REVISED BIRD AND BAT CONSERVATION STRATEGY

BADGER WIND PROJECT
LOGAN AND MCINTOSH COUNTIES, NORTH DAKOTA

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Proposed Exhibit 28 - Updated Bird and Bat Conservation Strategy
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Acronyms and Abbreviations

2019 Study Area	the 121,695-acre area in which Badger Wind studies were conducted
ADLS	Aircraft Detection Lighting System
AKN	Avian Knowledge Network
AWP	Aransas/Wood Buffalo Population (whooping cranes)
APLIC	Avian Power-Line Interaction Committee
AWWI	American Wind Wildlife Institute
Badger Wind	Badger Wind, LLC
BBCS	Bird and Bat Conservation Strategy
BCC	Birds of Conservation Concern
BCR	Bird Conservation Region
BGEPA	Bald and Golden Eagle Protection Act
CFR	Code of Federal Regulations
CREP	Conservation Reserve Enhancement Program
CRP	Conservation Reserve Program
DST	Local Siting Decision Support Tool
ECPG	Eagle Conservation Plan Guidance
ESA	Endangered Species Act
EVT	Existing Vegetation Type
FAA	Federal Aviation Administration
GenEst	Generalized Mortality Estimator
IBA	Important Bird Area
IPaC	Information for Planning and Consultation
Kaleidoscope	Kaleidoscope Pro 4.2.0
km	kilometer(s)
kV	kilovolt

LF	LANDFIRE
m	meter
MBTA	Migratory Bird Treaty Act
MET tower	meteorological evaluation tower
MW	megawatt
NDGF	North Dakota Game and Fish
NHD	National Hydrography Dataset
NLEB	northern long-eared bat
NWI	National Wetland Inventory
O&M	Operations and Maintenance
PAD-US	Protected Areas Database of the U.S.
PCMM	post-construction mortality monitoring
PLOTS	Private Lands Open to Sportsmen
Project	Badger Wind Project
Project Area	the 31,514-acre area of the Badger Wind Project
RSZ	rotor-swept zone
SCP	species of conservation priority
SWAP	State Wildlife Action Plan
SPCC	Spill Prevention, Control, and Countermeasure
TES	threatened and endangered species
USC	U.S. Code
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WEG	Wind Energy Guidelines
WEST	Western Ecosystems Technology, Inc.
WMA	Wildlife Management Area

WNS	white-nose syndrome
WPA	Waterfowl Production Area
WTG	wind turbine generator

1. INTRODUCTION

This Bird and Bat Conservation Strategy (BBCS) was prepared for the Badger Wind Project (Project) in Logan and McIntosh Counties, North Dakota. The proposed Project is a 256.1-megawatt (MW) wind energy project that will be developed by Badger Wind, LLC (Badger Wind). The project layout comprises 79 potential wind turbine generator (WTG) locations, including 74 primary and 5 alternate locations. The Project Area is located in Red Lake Township and three unorganized townships (T133N R70W, T133N R71W, and T133N R72W) in Logan County, North Dakota, and four unorganized townships (T132N R70W, T132N R71W, T132N R72W, and T131N R72W) in McIntosh County, North Dakota (**Figure 1, Site Location**).

An approximately 0.75-mile-long transmission line will extend east from the central portion of the Project Area (approximately 2.0 miles west-northwest of Wishek, McIntosh County, North Dakota) to the Wishek Junction 230-kilovolt (kV) substation approximately 1.5 miles west of Wishek, McIntosh County, North Dakota (**Figure 1, Site Location**). The proposed route is located entirely within the Badger Wind Project Area (Project Area) and is located in T133N R71W in Logan County, North Dakota and T132N R71W in McIntosh County, North Dakota (**Figure 1, Site Location**).

Badger Wind voluntarily developed this BBCS as part of ongoing efforts to avoid and minimize potential project impacts to avian and bat species. This BBCS covers the development, construction, and operations of the Project.

1.1. Goals and Objectives

The U.S. Fish and Wildlife Service (USFWS) Land-Based Wind Energy Guidelines (WEG) (USFWS 2012) outline a voluntary, structured, tier-based framework that is designed to iteratively evaluate avian and bat concerns at all stages of wind energy development. The USFWS recommends that a wind energy developer "prepare a Bird and Bat Conservation Strategy in stages, over time, as analysis and studies are undertaken for each tier." As such, this conservation strategy should be viewed as a living document.

In accordance with the WEG, this BBCS documents activities that Badger Wind has completed as part of each tier of the WEG to address potential risks to avian and bat populations and species of concern. Specifically, this BBCS documents steps taken to adhere to federal and state bird and bat conservation and protection laws and regulations; identifies, quantifies, and analyzes potential impacts to birds and bats that may use resources within the Project Area; and outlines measures that will be implemented to reduce potential wildlife impacts resulting from project activities. Sensitive habitat review, species of concern review, and conservation strategies outlined herein were informed by site assessment and by site characterization reviews, desktop and field studies conducted by consultants, and wildlife agency correspondence. Avian surveys and bat acoustic surveys were conducted on an approximately 121,695-acre study area (referenced herein as the "2019 Study Area") that contains much of the current Project Area. This BBCS is a living document that will remain in effect, and will be updated, as necessary, through the life of the Project.

1.2. Corporate Policy on Wildlife Conservation

Badger Wind has a strong commitment to protecting biodiversity, and its parent company, Ørsted, has set a goal of delivering a net-positive biodiversity impact from all new renewable energy projects it commissions beginning in 2030 at the latest. When developing new projects, Ørsted will systematically implement initiatives that ensure an overall net-positive contribution to natural ecosystems, habitats, and species in and around the company's new renewable energy projects. The core philosophy of the policy is prevention before mitigation wherever possible.

1.3. Regulatory Framework

This BBCS documents efforts by Badger Wind to comply with federal and state regulations including the Endangered Species Act (ESA), Bald and Golden Eagle Protection Act (BGEPA) and the Migratory Bird Treaty Act (MBTA). North Dakota does not maintain a state-level list of threatened and endangered species. Therefore, only species listed under the ESA are considered threatened or endangered in the state. However, the North Dakota Game and Fish Department (NDGF) does identify Species of Conservation Priority (SCP) within its State Wildlife Action Plan (SWAP); 47 bird species and 7 bat species have been identified. The USFWS specifically recommends that a wind energy developer "may prepare a Bird and Bat Conservation Strategy in stages, over time, as analysis and studies are undertaken for each tier" (USFWS 2012). Measures are incorporated into siting, design, and operation of the project in order to reduce or eliminate the potential for impacts to federal and state endangered and threatened species and bird and bat species of concern. These measures are described in this BBCS.

1.3.1. Endangered Species Act

The ESA of 1973 authorizes the USFWS (while working cooperatively with states) to identify, list, and monitor qualifying species as endangered and threatened. The process by which potential candidates are listed is determined by the vulnerability of the species population and considers a number of different factors. Species that are designated as either endangered or threatened are afforded protection from possession, sale, transport, and take. The definition of take is "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct" including "incidental take" or significant habitat modification. Take, however, can be permitted by the USFWS through the ESA Section 7 consultation process among federal agencies or by individual permit under ESA Section 10(a)(1)(B) and an accompanying habitat conservation plan.

The USFWS is responsible for the protection and management of ESA-listed species, as protected under federal law. The USFWS Information for Planning and Consultation (IPaC) is an online resource that allows users to quickly search a comprehensive geo-referenced database to help assess the potential for ESA-listed endangered and threatened species (TES) to occur in an area (USFWS 2021a). The USFWS also has created a list of bird species that have the potential to become listed in the future without additional conservation actions (USFWS 2021b). Information on these species, referred to as Birds of Conservation Concern (BCC), is also included in IPaC reports. BCC species are not afforded any additional regulatory protection under the ESA.

1.3.2. Bald and Golden Eagle Protection Act

Under authority of BGEPA, 16 U.S. Code (USC) 668–668d, bald eagles (*Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos*) are afforded legal protections in addition to the MBTA. BGEPA prohibits the take, sale, purchase, barter, offer of sale, 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. In 16 USC 668c, the BGEPA also expands the common law scope of "take" to include "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb," and includes criminal and civil penalties for violating the statute (see 16 USC 668). The USFWS further defined the term "disturb" as agitating or bothering an eagle to a degree that causes, or is likely to cause, injury, a decrease in productivity, or nest abandonment by substantially interfering with normal breeding, feeding, or sheltering behavior.

If eagles are identified as a potential risk at a project site, wind energy developers are encouraged by the USFWS to follow the Eagle Conservation Plan Guidance (ECPG) (USFWS 2013). The ECPG describes recommended actions to develop wind energy projects while protecting eagles, including guidance for applicants seeking to obtain the above permits.

1.3.3. Migratory Bird Treaty Act

The MBTA integrates and implements four international treaties that provide for the protection of migratory birds against hunters and poachers. The MBTA prohibits the taking, killing, possession, transportation, import, and export of migratory birds, their eggs, parts, and nests, except when specifically authorized by the Department of the Interior" (16 USC § 703; 1918). 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; 1973). The USFWS maintains a list of all species protected by the MBTA at 50 CFR § 10.13 (1973). This list includes over one thousand species of migratory birds, including eagles and other raptors, waterfowl, shorebirds, seabirds, wading birds, and passerines. There currently is no permit available from the USFWS that authorizes take of migratory birds protected under the MBTA. However, the USFWS is currently evaluating proposed rulemaking that would include regulations that would authorize incidental take of migratory birds under certain prescribed conditions.

