draft January 2013. Available online: <https://www.fws.gov/midwest/endangered/mammals/inba/surveys/pdf/AcousticPrgrmDrftTestCriteria3Jan13.pdf>

US Fish and Wildlife Service (USFWS). 2015. Endangered and Threatened Wildlife and Plants; Threatened Species Status for the Northern Long-Eared Bat with 4(d) Rule; Final Rule and Interim Rule. Department of the Interior, Fish and Wildlife Service, 50 CFR Part 17. 80 Federal Register (FR) 63: 17974-18033. April 2, 2015.

US Fish and Wildlife Service (USFWS). 2019. Northern Long-Eared Bat Range Map. USFWS Endangered Species, Midwest Region. Midwest Ecological Services, Bloomington, Minnesota. Map created November 26, 2019. Page last updated January 15, 2020. Available online: <https://www.fws.gov/midwest/endangered/mammals/nleb/nlebRangemap.html>

- US Fish and Wildlife Service (USFWS). 2020. 20 Range-Wide Indiana Bat Summer Survey Guidelines. March, 2020. Information online: <https://www.fws.gov/midwest/endangered/mammals/inba/surveys/pdf/FINAL%20Range-wide%20IBat%20Survey%20Guidelines%203.23.20.pdf>
- US Fish and Wildlife Service (USFWS) and US Geological Survey (USGS). 2019. Testing Procedures, Performance Criteria and Approval Process for Automated Acoustic Bat ID Software Programs Associated with the Range-Wide Indiana Bat Summer Survey Guidelines. January 31, 2019. 6 pp.
- US Geological Survey (USGS). 2019. 3D Elevation Program (3DEP). 3D elevation data from light detection and ranging (lidar) data: conterminous United States, Hawaii, and the US territories. USGS, Reston, Virginia. Accessed May 2019. Information online: <https://www.usgs.gov/core-science-systems/ngp/3dep>
- Western EcoSystems Technology, Inc. (WEST). 2019. Regional Summaries of Wildlife Fatalities at Wind Facilities in the United States. 2019 Report from the Renew Database. WEST, Cheyenne, Wyoming. December 31, 2019.
- Wildlife Acoustics, Inc. Kaleidoscope Pro® Version 5.1.0 (acoustic analysis computer software) and Bats of North America Version 5.1.0. (bat pass classifier). Wildlife Acoustics, Maynard, Massachusetts. Information online: www.wildlifeacoustics.com
- Yates, M. and R. M. Muzika. 2006. Effect of Forest Structure and Fragmentation on Site Occupancy of Bat Species in Missouri Ozark Forests. *Journal of Wildlife Management* 70: 1238-1

**Appendix C. US Fish and Wildlife Service Information, Planning and Consultation System
Resource List and Species of Habitat Fragmentation Concern**

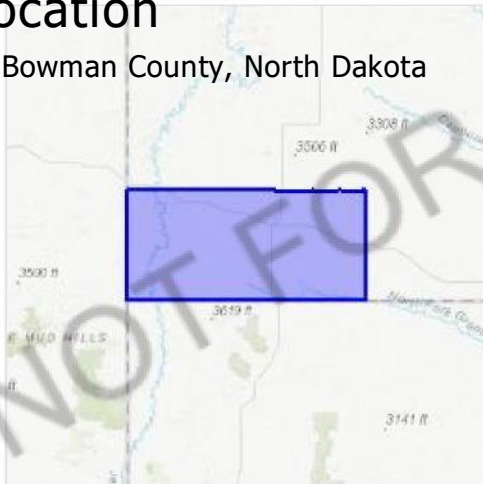
IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

Bowman County, North Dakota



Local office

North Dakota Ecological Services Field Office

☐ (701) 250-4481
☐ (701) 355-8513

3425 Miriam Avenue

Bismarck, ND 58501-7926

http://www.fws.gov/northdakotafielddoffice/endspecies/endangered_species.htm

<https://ecos.fws.gov/ipac/location/ECEQXZ3FRVHDDHDIBDAO3BKXVO/resources#migratory-birds>

1/13

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population, even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species and their critical habitats are managed by the [Ecological Services Program](#) of the U.S.

¹ Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries). ²

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact [NOAA Fisheries](#) for [species under their jurisdiction](#).