1.3.4. North Dakota Century Code Chapter 20.1-04

In accordance with North Dakota Century Code Chapter 20.1-04, no person, without a permit, "shall kill, catch, take, ship, cause to be shipped, purchase, offer, or expose for sale, sell, or have in that person's possession or under that person's control, any harmless wild bird, or any part thereof". Harmless wild birds are defined as all wild birds except blackbirds, magpies, English sparrows, and starlings. Similarly, "no person may hunt, take, kill, posses, convey, ship, or cause to be shipped, by common or private carrier, sell, or barter any game bird or any part thereof…except as provided by this title". Game birds include all varieties of geese, brant, swans, ducks, plovers, snipes, woodcocks, grouse, sagehens, pheasants, Hungarian partridges, quails, partridges, cranes, rails, coots, wild turkeys, mourning doves, and crows.

1.3.5. North Dakota's State Wildlife Action Plan

The 2015 North Dakota SWAP is the principal document for safeguarding rare and declining species of fish and wildlife within the state (Dyke et al. 2015). The SWAP places an emphasis on the protection of diverse native habitats to maximize the preservation of native wildlife diversity. In addition, the SWAP denoted 115 species that are assigned to one of three conservation priority levels based on their risk level and the species-specific sources and availability of conservation funding. The SWAP defines SCP conservation levels as follows (Dyke et al. 2015):

> Level I species are those having a high level of conservation priority because of declining status in North Dakota or across their range; or have a high rate of occurrence in North Dakota, constituting the core of the species breeding range, but may be at risk range wide.
>
> Level II species are those having a moderate level of conservation priority; or a high level of conservation priority but a substantial level of non-state wildlife grant funding is available to them.
>
> Level III species are those having a moderate level of conservation priority but are believed to be peripheral or non-breeding in North Dakota.

The statewide list includes 47 birds, 2 amphibians, 9 reptiles, 21 mammals, 22 fish, 10 freshwater mussels, and 4 insects (Dyke et al. 2015).

It is understood that the SWAP has no regulatory authority over industrial development on private land. Conservation actions in the SWAP for such development include goals to foster/develop entities to administer conservation easements and to urge ecologically responsible ordinances and suitable reclamation standards. Should project development impact SCP on private land, the SWAP will be consulted for possible mitigation actions to reduce or minimize those impacts.

1.3.6. Agency Coordination

Badger Wind has coordinated with the USFWS and NDGF during development of the Project. Periodic coordination with the wildlife agencies has continued, particularly through the process of assessing and analyzing bird and bat data collected, throughout the development of the Project. Coordination has included emails, conference calls, and meetings to discuss study plans and preliminary results from studies, as well as to request data from the agencies. Badger Wind has also requested that USFWS and NDGF provide recommendations to minimize potential impacts to species of concern for consideration by Badger Wind. **Table 1** includes a timeline of communications and coordination with federal and state wildlife agencies. Badger Wind intends to continue to coordinate with USFWS and NDGF during the development and implementation of this BBCS.

Table 1. Summary of Agency Correspondence

Date	Parties Involved	Correspondence Type	Correspondence Content
January 10, 2020	**USFWS**: Michael Erickson **Atwell**: Chris McCreedy	Email	Request for grassland and wetlands easements data.
January 14, 2020	**USFWS**: Michael Erickson **Atwell**: Chris McCreedy	Email	Response to request for grassland and wetlands easements data.
January 21, 2020	**USFWS**: Michael Erickson **Atwell**: Chris McCreedy	Email	Answers to follow-up questions, including how to get shapefile and KMZ spatial data of easements.
January 28, 2020	**USFWS**: Drew Becker, Heidi Riddle **NDGF**: Steve Dyke, Elisha Mueller, Sandra Johnson, Kevin Kading, Renae Schultz **Ørsted**: Jon Baker **Atwell**: Emily Cooper, Chris McCreedy	Meeting	Agency project introduction meeting—included summary of studies completed to date.
February 12–18, 2020	**NDGF**: Sandra Johnson **Atwell**: Chris McCreedy	Email	Request to discuss available data layers NDGF has developed to inform analysis for the Project and to establish a data-sharing agreement. S. Johnson requested shapefiles of the latest project boundary. C. McCreedy sent the shapefiles and set up a follow-up meeting to discuss the shapefiles.
February 25–27, 2020	**NDGF**: Sandra Johnson **Atwell**: Chris McCreedy	Email	S. Johnson provided the data-sharing agreement, along with data for sharp-tailed grouse, native grassland, whooping crane, and bald eagle nests, as well as manuscripts to inform impact assessment and recommendations for offsets. C. McCreedy responded confirming the one bald eagle nest in the Project Area was the one Atwell identified. C. McCreedy also provided coordinates for that nest, as well as four ferruginous hawk nest locations.

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Date	Parties Involved	Correspondence Type	Correspondence Content
February 25–26, 2020	**USFWS**: Heidi Riddle, **NDGF**: Elisha Mueller, Kevin Kading, Renae Schultz **Ørsted**: Jon Baker **Atwell**: Emily Cooper, Chris McCreedy	Email	C. McCreedy requested final comments on the draft minutes from the January 28 meeting. E. Mueller recommended that developers perform lek surveys and requested that the meeting minutes reflect that recommendation.
March 11–20, 2020	**NDGF**: Elisha Mueller, Sandra Johnson **Atwell**: Chris McCreedy	Email	C. McCreedy inquired about the availability of the grassland habitat tool. E. Mueller confirmed NDGF had just received that data and will follow up when they determine how they may be able to share it. In another follow-up, E. Mueller indicated there was a delay due to staff working remotely, but Sandra would be in touch when the data can be shared.
March 12, 2020	**NDGF**: Sandra Johnson **Atwell**: Chris McCreedy	Email	Follow-up response to agency meeting requesting to create a data-sharing agreement with the agency to obtain North Dakota grassland habitat decision support tool.
April 3, 2020	**USFWS**: Heidi Riddle **NDGF**: Elisha Mueller **Atwell**: Emily Cooper, Chris McCreedy	Meeting	Agency meeting regarding aerial survey safety precautions. Given (a) health concerns regarding the COVID-19 virus and (b) safety concerns stemming from recent incidents during nesting raptor surveys at wind facilities in nearby states. Atwell inquired whether a hybrid aerial survey and ground-based survey approach could meet the goals and expectations for year 2 pre-construction raptor nest and lek surveys. USFWS and NDGF indicated their acceptance of a hybrid survey approach, with a scaled-back aerial survey focusing on areas within the 2019 Study Area that lack roads and cannot be easily accessed during ground-based survey.
April 22, 2020	**USFWS**: Heidi Riddle **Atwell**: Chris McCreedy	Phone Call	Discussion of whooping crane sightings near Wishek.

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Date	Parties Involved	Correspondence Type	Correspondence Content
May 15, 2020	**USFWS**: Heidi Riddle **NDGF**: Elisha Mueller **Atwell**: Aaron McAlexander	Email	Provided draft bat habitat assessment and year 1 acoustic monitoring results for review and comment. Recommendation is that summer potential for northern long-eared bats may be limited within the Project Area. Requested input on whether the Project should be concerned with impacts to bats, particularly northern long-eared bats, and whether the agencies feel summer presence/probable absence (p/a) surveys (in accordance with the 2020 Range-Wide Indiana Bat Survey Guidelines) are warranted.
May 22, 2020	**USFWS**: Heidi Riddle **Atwell**: Aaron McAlexander	Email	Follow-up to May 15, 2021, email.
May 27, 2020	**USFWS**: Heidi Riddle, Michael Erickson **Ørsted**: Jon Baker **Atwell**: Emily Cooper, Tara Corbett	Meeting	Discussion of USFWS wetland easements in Badger Project Area.
October 28, 2020	**USFWS**: Heidi Riddle **NDGF**: Elisha Mueller **Atwell**: Chris McCreedy	Email	Submitted initial Grasslands Report to agency. Request to schedule meeting to provide update on Project and discuss findings for avian studies and grassland assessment.
October 28, 2020	**USFWS**: Heidi Riddle **NDGF**: Elisha Mueller, Sandra Johnson, Steve Dyke, Greg Link **Atwell**: Chris McCreedy	Email	Response to receipt of report and how the contents relate to regulatory guidance and prior January 28, 2020 meeting.

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Date	Parties Involved	Correspondence Type	Correspondence Content
October 30, 2020	**USFWS**: Heidi Riddle **NDGF**: Elisha Mueller, Sandra Johnson, Steve Dyke, Greg Link **Atwell**: Chris McCreedy, Maureen O'Shea-Stone	Email (2)	1) NDGF response to grassland assessment, noting specific definition of unbroken grasslands are grasslands that have not been plowed. Presence of haying, grazing, or undesirable species do not indicate disturbance. NDGF noted they… *"are discouraging efforts to try to classify "high quality" or "native" grassland as not worthwhile, and are focusing instead on the unbroken classification as the conservation priority."* 2) NDGF provided contact information for Chuck Loesch, USFWS HAPET and recommendation he would be best contact for moving forward with a wetland/waterfowl impact analysis using the Local Siting Decision Support Tool (DST).
October 30, 2020	**NDGF**: Elisha Mueller **Atwell**: Maureen O'Shea-Stone, Chris McCreedy	Meeting	Phone meeting to discuss E. Mueller's comments on the draft grassland report. E. Mueller provided contact information (Chuck Loesch, USFWS HAPET) for moving forward with wetland/waterfowl impact analysis; C. Loesch should be able to provide the Local Siting DST.
November 2–6, 2020	**USFWS**: Heidi Riddle **NDGF**: Elisha Mueller, Steve Dyke, Greg Link, Sandra Johnson **Atwell**: Tara Corbett, Chris McCreedy, Maureen O'Shea-Stone, Emily Cooper,	Email	E. Mueller responded to M. O'Shea-Stone's email with some edits to her list of understanding points/action items and then asked S. Johnson to add anything she missed. S. Johnson responded and said that she will send the base raster layer for native prairie (unbroken grassland) and attached an email she sent C. McCreedy in February 2020. Revisions to notes re: understanding points and action items were finalized based on E. Mueller's requests.
November 6, 2020	**USFWS**: Heidi Riddle **NDGF**: Elisha Mueller, Sandra Johnson, Steve Dyke, Greg Link **Atwell**: Chris McCreedy, Tara Corbett, Maureen O'Shea-Stone	Email	Response to November 2, 2020, email from E. Mueller. Email outlines list of further understanding points from conversations and action items to complete to address issue.

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Date	Parties Involved	Correspondence Type	Correspondence Content
December 8, 2020	**USFWS**: Heidi Riddle, Drew Becker **NDGF**: Elisha Mueller, Sandra Johnson, Steve Dyke, Greg Link **Ørsted**: Sam Lodge, Jon Baker, Nick Lindsey **Atwell**: Chris McCreedy, Tara Corbett, Maureen O'Shea-Stone	Meeting	Meeting to provide a project update and grassland discussion.
January 15, 2021	**NDGF**: Elisha Mueller **Atwell**: Maureen O'Shea-Stone	Phone Call	Discussion of native grassland impacts and voluntary offsets.
January 19, 2021	**NDGF**: Elisha Mueller **Atwell**: Maureen O'Shea-Stone	Email	Draft guidance regarding wetland and grassland mitigation.
February 2, 2021	**USFWS**: Heidi Riddle **Atwell**: Chris McCreedy	Email	USFWS response to Project, including recommended guidance and required compliance for development of Badger Wind Project.
May 20–25, 2021	**USFWS**: Heidi Riddle **NDGF**: Sandra Johnson, Elisha Mueller **Atwell**: Chris McCreedy	Email	Guidance regarding raptor nest buffers and removal.
August 9, 2021	**USFWS**: Heidi Riddle **NDGF**: Elisha Mueller **Ørsted**: Charlie Smith, Francesca Martella, Sarah Aftergood **Atwell**: Maureen O'Shea-Stone, Tara Corbett, Chris McCreedy	Meeting	Project update meeting.

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Date	Parties Involved	Correspondence Type	Correspondence Content
September 1, 2021	**USFWS**: Heidi Riddle **NDGF**: Elisha Mueller **Ørsted**: Francesca Martella, Charlie Smith, June Marie Gray, Sarah Aftergood **Atwell**: Christopher Rutledge, Maureen O'Shea-Stone	Phone Call	Informal project update meeting.
September 20, 2021	**USFWS**: Heidi Riddle **NDGF**: Elisha Mueller **Ørsted**: Francesca Martella, Claire Dittrich, Sarah Aftergood **WEST:** Kurt Smith, Martin Piorkowski **Atwell**: Christopher Rutledge, Maureen O'Shea-Stone, Tanya Johnson	Meeting	Meeting to discuss grassland assessment, avian species impact analysis, and sharp-tailed grouse leks.
December 8, 2021	**USFWS**: Heidi Riddle **NDGF**: Elisha Mueller **Ørsted**: Francesca Martella, June Marie Grey, Lucas Buseck, Sarah Aftergood **WEST:** Kurt Smith, Martin Piorkowski **Atwell**: Christopher Rutledge, Tanya Johnson, Caitlin Cyrus, Alan Plumeau **Frederickson:** Mollie Smith, Bridget Duffus	Meeting	Project update meeting. Ørsted presented the preliminary project layouts, working through how they have been sited to address USFWS and NDGF concerns. Western Ecosystems Technology, Inc. (WEST) presented results of year 2 grassland habitat surveys and sharp-tailed grouse lek surveys. The remainder of the meeting focused on discussions relating to how to address impacts and potential mitigation measures. The USFWS and NDGF pointed Ørsted toward the Shaffer and Loesch models for calculating offsets to grassland birds and waterfowl.

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2. PROJECT AND SITE DESCRIPTION

The current Project Area (as of February 10, 2022) spans approximately 31,514 acres within Red Lake Township and three unorganized townships (T133N R70W, T133N R71W, and T133N R72W) in Logan County, North Dakota, and four unorganized townships (T132N R70W, T132N R71W, T132N R72W, and T131N R72W) in McIntosh County, North Dakota (**Figure 1, Site Location**). Project components include 74 primary and 5 alternate WTG locations.

An approximately 0.75-mile-long transmission line will extend south from the central portion of the Project Area (approximately 2.0 miles west-northwest of Wishek, McIntosh County, North Dakota) to the Wishek Junction 230-kV substation approximately 1.5 miles west of Wishek, McIntosh County, North Dakota. The proposed route travels through T133N R71W in Logan County, North Dakota, and T132N R71W in McIntosh County, North Dakota (**Figure 1, Site Location**).

Project infrastructure would include approximately 30.3 miles of permanent access roads, an underground electric collection line system totaling approximately 75.0 miles, temporary laydown/staging areas totaling approximately 90.2 acres, approximately 2.1 acres for the proposed electric substation. In addition, a haul route with multiple temporary road intersection improvements and temporary disturbance from construction crane paths will be required for construction of the Project. WTGs and permanent infrastructure for the project layout have been sited to reduce the potential for impacts to sensitive wildlife and habitat to the maximum extent feasible. Total permanent impacts from all project infrastructure will comprise approximately 92.3 acres (approximately 0.3 percent of the Project Area), and temporary construction impacts will account for approximately 1,361.4 acres (approximately 4.3 percent of the Project Area).

The Project Area is predominately within the Missouri Coteau Slope Level IV Ecoregion, with portions of the eastern boundary extending upward into the Missouri Coteau Level IV Ecoregion (Bryce et al. 1996). The Level IV Ecoregions are located within the Northwestern Glaciated Plains Level III Ecoregion. Soils in the ecoregion consist of mollisols and some entisols. The region was once dominated by prairie grasses (spear, grama, and wheat grasses) and shrubs. Forested area consisting of scrubby aspen, box elder, cottonwood, and willow is limited to shaded slopes in the valleys and river terraces (EPA 2002). The Missouri Coteau is an escarpment of glacial till containing numerous hills, small lakes, and poorly drained depressions that are referred to as “potholes” that receive most of their water from snow melt and precipitation (Bryce et al. 1996). The Missouri Coteau Slope descends westward toward the Missouri River from the Coteau and is characterized by a thinner glacial till layer and integrated drainages that flow toward the Missouri River (Clayton 1962).

Existing vegetation within the Project Area is summarized using LANDFIRE’s (LF) Existing Vegetation Type (EVT) dataset (USGS 2020a). According to the LF dataset, cropland represents the greatest portion, approximately 39.3 percent, of land cover within the Project Area. In addition, pasture/hayland comprises approximately 6.3 percent of cover within the Project Area. Mixed-grass prairie, planted grassland, and riparian herbaceous cover types encompass approximately 29.2 percent, 14.7 percent, and 6.7 percent of the Project Area, respectively (**Figure 2, Land Cover**

Types within the Project Area). Developed roadways comprise approximately 2.5 of land cover within the Project Area. The remaining approximately 1.3 percent of land cover within the Project Area includes planted woodland (0.4 percent), planted herbaceous (0.3 percent), prairie pothole (0.3 percent), open water (0.1 percent), and wooded draw/ravine woodland (0.1 percent) cover types. Shrubland, riparian woodland, badlands, herbaceous wetland, and tallgrass prairie cover types each represent less than 0.1 percent of cover within the Project Area (USGS 2020a). According to the U.S. Geological Survey (USGS) Protected Areas Database of the U.S. (PAD-US), protected lands within the Project Area consist several USFWS grassland and wetland easements, as well as one state-owned land parcel. Additional USFWS easements and state-owned lands (including state wildlife management areas) are located within one mile of the Project Area (**Figure 3, Public Lands**) (USGS 2020b).

Analysis of aerial imagery, the USGS National Hydrography Dataset (NHD), and USFWS National Wetland Inventory (NWI) databases confirms that scattered woodlots, tree lines, riparian corridors, and mapped surface water features (i.e., streams) and/or wetlands exist within the Project Area. According to the USGS NHD and USFWS NWI, the Project Area contains approximately 127.0 miles of NHD watercourses, 219.4 acres (approximately 0.7 percent of the Project Area) of NHD waterbodies (USGS 2020c), and approximately 1,372.8 acres (approximately 4.4 percent of the Project Area) of NWI wetlands (USFWS 2020a) (**Figure 4, Water Resources**).

A review of NWI data indicates that there are approximately 1,147.9 acres (approximately 3.6 percent of the total Project Area) of emergent wetlands and freshwater ponds within the Project Area. Additionally, forested/scrub-shrub wetlands account for approximately 0.8 acres (less than 0.1 percent of the Project Area), and riverine features account for approximately 224.1 acres (approximately 0.7 percent) of the Project Area (USFWS 2021c). NWI wetlands are scattered throughout the Project Area and appear to be concentrated along stream corridors. According to the LF dataset, the prairie pothole cover type encompasses approximately 100.8 acres (0.3 percent) of the Project Area (USGS 2020a). Prairie potholes are depressional freshwater wetlands found mostly in the upper Midwest. The prairie pothole region is a complex system of wetlands and surrounding grasslands that serves as crucial habitat for waterfowl, grassland species, and migratory birds. However, more than half of the region has been converted to cropland. The northeastern portion of the Project Area appears to have the relatively highest concentration of prairie pothole features with associated emergent wetlands.

Filter strips (also referred to as buffer strips) are common within agricultural areas in this region. Filter strips are vegetated areas similar to pastures and grasslands. These areas serve as buffers to protect surface water from agricultural runoff and provide potential habitat for wildlife.