1. Species listed under the [Endangered Species Act](#) are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the [listing status page](#) for more information.
2. [NOAA Fisheries](#), also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Mammals

NAME

STATUS

<https://ecos.fws.gov/ipac/location/ECEQXZ3FRVHDDHDI DAO3BKXVQ/resources#migratory-birds>

2/13

Northern Long-eared Bat *Myotis septentrionalis*

Threatened

No critical habitat has been designated for this species.

<https://ecos.fws.gov/ecp/species/9045>

Birds

NAME

STATUS

Whooping Crane *Grus americana*

Endangered

There is **final** critical habitat for this species. Your location is outside the critical habitat.

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act.¹

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described [below](#).

1. The [Migratory Birds Treaty Act](#) of 1918.
2. The [Bald and Golden Eagle Protection Act](#) of 1940.

<https://ecos.fws.gov/ecp/species/758>

Additional information can be found using the following links:

[Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php](http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php)

Measures for avoiding and minimizing impacts to birds

<http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php>

Nationwide conservation measures for birds

<http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf>

[The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern \(BCC\) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ \[below\]\(#\).](#)

This is not a list of every bird you may find in this location, nor a guarantee that every bird on

<https://ecos.fws.gov/ipac/location/ECEQXZ3FRVHDDHDIBDAO3BKXVQ/resources#migratory-birds>

3/13

this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the [E-bird data mapping tool](#) (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found [below](#).

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME

BREEDING SEASON (IF A BREEDING SEASON IS INDICATED FOR A BIRD ON YOUR LIST, THE BIRD MAY BREED IN YOUR PROJECT AREA SOMETIME WITHIN THE TIMEFRAME SPECIFIED, WHICH IS A VERY LIBERAL ESTIMATE OF THE DATES INSIDE WHICH THE BIRD BREEDS ACROSS ITS ENTIRE RANGE. "BREEDS ELSEWHERE" INDICATES

Breeds May 20 to Aug 15
THAT THE BIRD DOES NOT LIKELY
BREED IN YOUR PROJECT AREA.)

Baird's Sparrow *Ammodramus bairdii*

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

<https://ecos.fws.gov/ecp/species/5113>

Breeds Dec 1 to Aug 31

Bald Eagle *Haliaeetus leucocephalus*

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.

<https://ecos.fws.gov/ecp/species/1626>

Breeds May 15 to Aug 10

Brewer's Sparrow *Spizella breweri*

This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA

<https://ecos.fws.gov/ecp/species/9291>

Burrowing Owl *Athene cunicularia*

This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA

<https://ecos.fws.gov/ecp/species/9737>

<https://ecos.fws.gov/ipac/location/ECEQXZ3FRVHDDHDBDAO3BKXVQ/resources#migratory-birds>

4/13

Breeds Mar 15 to Aug 31

Breeds May 1 to Aug 10

Chestnut-collared Longspur *Calcarius ornatus*

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Breeds Jan 1 to Dec 31

Clark's Grebe *Aechmophorus clarkii*

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Breeds Mar 15 to Aug 15

Ferruginous Hawk *Buteo regalis*

This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA

<https://ecos.fws.gov/ecp/species/6038>

Breeds Jan 1 to Aug 31

Golden Eagle *Aquila chrysaetos*

This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA

<https://ecos.fws.gov/ecp/species/1680>

Breeds May 10 to Aug 15

Lark Bunting *Calamospiza melanocorys*

This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA

Breeds elsewhere

Lesser Yellowlegs *Tringa flavipes*

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

<https://ecos.fws.gov/ecp/species/9679>

Breeds Apr 1 to Jul 31

Long-billed Curlew *Numenius americanus*

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

<https://ecos.fws.gov/ecp/species/5511>

Breeds May 1 to Jul 31

Marbled Godwit *Limosa fedoa*

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

<https://ecos.fws.gov/ecp/species/9481>

Breeds May 1 to Aug 15

Mccown's Longspur *Calcarius mccownii*

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

<https://ecos.fws.gov/ecp/species/9292>

Red-headed Woodpecker *Melanerpes erythrocephalus*

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

<https://ecos.fws.gov/ipac/location/ECEQXZ3FRVHDDHDIBDAO3BKXVQ/resources#migratory-birds>

5/13

Breeds May 10 to Sep 10

Sprague's Pipit *Anthus spragueii*

Breeds May 10 to Aug 31

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

<https://ecos.fws.gov/ecp/species/8964>

Willet *Tringa semipalmata*

Breeds Apr 20 to Aug 5

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence ()

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is $0.25/0.25 = 1$; at week 20 it is $0.05/0.25 = 0.2$.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season ()

Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort ()

<https://ecos.fws.gov/ipac/location/ECEQXZ3FRVHDDHDIBDAO3BKXVQ/resources#migratory-birds>

6/13

Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data ()

A week is marked as having no data if there were no survey events for that week.