The Project Area is located in the Prairie Pothole Bird Conservation Region (BCR) (NABCI 2021). BCRs are ecologically distinct regions in North America with similar bird communities, habitats, and resource management issues. The prairie potholes region stretches from the prairie provinces in Canada into northern Montana, the Dakotas, western Minnesota, and northern Iowa and is an area characterized by mixed-grass and tallgrass prairie marked by thousands of shallow wetlands (i.e., potholes). This region is important to North American waterfowl production, despite years of extensive wetland drainage and agricultural conversion. Dabbling and diving duck densities, in

addition to upland nesting shorebird species, can be notably high in this region of North Dakota. Important habitat for dozens of other nesting and migrant conservation priority species is present throughout the region (Fitzgerald et al. 1999). Based on USFWS waterfowl nesting density data provided to Atwell in 2017 by the NDGF, the Project Area is located primarily within a region that supports approximately 40 pairs of waterfowl or less per square mile. This is relatively low compared to much of the region to the north and east of the Project Area, which supports more than 100 pairs of waterfowl per square mile (NABCI 2021). The overall landscape within the Project Area is highly fragmented, consisting of approximately 45.6 percent cultivated crops and hay/pasture (USGS 2020a), consistent with the described modern use of this BCR. According to USFWS, 34 species are considered BCC for the U.S. portion of the Prairie Pothole BCR, eight of which do not breed within the BCR (USFWS 2021b).

3. DESCRIPTION OF WEG TIERED APPROACH

In March 2012, the USFWS released the final WEG, which uses a tiered approach as an interactive decision-making process. This tier process collects information in increasing detail to identify avian and bat species of concern to determine how a proposed development may impact such species, both directly and indirectly (USFWS 2012). This section provides an overview of the tiered approach outlined in the WEG.

Tier 1 of the WEG is a preliminary site evaluation on a broad geographical scale that is undertaken to understand which species of concern may be present, what critical habitat may exist, and whether areas of wildlife concentration are present. Tier 2 typically consists of the same review but on a site-level scale. For Tier 2, the proposed development footprint within site boundaries is evaluated relative to the potential for species of concern to occupy the site, and potential impacts to those species are assessed. The specific objectives of the Tier 1 and Tier 2 evaluations as they pertain to the Project include the following:

- Tier 1—Preliminary Site Evaluation
    - Identify species of concern and/or their habitats in the region surrounding the proposed project.
    - Identify critical habitats, areas of conservation concern, and state/local habitat areas that could harbor or concentrate species of known conservation concern in the region surrounding the proposed project.
    - Review known areas of wildlife concentration, large habitat patches, and known movement corridors in the region surrounding the proposed project.
- Tier 2—Site Characterization
    - Conduct the same analysis as Tier 1, but on a more refined site-specific scale.
    - Review which species of birds and bats are known to be at risk from wind energy development and operation and are likely to use or move through the site.
    - Assess potential impacts to species of concern.

During Tier 3, field studies are conducted to determine the use of the site by avian and bat species, including species of concern. Information gathered from Tier 3 studies is used to evaluate potential risks to birds and bats and to inform the project design to avoid or minimize significant impacts to species and habitats. The specific objectives of the Tier 3 evaluations are summarized as follows:

- Tier 3—Wildlife Field Studies and Impact Prediction
    - Evaluate potential risks to bird and bat species.

- Design and conduct wildlife surveys/studies to determine use of the site by species of concern.
- Use study results to inform project design to avoid and/or minimize significant adverse impacts, identify potential mitigation measures, and determine level of effort needed for post-construction studies.

For the Tier 4 evaluation, potential impacts are evaluated through post-construction mortality studies. If additional information is needed, other post-construction studies or a more formalized research program may be deemed necessary, and these studies may be implemented as part of a Tier 5 process. The specific objectives of the Tier 4 and 5 evaluations include the following:

- Tier 4—Post-construction Studies to Estimate Impacts
  - Conduct fatality studies to assess whether predictions of fatality risk and direct and indirect impacts were correct.
  - Compare fatality rates within the Project Area, and among other nearby projects, relative to bird and bat use of the Project Area.
  - Assess direct and indirect impacts of habitat loss, degradation, and fragmentation.
- Tier 5—Other Post-Construction Studies and Research
  - Implement additional post-construction studies or research only if additional information is needed.

Tier 4 studies will be undertaken after the completion of project construction and in accordance with the post-construction monitoring program. The results of these studies may be used to inform updates to this BBCS, as appropriate.

At the conclusion of each tiered analysis, a series of decision points are evaluated prior to moving to the next tier. Decisions are based on the information obtained from answering a series of questions in each tier. Part of the decision process for each tier is an evaluation of risk. Estimates of risk will typically be qualitative but may be based on quantitative information.

The BBCS summarizes the results of/answers to questions posed in each tier of the WEG. The BBCS document serves as the primary synthesis of information gathered during the tiered siting process, details each specific question for each WEG tier, provides a response to that question, and ultimately addresses how this information was used to avoid and reduce potential impacts to birds and bats.

4. TIERS 1 AND 2—PRELIMINARY SITE EVALUATION AND SITE CHARACTERIZATION

A preliminary site evaluation was conducted to review habitat characteristics and historic bird and bat occurrence data at a regional level. As part of this evaluation, a Tier 1 analysis was completed to assess the likelihood of federal and state species to occur within the general vicinity of the Project Area (the 2019 Study Area). For the purposes of this document, the 2019 Study Area consists of an initial (April 2019) project boundary that was considered for development of the Badger Wind Project and described in the Critical Issues Analysis for the Badger Wind Project (Atwell 2019). An IPaC analysis was performed for the 2019 Study Area and a 1-mile buffer in July 2019 (**Appendix A**) (USFWS 2019a). **Figure 5, Site Evaluation** shows the 2019 Study Area boundary drawn at a scale that includes a 10-mile buffer around the 2019 Study Area to provide regional context regarding potential resources relevant to birds and bats in the surrounding area.

Following the preliminary site evaluation, Tier 2 studies were conducted for the Project, including a desktop bat habitat characterization (with site visit), desktop whooping crane (*Grus americana*) stopover habitat assessment, and a desktop grassland assessment (with site visit). The bat habitat assessment was conducted for the 2019 Study Area, but the whooping crane stopover habitat assessment was conducted for a December 2020 Project Area boundary that is similar to (though slightly larger than) the current Project Area. The desktop grassland assessment was conducted for a preliminary site layout within the current Project Area boundary. The current Project Area boundary is a significant reduction in size from the 2019 Study Area; however, this smaller boundary is almost entirely within the larger 2019 Study Area boundary. Approximately 96.7 percent of the current Project Area boundary is within the 2019 Study Area boundary. Therefore, results from the studies discussed hereafter are representative of the current Project Area.

Publicly available information that was reviewed as part of Tier 1 and Tier 2 analyses included, but was not limited to:

- USGS 7.5-minute quadrangle maps
- USGS PAD-US
- USGS NHD
- USGS National Land Cover Database
- USFWS NWI data
- USFWS Critical Habitat Portal
- USFWS IPaC tool
- USFWS and NDGF websites (including species profiles)
- North Dakota SWAP

Data that were utilized for the preliminary site evaluation were compiled into a site evaluation map (**Figure 5, Site Evaluation**) that was subsequently used to inform site characterization (Tier 2), baseline avian and bat studies (Tier 3), project planning and site layout and design, and project infrastructure micrositing.

4.1. Question 1 and Response

Are known species of concern present on the proposed site, or is habitat (including designated critical habitat) present for these species?

Tier 1 and 2 analyses indicated that the 2019 Study Area is within the range of 21 species of concern, including four ESA-listed threatened or endangered species and species listed as SCP per North Dakota's SWAP. ESA-listed species identified as having the potential to occur within the 2019 Study Area include northern long-eared bat (*Myotis septentrionalis*), whooping crane, piping plover (*Charadrius melodus*), and red knot (*Calidris canutus rufa*) (**Table 2**). Bald and golden eagles, which are protected under BGEPA, were also identified during Tier 1 and 2 analyses as being likely to occur within the 2019 Study Area (**Table 2**). Threatened and endangered species listed under the ESA and eagle species listed under the BGEPA are discussed below.

Table 2. Bird and Bat Species of Concern with Potential to Occur in the 2019 Study Area

Common Name (Scientific Name)	Federal Status[a]	State Status[b]	Habitat Requirements[c]	Likelihood of Occurrence[d]
BIRDS				
Whooping Crane (*Grus americana*)	FE	SCP III	Inhabits open habitats such as grasslands, marshes, and agricultural fields. Nest selection varies from natural cavities to fabricated structures.	Moderate
Piping Plover (*Charadrius melodus*)	FT	SCP II	Alkali lakes, freshwater lakes, reservoirs, and rivers.	Unknown
Red Knot (*Calidris canutus rufa*)	FT	SCP III	Natural wetland features such as freshwater lakeshores and alkali lakes for migration stopover habitat.	Unknown
Bald Eagle (*Haliaeetus leucocephalus*)	BGEPA; BCC[e]	SCP II	Inhabits isolated and undisturbed areas near large waterbodies. Nests in forest stands with large trees near open water, wetlands, or rivers.	High
Golden Eagle (*Aquila chrysaetos*)	BGEPA	SCP II	Open habitats with nesting often occurring in association with cliffs.	High
American Bittern (*Botaurus lentiginosus*)	BCC[e]	SCP I	Wetlands with tall emergent vegetation or tall grasslands adjacent to wetlands.	Moderate
Black Tern (*Chlidonias niger*)	BCC	SCP I	A variety of wetland types with relatively shallow water and an even mix of open water and emergent vegetation, preferably surrounded by grassland.	Moderate
Bobolink (*Dolichonyx oryzivorus*)	BCC	SCP II	A variety of open grassland habitats, including native and tame grasslands, hayfields, no-till croplands, wet meadows, etc., with moderate-to-tall dense vegetation.	High
Canvasback (*Aythya valisineria*)	N/A	SCP II	Deep, semipermanent wetlands and lakes with emergent vegetation.	Moderate
Chestnut-collared Longspur (*Calcarius ornatus*)	BCC	SCP I	Shortgrass prairie or mixed-grass prairie that has been grazed or mowed.	High

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Common Name (Scientific Name)	Federal Status[a]	State Status[b]	Habitat Requirements[c]	Likelihood of Occurrence[d]
Ferruginous Hawk (*Buteo regalis*)	N/A	SCP I	Expansive open grasslands and shrublands; often nests in solitary trees or shrubs, though will sometimes nest on the ground.	High
Franklin's Gull (*Leucophaeus pipixcan*)	BCC	SCP I	Large prairie wetlands with a mix of open water and emergent vegetation; will use agricultural fields for foraging.	High
Lesser Scaup (Aythya affinis)	N/A	SCP II	Large wetlands with emergent vegetation and associated upland habitat.	Moderate
Marbled Godwit (*Limosa fedoa*)	BCC	SCP I	Expansive wetland complexes with associated grasslands; will also use uplands and roadside ditches for foraging.	Moderate
Nelson's Sparrow* (*Ammospiza nelsoni*)	BCC[e]	SCP I	Freshwater wetlands or moist areas with dense emergent vegetation or dense grass.	Moderate
Northern Harrier (*Circus hudsonius*)	BCC[f]	SCP II	Large, open grasslands or marshes with tall, dense vegetation; will also use cropland, pastures, shrubby fields, and fallow fields for foraging.	High
Northern Pintail (*Anas acuta*)	N/A	SCP II	Wetland complexes with open water and associated upland prairie; prefers native prairie but will also use Conservation Reserve Program (CRP) lands, hayfields, pastures, and weedy field borders.	Moderate
Sharp-tailed Grouse (*Tympanuchus phasianellus*)	N/A	SCP II	Mixed-grass prairie with scattered shrubs or small trees; leks are generally found on elevated, less vegetated areas compared to the surrounding area.	Moderate
Swainson's Hawk (*Buteo swainsoni*)	BCC[e]	SCP I	A variety of open grasslands with scattered trees and shrubs; will also use cropland and pastures. Nests may be placed in small clumps of isolated trees or shelterbelts, though will sometimes nest on the ground.	High
Willet (*Tringa semipalmata*)	BCC	SCP II	Expansive wetland complexes with associated grasslands; prefers shallow wetlands without dense emergent vegetation.	Moderate

BW Exhibit 28

Common Name (Scientific Name)	Federal Status[a]	State Status[b]	Habitat Requirements[c]	Likelihood of Occurrence[d]
Wilson's Phalarope (*Phalaropus tricolor*)	N/A	SCP I	Open wetlands with associated upland grasslands or wet meadows.	Moderate
BATS				
Northern Long-eared Bat (*Myotis septentrionalis*)	FT	SCP I	Interior forest species; however, will use a variety of woodland habitats. Roost generalist. Roosts under bark, cavities, or crevices of dead and living trees during summer. Colonies can be found in fabricated structures as well.	Low
Big Brown Bat (*Eptesicus fuscus*)	N/A	SCP I	Habitat generalist, including urban and rural habitats, but often associated with trees; will also use fabricated structures for roosting.	High
Little Brown Bat (*Myotis lucifugus*)	N/A	SCP I	Inhabits caves, mines, forests, and agricultural areas. Colonies can be found in fabricated structures as well.	Moderate

[a] Federal status: BCC= Bird of Conservation Concern (USFWS 2008); BGEPA = Bald and Golden Eagle Protection Act; FE = ESA-listed as endangered; FT = ESA-listed as threatened; N/A = No federal and/or state status.
[b] State status indicates North Dakota SWAP (Dyke et al. 2015) SCP Level I, II, or III.
[c] (Dyke et al. 2015).
[d] Likelihood of Occurrence: Low = species range intersects the 2019 Study Area but no or minimal suitable habitat is present; Moderate = species range intersects the 2019 Study Area and suitable habitat is likely present or the species is known to have occurred within the 2019 Study Area or the general vicinity; High = species range intersects the 2019 Study Area and high-quality suitable habitat is present within and/or populations are known to exist within the general vicinity of the 2019 Study Area; Unknown = species range intersects the 2019 Study Area but the extent of suitable habitat within the 2019 Study Area is unknown.
[e] At the time of Tier 1 through 3 studies, this species was considered BCC (USFWS 2008). However, the USFWS has since removed this species from their list of BCC for the Prairie Pothole BCR (USFWS 2021a).
[f] At the time of Tier 1 through 3 studies, this species was not considered BCC (USFWS 2008). However, the USFWS has since added this species to their list of BCC for the Prairie Pothole BCR (USFWS 2021a).

Northern long-eared bat: The northern long-eared bat is a ESA-listed threatened species and is considered a rare species in North Dakota (NDGF 2016a). The USFWS recognizes every county in North Dakota as being within the range of northern long-eared bat (USFWS 2018a); however, no maternity roost trees or hibernacula have been reported for this species in North Dakota (USFWS 2019b), and the Project Area is located outside of the core range for this species. The SWAP identifies the Turtle Mountains and riparian corridors of the Little Missouri and Missouri Rivers as key areas of northern long-eared bat habitat. The Turtle Mountains are approximately 180 miles north of the 2019 Study Area; the Missouri River is approximately 33 miles west.

Publicly documented northern long-eared bat presence in North Dakota is west of the Missouri River within the Missouri River Valley, the Badlands of North Dakota, and the Moreau Prairie. Confirmed northern long-eared presence via acoustic recordings or mist netting ranged from approximately 53 to 187 miles west and northwest of the 2019 Study Area (Nelson et al. 2015; Shank et al. 2015).

Suitable summer habitat for northern long-eared bats consists of a wide variety of forested/wooded habitats, as well as interspersed non-forested habitats (i.e., emergent wetlands, shelterbelts adjacent to agriculture fields, and pastures). Northern long-eared bats prefer mature forest as foraging habitat but can also use younger riparian forests, open forest corridors, wooded ponds, emergent wetlands, adjacent agriculture fields, and wooded shelterbelts (Foster and Kurta 1999). Linear features, such as fencerows, riparian forests, and other wooded corridors, can serve as suitable habitat for northern long-eared bat. The 2019 Study Area does contain wooded shelterbelts and limited forested area adjacent to agriculture fields.

Northern long-eared bats are roost generalists and utilize a broad array of roost characteristics, including roost types (e.g., cavities, crevices, exfoliating bark) and tree species (Carter and Feldhamer 2005; Timpone et al. 2010). Northern long-eared bat roost species can vary by geographic location and site characteristics (Whalen and Krusac 2014).

USFWS guidelines define suitable northern long-eared bat habitat as forests and woodlots containing potential roost trees; however, buildings, barns, bridges, and bat houses may also be considered potential summer habitat for northern long-eared bat. Trees with a diameter at breast height greater than or equal to 3.0 inches (7.6 centimeters) and that have exfoliating bark and/or cavities are defined as potential roosts. Northern long-eared bat roost trees may include individual trees when they exhibit characteristics of a potential roost and are within 1,000 feet (ft; 305 meters [m]) of other forested/wooded habitat (USFWS 2019c).

Tier 2 desktop analysis identified 426.9 acres (approximately 0.35 percent of the 2019 Study Area) of potentially suitable northern long-eared bat habitat from 248 forested areas and wooded shelterbelts (**Figure 6, Bat Resources**). The median forested area of potential suitable habitat was 1.4 acres. The size of woodlots ranges from 0.09 to 8.65 acres. On-site reconnaissance confirmed that forested area within the 2019 Study Area has low connectivity and high fragmentation, which limits the potential for foraging, commuting, and suitable northern long-eared bat habitat. However, as previously mentioned, northern long-eared bats are roost generalists, and roost tree species exhibiting preferential roost characteristics were documented within the 2019 Study Area

during a site visit on June 12–June 13, 2019 (Atwell 2020a). Therefore, occurrence of northern long-eared bat within the 2019 Study Area is possible, though unlikely.

Whooping crane: The whooping crane is ESA-listed as endangered. Designated critical habitat for whooping crane is not present within Logan or McIntosh Counties, North Dakota (USFWS 2016a; USFWS 2019d). The Aransas/Wood Buffalo population (AWP) is the only self-sustaining population in existence (Urbanek and Lewis 2015) and was estimated at 505 individuals in 2017 (Devokaitis 2018). Whooping cranes that constitute the AWP winter at locations in the Texas Gulf Coast, including the Aransas National Wildlife Refuge. In the spring, the population migrates northward to its nesting grounds at Wood Buffalo National Park in Alberta and the Northwest Territories of Canada, passing through North Dakota en route. Cranes return to Texas in the fall, following approximately the same pathway on both their northern and southern migrations. Whooping cranes occur in North Dakota in the spring from April into May and in the fall from October into November. However, this species does not breed in North Dakota (Urbanek and Lewis 2015).

Concentrated stopover use within North Dakota appears to be located within the northwestern part of the state (Pearse et al. 2015). Cranes are known to utilize a variety of wetland habitats within an agricultural landscape during migration stopover (USFWS 2009). Potentially suitable stopover habitat exists within the 2019 Study Area. Mapped NWI wetlands associated with stream corridors are present throughout the 2019 Study Area, particularly in the southern and northeastern portions of the 2019 Study Area. The northeastern portion of the 2019 Study Area appears to have the heaviest concentration of prairie pothole features with associated emergent wetlands (**Figure 7, Avian Resources**).