Survey Timeframe

Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.

Burrowing Owl BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)

<https://ecos.fws.gov/ipac/location/ECEQXZ3FRVHDDHDIBDAO3BKXVQ/resources#migratory-birds>

7/13





Bowman Bat Acoustic

9/19/2019 IPaC: Explore
Location



Mccown's
Longspur
BCC Rangewide
(CON) (This is a Bird
of Conservation...
Concern (BCC)
throughout its range
in the continental
USA and Alaska.)



Red-headed
Woodpecker BCC
Rangewide (CON)
(This is a Bird of
Conservation.....
Concern (BCC)
throughout its range
in the continental
USA and Alaska.)

Sprague's Pipit BCC
Rangewide (CON)
(This is a Bird of
Conservation
Concern (BCC)
throughout its range
in the continental
USA and Alaska.)



Willet
BCC Rangewide
(CON) (This is a Bird
of Conservation
Concern (BCC)
throughout its range
in the continental
USA and Alaska.)



Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

[Nationwide Conservation Measures](#) describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. [Additional measures and/or permits may be](#) advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS [Birds of Conservation Concern \(BCC\)](#) and other species that may warrant special attention in your project location.

[The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network \(AKN\). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is](#) queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle ([Eagle Act](#) requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the [AKN Phenology Tool](#).

<https://ecos.fws.gov/ipac/location/ECEQXZ3FRVHDDHDIBDAO3BKXVQ/resources#migratory-birds>

9/13

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the [Avian Knowledge Network \(AKN\)](#). [This data is derived from a growing collection of survey, banding, and citizen science datasets](#).

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go to the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: [The Cornell Lab of Ornithology All About Birds Bird Guide](#), or [\(if you are unsuccessful in locating the bird of interest there\), the Cornell Lab of Ornithology Neotropical Birds guide](#). [If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur](#) in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are [Birds of Conservation Concern](#) (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the [Eagle Act](#) requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the [Northeast Ocean Data Portal](#). The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. [Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.](#)

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on [marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.](#)

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to [obtain a permit](#) to avoid violating the Eagle Act should such impacts occur.

<https://ecos.fws.gov/ipac/location/ECEQXZ3FRVHDDHDIBDAO3BKXVO/resources#migratory-birds>

10/13

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the [National Wildlife Refuge](#) system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

This location overlaps the following National Wildlife Refuge lands:

LAND	ACRES
Des Lacs National Wildlife Refuge	0 acres

☐ (701) 385-4046

☐ (701) 385-3214

42000 520th St Nw

Kenmare, ND 58746

<https://www.fws.gov/refuges/profiles/index.cfm?id=62570>

Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

<https://ecos.fws.gov/ipac/location/ECEQXZ3FRVHDDHDIBDAO3BKXVQ/resources#migratory-birds>

11/13

Wetlands in the National Wetlands Inventory

Impacts to [NWI wetlands](#) and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

[For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.](#)

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of

The area of this project is too large for IPaC to load all NWI wetlands in the area. The list below [may be incomplete. Please contact the local U.S. Fish and Wildlife Service office or visit the NWI map for a full list.](#)

FRESHWATER

[PEM1A](#)
[PEM1Fh](#)
[PEM1Ah](#)
[PEM1Ch](#)
[PEM1C](#)
[PEM1Cx](#)

EMERGENT

WETLAND

FRESHWATER POND

[PABFh](#)
[PABKx](#)
[PABF](#)
[PUSC](#)
[PUSAh](#)
[PUBFx](#)
[PABFx](#)
[PUSA](#)
[PUSCh](#)
[PUSCx](#)

wetlands on site.