Researchers have defined whooping crane migration corridors using accrued sightings reported by the public from 1942 to present, including locations from telemetered birds between 2010 and 2016. The migration corridor has been delineated with 50 percent, 75 percent, and 95 percent core areas. The 95 percent core area (i.e., the area containing 95 percent of all recorded observations) averages 183 miles (294 kilometers [km]) in width (Pearse et al. 2018). The 2019 Study Area is located within the 75 percent migration corridor (**Figure 7, Avian Resources**). Stopover data (USFWS unpublished data) indicate that whooping crane observations have occurred within relatively close proximity to the 2019 Study Area (i.e., within 5 miles). The observations occurred between October 31 and November 6, 2011 and consisted of four individuals loafing in a pond and feeding in nearby fields approximately 5 miles southwest of the 2019 Study Area. Whooping crane observations have not been previously reported from within the 2019 Study Area boundaries.

Other publicly available data sources, such as the Avian Knowledge Network (AKN) have not reported observations of whooping cranes in McIntosh County (AKN 2019). The federal crane observation database does not indicate that whooping cranes historically congregated at NWI wetlands within 5 miles of the 2019 Study Area, despite the presence of potential stopover habitat (USFWS unpublished data). Sizable wetland complexes occur within at least 5 miles of the eastern boundary of the 2019 Study Area (**Figure 5, Site Evaluation**).

In sum, there is a moderate likelihood that whooping cranes could utilize available stopover habitat within the 2019 Study Area.

Piping plover and red knot: In the Northern Great Plains, piping plovers utilize alkali lakes, freshwater lakes, reservoirs, and rivers. No critical habitat occurs within the 2019 Study Area; however, Logan County does contain designated critical habitat for the piping plover within Baltzer WPA, approximately 3 miles northeast of the 2019 Study Area (**Figure 5, Site Evaluation**). McIntosh County also contains critical habitat for this species, approximately 10.5 miles east of the 2019 Study Area (USFWS 2019d).

Similarly, natural wetland features such as freshwater lakeshores and alkali lakes may also provide suitable migration stopover habitat for red knot, another ESA-listed threatened migratory shorebird species. Red knots do not breed in North Dakota, and critical habitat has not been designated for this species (USFWS 2019a). In general, the red knot is a scarce migrant within the state (AKN 2019); however, it is possible that red knots could use similar alkaline wetland features within piping plover designated critical habitat in Logan or McIntosh Counties.

It is unclear whether the 2019 Study Area includes alkali wetland features that could provide suitable stopover habitat for piping plover or red knot. Tier 3 field studies would help to identify use of habitat within the 2019 Study Area by these two ESA-listed species.

Bald eagle: Bald eagles require large mature trees in which to build their nests, typically near open water. They have strong nest site fidelity and will often build more than one nest within their territory (Buehler 2000). Bald eagles likely utilize the 2019 Study Area across multiple seasons within the annual cycle, particularly during spring and fall migration periods (AKN 2019).

A 2009 statewide census did not document any bald eagle nests in Logan or McIntosh Counties; however, two occupied nests were documented in southern Kidder County, north of the 2019 Study Area along the Missouri River (Johnson 2009) (specific locations within the county were not disclosed in this report). Since the publication of this report, the nesting bald eagle population in North Dakota has more than doubled (NDGF 2016b). It is possible that eagles may have begun nesting in Logan or McIntosh County since data was last published. For example, citizen science data from Logan County indicates some small lakes, such as Beaver Lake, may host one or more nesting pairs (AKN 2019). Small, isolated patches of trees associated with wetlands or riparian areas within the 2019 Study Area may also provide suitable bald eagle breeding habitat.

Golden eagle: The western population of golden eagle prefers open habitats during migration and winter (Kochert et al. 2002), and this habitat signature is prevalent in the vicinity of the 2019 Study Area. Golden eagles likely breed farther west of the 2019 Study Area as the primary breeding range has been delineated mainly in the western half of the state (Dyke et al. 2015; AKN 2019). Golden eagles likely migrate through the 2019 Study Area and are known to winter within south-central counties of North Dakota (Kochert et al. 2002; AKN 2019). As such, it is possible that golden eagles could occur within the 2019 Study Area across multiple seasons.

4.1.1. North Dakota Species of Conservation Priority

In addition to the TES and BGEPA species above, Tier 1 and 2 analyses identified 18 additional species designated as North Dakota SCP that may occur within the 2019 Study Area as potential breeding species (see **Table 2**). As previously mentioned, SCP species are not afforded any additional regulatory protection under the ESA or North Dakota state law.

An IPaC analysis conducted in 2019 during the initial planning stages of the project indicated 10 avian species classified as BCC (see **Table 2; Appendix A**) (USFWS 2019a) had the potential to occur in the Project Area, eight of which were also listed as North Dakota SCP (Dyke et al. 2015). Atwell assessed the potential for these species to occur within the 2019 Study Area based on habitat requirements and aerial photograph interpretation.

A majority of BCC species identified in the 2019 IPaC report (USFWS 2019a) are designated as breeders (species that may breed in the Project Area or its vicinity), including the following: American bittern (*Botaurus lentiginosus*; SCP Level I), black tern (*Chlidonias niger*; SCP Level I), bobolink (*Dolichonyx oryzivorus*; SCP Level II), chestnut-collared longspur (*Calcarius ornatus*; SCP Level I), Franklin's gull (*Leucophaeus pipixcan*; SCP Level I), marbled godwit (*Limosa fedoa*; SCP Level I), Nelson's sparrow (*Ammospiza nelsoni*; SCP Level I), and willet (*Tringa semipalmata*; SCP Level II). These species all have a moderate-to-high likelihood of occurrence within the 2019 Study Area. The 2019 Study Area also intersects the primary breeding range for most of these species, though it is not within the primary range of chestnut-collared longspur and Nelson's sparrow. The 2019 Study Area is, however, within the secondary range of these two species (Dyke et al. 2015). Two species, the American golden-plover (*Pluvialis dominica*; no SCP designation) and lesser yellowlegs (*Tringa flavipes*; no SCP designation), do not nest within North Dakota and are transient migrants that occur within this region of the Northern Great Plains on an annual basis. There is potential for these species to occur within the 2019 Study Area during spring and/or fall migration. In 2021, the USFWS updated their list of BCC and, of the species listed above, American bittern and Nelson's sparrow are no longer included as BCC (USFWS 2021b). One species, golden-winged warbler (*Vermivora chrysoptera*), was a new addition to the BCC list for the Prairie Potholes BCR and is included in the updated IPaC analysis (USFWS 2021b; USFWS 2022); however, this species is not considered a North Dakota SCP.

The northeastern portion of the 2019 Study Area contains the relatively highest density of grassland habitat and pothole wetlands compared to the remainder of the 2019 Study Area. As a result, this portion of the 2019 Study Area is likely to see relatively higher abundance of grassland and wetland avian species, such as sharp-tailed grouse (*Tympanuchus phasianellus*; SCP Level II); Wilson's phalarope (*Phalaropus tricolor*; SCP Level I); a variety of duck species like northern pintail (*Anas acuta*; SCP Level II), lesser scaup (*Aythya affinis*; SCP Level II), and canvasback (*Aythya valisineria*; SCP Level II); and many of the SCP species listed above, such as chestnut-collared longspur, marbled godwit, and willet.

Raptor species have historically received more attention in collision analyses, due to an apparent higher probability of collision than other bird species given equal exposure to operating turbines (Strickland et al. 2011). Non-eagle raptor SCP species that may occur within the 2019 Study Area, particularly as breeding species, include ferruginous hawks (*Buteo regalis*; SCP Level I), Swainson's hawks (*Buteo swainsoni*; SCP Level I), and northern harriers (*Circus hudsonius*; SCP Level II).

Eleven bat species are known to occur in North Dakota, six of which may occur within the 2019 Study Area. Of the six species with ranges intersecting the 2019 Study Area, two species—big brown bat (*Eptesicus fuscus*) and little brown bat (*Myotis lucifugus*)—are considered Level I North Dakota SCP (Dyke et al. 2015; NDGF 2016c; NDGF 2016d; BCI 2019). Given the habitat requirements of these species and the presence of potentially suitable habitat within the 2019 Study Area, there is

a moderate-to-high likelihood of occurrence of big brown and little brown bat within the 2019 Study Area.

Designated Critical Habitat and habitat for species of concern: There is no Designated Critical Habitat for birds or bats within the 2019 Study Area. The nearest Designated Critical Habitat (piping plovers) is approximately 3 miles northeast of the 2019 Study Area in Logan County (**Figure 5, Site Evaluation**).

Patches of habitat that may be potentially used by TES and SCP may be found within the 2019 Study Area. The LF dataset indicated the 2019 Study Area contains approximately 22,529 acres (17.9 percent of the 2019 Study Area) of mixed-grass prairie, approximately 13,388 acres (10.6 percent of the 2019 Study Area) of planted grassland, and approximately 5,253 acres (4.2 percent of the 2019 Study Area) of pasture/hayland cover (USGS 2020a). TES and North Dakota SPC such as bobolink, chestnut-collared longspur, and northern harrier may utilize these hay/pasture areas.

The Project Area is dominated by cultivated cropland and herbaceous land cover with very little wooded habitat and no known caves or other karst landforms. Wooded bat habitat is limited to approximately 62.4 acres (wooded parcels and wooded shelterbelts or tree lines were manually delineated using satellite imagery), primarily consisting of small woodlots and shelterbelts scattered throughout the Project Area. Available wooded areas within the Project Area are highly fragmented and are all less than 10 acres in area. Most riparian areas in the Project Area do not support adjacent woodlands. Although it is possible that TES such as northern long-eared bat could use these wooded habitats, because of the limited size and fragmentation of woodlands within the Project Area, there is low potential for TES species to use these areas.

In general, use of the 2019 Study Area by species of concern is not anticipated to be higher than the surrounding regional landscape. Some species have potential to move through the 2019 Study Area during spring and fall migration, though potential stopover habitat that might cause congregations of large groups of migrating birds and bats is generally limited within the 2019 Study Area and is more prevalent northeast of the 2019 Study Area.

4.2. Question 2 and Response

Does the landscape contain areas where development is precluded by law or designated as sensitive according to scientifically credible information?

At the time of the Tier 1 and 2 analyses, USGS PAD-US version 2.0 identified one USFWS Waterfowl Production Area (WPA), two North Dakota State Lands parcels, and one USFWS Wildlife Management Area (WMA) that intersect the 2019 Study Area (USGS 2018). WPAs are public lands managed by the USFWS to preserve habitat for waterfowl and other wildlife, whereas WMAs are owned by the state of North Dakota and were established to protect and manage lands and waters for wildlife production, public hunting, trapping, fishing, and other recreational activities. Additionally, review of spatial data from NDGF indicated that four Private Lands Open to Sportsmen (PLOTS) parcels were located within or intersect the 2019 Study Area (NDGF 2021). All four of these PLOTS parcels were cross listed as Conservation Reserve Enhancement Program (CREP) easements. The NDGF holds PLOTS agreements with private landowners to conserve habitat for fish and wildlife

populations while also allowing walk-in public access for hunting. Normal farming and ranching activities are allowed in these PLOTS parcels.

Review of the USGS PAD-US version 2.1 (USGS 2020b) for the current Project Area boundary identified 10 locations within or partially within the Project Area where development is precluded by law of where the areas are identified as sensitive according to scientifically credible information. An approximately 14.6-acre portion of a parcel identified as North Dakota Surface Trust land overlaps the central portion of the Project Area (USGS 2020b). In addition, nine areas contain USFWS wetland or grassland easements, some of which contain both. In total, approximately 2,228 acres of USFWS easements were identified within the Project Area, including approximately 276 acres of USFWS grassland easements and 2,142 acres of USFWS wetland easements. Note that in some locations, grassland and wetland easements overlap (USGS 2020b). Refer to **Figure 3, Public Lands**.

Publicly available CRP spatial data were not readily available for Tier 2 studies.

4.3. Question 3 and Response

Are there plant communities of concern present or likely to be present within the site(s)?

The North Dakota Parks and Recreation Department maintains the North Dakota Natural Heritage Inventory database containing the known locations of rare animal and plant species and significant ecological communities within the state. In a November 2021 guidance letter, the Department indicates there are no known rare species or significant ecological communities documented within or immediately adjacent to the Project Area.

Some communities dominated by grasses have been described as native, or unbroken, prairie by NDGF. These areas are used as a proxy to estimate potential impacts to grassland breeding bird habitat, as discussed in **Section 6.15.2.1** of the Badger Wind CSC Permit Application. However, these areas have no jurisdictional protection or management mandates. Field verification of grassland habitat conditions further refined an understanding of where areas defined by NDGF as unbroken have been converted to agricultural production (WEST 2021). These areas were used to focus siting project infrastructure to avoid impacts to unbroken grassland habitat to the extent practical.

Badger Wind continues to coordinate with USFWS and NDGF to refine a site layout that minimizes impacts to unbroken grassland habitat (for upland game birds) and wetlands (for waterfowl) to the extent practical.

4.4. Question 4 and Response

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?

Based on Tier 2 site reconnaissance and desktop study, no known critical areas of congregation for species of concern were identified within the 2019 Study Area, though it is possible that the 2019

Study Area supports potential stopover habitat for ESA-listed endangered whooping cranes lek/nesting habitat for sharp-tailed grouse, and nesting sites for raptors.

As previously mentioned, no maternity roost trees or hibernacula have been reported for northern long-eared bats in North Dakota (USFWS 2019b). While some small forests, woodlots, and shelterbelts may provide suitable summer habitat for northern long-eared bats, maternity roosts are unlikely within the 2019 Study Area given a lack of available forested habitat. This species may occur as spring or fall migrants within the 2019 Study Area.

While whooping cranes do not breed in North Dakota, potentially suitable stopover habitat may exist within the 2019 Study Area. A Tier 2 desktop stopover habitat assessment was conducted to assess the likelihood of whooping crane stopover use within the current Project Area relative to four reference areas (Atwell 2021a). This assessment was conducted for a December 2020 Project Area (hereafter referred to as the whooping crane assessment area) that is similar in size and location to the current Project Area boundary. The reference areas were of equal shape and dimension at equal distances from the Project's centroid in each of the four cardinal directions (north, south, east, and west). The reference areas were spaced to be adjacent to, but without overlapping, the whooping crane assessment area. Due to the whooping crane assessment area configuration and to avoid overlap, the west and east reference areas were slightly farther from the whooping crane assessment area than the north and south reference areas. The results of the analysis generally confirmed that on a regional basis, and in comparison, to four reference areas adjacent to the whooping crane assessment area, the Project had been sited in an area that has relatively lower quality and quantity whooping crane stopover habitat. The whooping crane assessment area primarily comprises croplands, has the relatively lowest portion of wetland and water habitat, and is located in the 75th percentile of the whooping crane migration corridor. Areas to the west (which are located in the 50th percentile migration corridor) and to the north and east (which have a relatively higher percentage of wetlands and waters) have relatively more potentially suitable whooping crane stopover habitat (Atwell 2021a).

Sharp-tailed grouse is a North Dakota SCP Level II species that likely occurs year-round within the 2019 Study Area (Dyke et al. 2015). This species utilizes a breeding strategy known as "lekking" in which multiple males gather at a particular site to display and compete for spectating females (i.e., potential mates) (NDGF 2019). The North Dakota SWAP identified Logan and McIntosh Counties as being entirely within the primary range for this species and indicates that sharp-tailed grouse are most common within the Missouri Slope region. Preferred habitat includes mixed-grass prairie with scattered shrubs or small trees. Leks are generally found on elevated, less vegetated areas compared to the surrounding area (Dyke et al. 2015). As such, the 2019 Study Area is likely to contain habitat to support sharp-tailed grouse leks, particularly in the north and northeastern portions of the 2019 Study Area.

Raptors may migrate over the 2019 Study Area but are generally expected to be dispersed over the broader landscape prior to reaching the 2019 Study Area. Migrating raptor species will often use ridgelines and shorelines of large bodies of water to assist with thermal lift and navigation during migration (Liguori 2005), potentially resulting in high concentrations near these features during migration. Topography throughout most of the 2019 Study Area is generally similar to the surrounding landscape and is not expected to attract or concentrate migrating raptors. However,

steeper topographic relief associated with the Missouri Coteau in the northern and northeastern portions of the Project has potential to create thermals and attract migrating raptors. Furthermore, grassland and wetland habitats located in the northern and northeastern portions of the 2019 Study Area may provide a larger prey base for raptors compared to the more cropland-heavy areas in the southern portion of the 2019 Study Area. Therefore, raptor use may be relatively higher in northern and northeastern portions of the 2019 Study Area. Tier 3 avian use studies would help to identify whether raptor use is concentrated within any particular region of the 2019 Study Area.

No landscape features identified within the 2019 Study Area are expected to concentrate migrating passerines, which could result in higher-than-expected fatality rates. The 2019 Study Area is predominantly covered by cultivated cropland and herbaceous land cover and contains very little forested and wetland habitat. No particular habitat resources are likely to attract passerine migrants to the 2019 Study Area.

No globally or state recognized Important Bird Areas (IBA) are within 10 miles of the 2019 Study Area. The closest IBA is Appam Lake Waterfowl Protection Area (located approximately 16 miles to the north of the 2019 Study Area in Kidder and Logan Counties, N46.655954° W99.56191°). This IBA is a state-recognized IBA (National Audubon Society 2019) and provides important breeding habitat for piping plovers (Chipley et al. 2003).

4.5. Question 5 and 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?

Existing vegetation in the Study and Project Areas is summarized using LF's EVT dataset (USGS 2020a). Ruderal or semi-natural vegetation types are classified using the U.S. National Vegetation Classification (Comer et al. 2003; NCSU 2021). The results of this analysis show that the Project Area is dominated by cropland (approximately 39.4 percent) (**Figure 6, Bat Resources**).

Mixedgrass prairie accounts for approximately 29.2 percent of cover in the Project Area. Planted grasslands represent approximately 14.7 percent of cover within the Project Area. Herbaceous riparian areas account for approximately 6.7 percent cover of the Project Area. These grassland and riparian areas are particularly prevalent in the northern and northeastern portions of the Project Area (**Figure 6, Bat Resources**). These areas may be susceptible to fragmentation from location of project infrastructure. Tier 1 and 2 analyses have identified several grassland bird species susceptible to habitat fragmentation that may be present within the Project Area, including SCP such as bobolink, chestnut-collared longspur, northern harrier, and sharp-tailed grouse (WEST 2021).

4.6. Question 6 and Response

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?

Landscape characteristics within the 2019 Study Area and publicly available information of distribution ranges, habitat requirements, and known occurrences in North Dakota collectively indicate that several species of birds and bats known to be vulnerable to impacts from wind energy facilities may use the 2019 Study Area on a limited basis. These species also have potential to use relatively higher quality habitat in the vicinity of the 2019 Study Area. These species include, but are not limited to, cave and tree-roosting migratory bats, nesting and migrating raptors, and breeding and migratory land birds.

4.6.1. Cave and Tree-roosting Migratory Bats

As previously mentioned, 11 species of bats are known to occur in North Dakota, six of which may occur within the 2019 Study Area. This includes big brown bat, eastern red bat (*Lasiurus borealis*), hoary bat (*Lasiurus cinereus*), little brown bat, northern long-eared bat, and silver-haired bat (*Lasiurus cinereus*) (NDGF 2016c; NDGF 2016d; BCI 2019). One of these species, northern long-eared bat, is ESA-listed as threatened (USFWS 2019a) and is also considered a Level I North Dakota SCP. Two additional species, big brown bat and little brown bat are also considered Level I North Dakota SCP. SCP are a conservation priority for the state under the North Dakota SWAP (Dyke et al. 2015) but are not protected under state law. The little brown bat is known for forming maternity colonies in artificial structures and foraging over water (BCI 2019). The little brown bat was heavily impacted by white-nose syndrome (WNS) in the eastern part of its range and is currently under review for federal listing (USFWS 2019e).