This location overlaps the following wetlands:

LAKE

[L2ABFh](#)
[L1UBGh](#)
[L2USAh](#)

RIVERINE

[R2USA](#)

[R4SBC](#)

[R5UBH](#)

[R2USC](#)

<https://ecos.fws.gov/ipac/location/ECEQXZ3FRVHDDHDI BDAO3BKXVQ/resources#migratory-birds>

12/13

A full description for each wetland code can be found at the [National Wetlands Inventory website](#) **Data**

limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tubercid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

<https://ecos.fws.gov/ipac/location/ECEQXZ3FRVHDDHDIBDAO3BKXVQ/resources#migratory-birds>

13/13

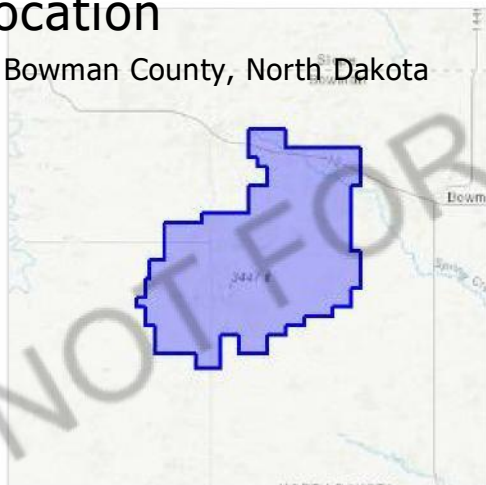
IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

Bowman County, North Dakota



Local office

North Dakota Ecological Services Field Office

☐ (701) 250-4481
☐ (701) 355-8513

3425 Miriam Avenue

Bismarck, ND 58501-7926

http://www.fws.gov/northdakotafielddoffice/endspecies/endangered_species.htm

<https://ecos.fws.gov/ipac/location/BLOQOVRT5JEFFJYI7EWOCETVYI/resources#migratory-birds>

1/10

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population, even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species and their critical habitats are managed by the [Ecological Services Program](#) of the U.S.

¹ Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries). ²

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list.

Please contact [NOAA Fisheries](#) for [species under their jurisdiction](#).

1. Species listed under the [Endangered Species Act](#) are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the [listing status page](#) for more information.
2. [NOAA Fisheries](#), also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Mammals

NAME

STATUS

<https://ecos.fws.gov/ipac/location/BLOQOVRT5JEFFJYI7EWOCETVYI/resources#migratory-birds>

2/10

Northern Long-eared Bat *Myotis septentrionalis*

Threatened

No critical habitat has been designated for this species.

<https://ecos.fws.gov/ecp/species/9045>

Birds

NAME

STATUS

Whooping Crane *Grus americana*

Endangered

There is **final** critical habitat for this species. Your location is outside the critical habitat.

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act.¹

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described [below](#).

1. The [Migratory Birds Treaty Act](#) of 1918.
2. The [Bald and Golden Eagle Protection Act](#) of 1940.

<https://ecos.fws.gov/ecp/species/758>

Additional information can be found using the following links:

[Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php](http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php)

Measures for avoiding and minimizing impacts to birds

<http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php>

Nationwide conservation measures for birds

<http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf>

[The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern \(BCC\) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ \[below\]\(#\).](#)

This is not a list of every bird you may find in this location, nor a guarantee that every bird on

<https://ecos.fws.gov/ipac/location/BLOQOVRT5JEFFJYI7EWOCETVYI/resources#migratory-birds>

3/10

this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the [E-bird data mapping tool](#) (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found [below](#).

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME

BREEDING SEASON (IF A BREEDING SEASON IS INDICATED FOR A BIRD ON YOUR LIST, THE BIRD MAY BREED IN YOUR PROJECT AREA SOMETIME WITHIN THE TIMEFRAME SPECIFIED, WHICH IS A VERY LIBERAL ESTIMATE OF THE DATES INSIDE WHICH THE BIRD BREEDS ACROSS ITS ENTIRE RANGE. "BREEDS ELSEWHERE" INDICATES

Breeds May 1 to Aug 10
THAT THE BIRD DOES NOT LIKELY
BREED IN YOUR PROJECT AREA.)

Chestnut-collared Longspur *Calcarius ornatus*

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Breeds May 10 to Aug 15

Lark Bunting *Calamospiza melanocorys*

This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA

Breeds Apr 1 to Jul 31

Long-billed Curlew *Numenius americanus*

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

<https://ecos.fws.gov/ecp/species/5511>

Breeds May 1 to Jul 31

Marbled Godwit *Limosa fedoa*

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Probability of Presence Summary

<https://ecos.fws.gov/ipac/location/BLOQOVRT5JEFFJYI7EWOCETVYI/resources#migratory-birds>

4/10

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence ()

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is $0.25/0.25 = 1$; at week 20 it is $0.05/0.25 = 0.2$.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season ()

Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort ()

Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data ()

A week is marked as having no data if there were no survey events for that week.

Survey Timeframe

Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.

■ probability of presence breeding season survey effort no

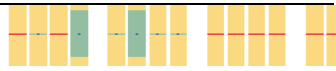
<https://ecos.fws.gov/ipac/location/BLOQOVRT5JEFFJYI7EWOCETVYI/resources#migratory-birds> 5/10

Bowman Bat Acoustic Activity Survey Report

9/11/2020

IPaC:

Explore Location



SPECIES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
---------	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

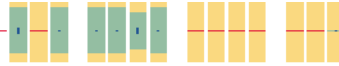
Chestnut-collared

Longspur

BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Lark Bunting

BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)



Long-billed Curlew

BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



Marbled Godwit

BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

[Nationwide Conservation Measures](#) describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. [Additional measures](#) and/or [permits](#) may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS [Birds of Conservation Concern \(BCC\)](#) and other species that may warrant special attention in your project location.

[The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network \(AKN\). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell\(s\) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that](#)

area, an eagle ([Eagle Act](#) requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the [AKN Phenology Tool](#).

<https://ecos.fws.gov/ipac/location/BLOQOVRT5JEFFJYI7EWOCETVYI/resources#migratory-birds>

6/10

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the [Avian Knowledge Network \(AKN\)](#). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: [The Cornell Lab of Ornithology All About Birds Bird Guide](#), or [\(if you are unsuccessful in locating the bird of interest there\), the Cornell Lab of Ornithology Neotropical Birds guide](#). If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are [Birds of Conservation Concern](#) (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the [Eagle Act](#) requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the [Northeast Ocean Data Portal](#). The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. [Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.](#)

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on [marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.](#)

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to [obtain a permit](#) to avoid violating the Eagle Act should such impacts occur.

<https://ecos.fws.gov/ipac/location/BLOQOVRT5JEFFJYI7EWOCETVYI/resources#migratory-birds>

7/10

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the [National Wildlife Refuge](#) system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS AT THIS LOCATION.

Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

Wetlands in the National Wetlands Inventory

Impacts to [NWI wetlands](#) and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

[For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.](#)

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

<https://ecos.fws.gov/ipac/location/BLOQOVRT5JEFFJYI7EWOCETVYI/resources#migratory-birds>

8/10

This location overlaps the following wetlands:

The area of this project is too large for IPaC to load all NWI wetlands in the area. The list below [may be incomplete. Please contact the local U.S. Fish and Wildlife Service office or visit the NWI map for a full list.](#)

FRESHWATER EMERGENT WETLAND

[PEM1A](#)
[PEM1C](#)
[PEM1Ch](#)
[PEM1Fh](#)
[PEM1Ah](#)
[PEM1Cx](#)
[PEM1Ax](#)
[PEM1Ad](#)

FRESHWATER POND

[PABFh](#)
[PUSA](#)
[PUBFx](#)
[PUSC](#)
[PUSCh](#)
[PABF](#)
[PUSAh](#)

LAKE

[L2ABFh](#)
[L2USAh](#)
[L2USCh](#)

RIVERINE

[R4SBC](#)

A full description for each wetland code can be found at the [National Wetlands Inventory website](#) Data

limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

<https://ecos.fws.gov/ipac/location/BLOQOVRT5JEFFJYI7EWOCETVYI/resources#migratory-birds>

9/10

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tubercid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

NOT FOR CONSULTATION

<https://ecos.fws.gov/ipac/location/BLOQOVRT5JEFFJYI7EWOCETVYI/resources#migratory-birds>

10/10

North Dakota Field Office

Mountain-Prairie Region

SPECIES OF HABITAT FRAGMENTATION CONCERN

[Baird's Sparrow](#) (pdf) (93kb)

[Bobolink](#) (pdf) (52 kb)

[Chestnut-collard Longspur](#) (pdf) (98 kb)

[Grasshopper Sparrow](#) (pdf) (48 kb)

[Greater Prairie Chicken](#) (pdf) (64 kb)

[Greater Sage Grouse](#) (pdf) (48 kb)

[Harrier](#) (pdf) (73 kb)

[Sedge Wren](#) (pdf) (74 kb)

[Sharp-tailed Grouse](#) (pdf) (99 kb)

[Sprague's Pipit](#) (pdf) (105 kb)

[Upland Sandpiper](#) (pdf) (94kb)

Last updated: February 19, 2013

http://www.fws.gov/northdakotafldoffice/species_of_habitat_fragmentation.htm

1/1