Arnett and Baerwald (2013) summarized the results of post-construction bat mortality monitoring studies at wind facilities across five regions in the United States and Canada between 2000 and 2011. The Great Plains region (which includes North Dakota) had moderately high fatality rates on average, though results were highly variable. This region had the second lowest fatality estimate of the five regions examined (Arnett and Baerwald 2013). While Arnett and Baerwald (2013) do not focus heavily on habitat features, they note that wind facilities within the Great Basin/Southwest Open Range-Desert region typically reported the lowest mean fatality rates and were generally located in areas with few roosting and foraging areas, and possibly outside of migratory pathways (Arnett and Baerwald 2013). This suggests that placing turbines away from potential roosting and foraging areas may help to reduce bat fatalities. Given the overall land cover within the 2019 Study Area, the Project is not expected to take bats at a greater rate than other wind facilities in the Great Plains region.

Migratory tree bats are among the most affected species at wind farms across North America and Canada (Arnett and Baerwald 2013). Collision risk for bats within the 2019 Study Area is expected to follow national trends with migratory tree bats, such as eastern red, hoary, and silver-haired bats, comprising a majority of fatalities. It is unlikely that bats would utilize the 2019 Study Area for summer roosting given the relative lack of forested roosting habitat within the 2019 Study Area. More likely utilization of the 2019 Study Area would be during migration.

The known distribution and specific habitat requirements of northern long-eared bats indicate that this species could potentially occur within the 2019 Study Area (USFWS 2019f). In particular, this species may occur as a migrant within the 2019 Study Area, but the absence of high-quality woodlands within the 2019 Study Area and Project Area and climate limit the species' likelihood to

occur as summering or wintering species. Limited patches of deciduous woodland that may provide summer roosting habitat and foraging habitat exist within the 2019 Study Area.

The 2019 Study Area is within the WNS zone, per the USFWS WNS Zone Final 4(d) Rule and the current WNS zone map issued on May 31, 2019 (USFWS 2019g). As such, incidental take is prohibited under the following circumstances:

1. If it occurs within a hibernaculum.
2. If it results from tree removal activities, and
    a. the activity occurs within 0.25 miles of a known, occupied hibernaculum, or
    b. the activity cuts or destroys a known, occupied maternity roost tree or other trees within a 150-ft radius from the maternity roost tree during the pup season from June 1 through July 31 (USFWS 2016b).

Impacts to woodland habitat will be avoided where feasible. If some tree removal is unavoidable, this removal will be completed in accordance with tree clearing restrictions for northern long-eared bat as described in the USFWS 4(d) rule (USFWS 2015a) or coordinated with USFWS prior to tree clearing activities.

As noted by USFWS, deaths of northern long-eared bats caused by wind turbines have been documented (USFWS 2015b), though relatively few individuals of this species are generally found as fatalities during post-construction monitoring surveys. For example, the American Wind Wildlife Institute (AWWI) found that, based on 190 post-construction studies between 2006 and 2016, only six northern long-eared bat fatalities were discovered at wind farms, representing approximately 0.05 percent of fatality incidents (Allison 2018).

The 2019 Study Area is dominated by cultivated cropland, a non-ideal habitat for bats. Using aerial imagery, Badger Wind delineated bat habitat within the 2019 Study Area by using a 1,000-ft buffer around forested areas greater than 5 acres and around connective woodlands (i.e., forest patches of less than 5 acres connected to the larger forest parcels; **Figure 6, Bat Resources**). The highest concentration of bat habitat occurs in the southern portion of the 2019 Study Area, generally associated with shelterbelts (**Figure 6, Bat Resources**). Reducing turbine placement within this 1,000-ft buffer to the greatest extent feasible may help to reduce bat fatalities during project operation.

4.6.2. Nesting and Migratory Raptors

The predominance of open, agricultural cropland and herbaceous habitat greatly reduces the 2019 2019 Study Area's suitability for tree-nesting raptors. Occasional shelterbelts and small woodlots identified during site reconnaissance may provide suitable raptor nesting habitat, but the overall density of breeding raptors in the 2019 Study Area is expected to be low. BGEPA species and state raptor SCP with potential to occur within the 2019 Study Area are discussed in more detail below.

Bald eagles are known to occur within Logan and McIntosh Counties (AKN 2019). This species prefers to nest in tall trees near bodies of water where prey resources (e.g., fish, waterfowl) are

available (Buehler 2000). While the 2019 Study Area generally lacks the habitat features typical for nesting bald eagles, the NDGF indicated that bald eagles have nested in Kidder County, north of the 2019 Study Area (Johnson 2009), and an increasing bald eagle population in the state (NDGF 2016b) may indicate a possibility that bald eagle nests exist in Logan and McIntosh Counties. Therefore, this species may use the 2019 Study Area, most likely during both spring and fall migration periods. The absence of large riparian zones, lakes, and other concentrating natural features may decrease bald eagle use of the 2019 Study Area. Bald eagle winter roosts likely do not occur within the 2019 Study Area because few habitat features conducive to large winter roosts, such as larger super-canopy trees within a woodland tract near water, are present (Buehler 2000).

As previously mentioned, golden eagles are more likely to nest in the western portion of North Dakota (Dyke et al. 2015; AKN 2019); however, this species is known to have a limited and scattered presence in the vicinity of the 2019 Study Area and may occur within the 2019 Study Area during spring and fall migratory periods, as well as in winter (AKN 2019).

The 2019 Study Area also has potential habitat to support other species of breeding and migratory raptors, such as red-tailed hawk (*Buteo jamaicensis*), ferruginous hawks (SCP Level I), Swainson's hawks (SCP Level I), and northern harriers (SCP Level II) among others. Beston et al. (2016) found that in general, Accipitriformes (i.e., diurnal birds of prey) tended to have a higher proportion of fatalities due to turbines and a higher risk of turbine-caused fatality compared to other species groups. The risk of collision mortality for some raptor species, such as northern harrier, tended to be rather low (Smith et al. 2011; Beston et al. 2016)

4.6.3. Breeding and Migratory Land Birds

A variety of migratory birds may move through and utilize the 2019 Study Area seasonally. Neotropical migrant species likely move over the 2019 Study Area during both during the day and nocturnally (AKN 2021). The 2019 Study Area includes limited woodland and/or shrubland habitat that could be used by neotropical migrants during stopover events. Habitat and topographical features found within the 2019 Study Area are not expected to attract large congregations of birds during migration at a rate greater than the surrounding landscape. Although habitat features (e.g., water bodies, escarpments, conservation areas) that would concentrate large numbers of birds are minimal throughout most of the 2019 Study Area, the occurrence of any scattered wetlands, small open water features, or seasonally flooded agricultural fields could potentially provide some stopover or breeding habitat for shorebirds, waterbirds, and waterfowl species. The northeastern portion of the 2019 Study Area contains prairie pothole ponds and relatively larger tracts of herbaceous land cover. This area may see a higher proportion of waterfowl, waterbirds, shorebirds, and grassland birds compared to more southern portions of the 2019 Study Area. Minimizing turbine placement within the vicinity of this wetland-grassland complex to the greatest extent feasible will help to reduce direct impacts to avian species, such as collisions with turbines and habitat loss, as well as indirect impacts, such as displacement (Shaffer and Buhl 2016).

At the time of Tier 1 and 2 studies, the USFWS list of BCC species for the Prairie Potholes BCR contained 27 species. IPaC analyses for the 2019 Study Area specifically indicate 10 BCC species that are either BCC for the Prairie Potholes BCR or BCC throughout their ranges within the continental United States and Alaska. These include species with potential to breed within the 2019

Study Area, such as American bittern, black tern, bobolink, chestnut-collared longspur, Franklin's gull, marbled godwit, Nelson's sparrow, and willet, as well as species considered transient, such as American golden-plover and lesser yellowlegs (**Appendix A**) (USFWS 2019a). American bittern and Nelson's sparrow have since been removed from the USFWS BCC list for the Prairie Potholes BCR (USFWS 2021b).

Several avian species are common in agricultural areas of North Dakota and have potential to occur in the 2019 Study Area. In particular, the horned lark (*Eremophila alpestris*) is one of the most widely distributed species in North America (Beason 2020), and dramatic declines are widespread (Sauer et al. 2017). Horned Larks are one of the most commonly recorded mortalities at North American wind farms (Erickson et al. 2001; Erickson et al. 2014).

4.7. Question 7 and Response

Is there a potential for significant impacts to species of concern based on the answers to the questions above, and considering the design of the proposed site?

The potential for significant impacts to species of concern within the 2019 Study Area is expected to be low. Like other wind energy projects in the Midwest, there is potential for the Project to impact some bird and bat species of conservation concern, including TES and SCP, migratory bat species, migrating and nesting raptors, and grassland birds. Potential impacts are more likely to occur within the northern and northeastern portions of the 2019 Study Area due to the presence of relatively larger tracts of herbaceous land cover and a greater presence of wetlands. This is compared to the southern portion of the 2019 Study Area where agricultural habitat dominates and the landscape is more fragmented. Siting of project infrastructure in agricultural lands and away from proximate areas of relatively higher quality habitat and the avoidance of relatively higher quality patches of habitat is expected to reduce impacts to species of concern. Adverse population-level impacts to species of concern are unlikely to occur.

4.8. Tiers 1 and 2 Decision Point

Tier 3 pre-construction studies were concluded to be warranted to further assess the potential for direct and indirect impacts from the Project on bird and bat species. Tier 1 and Tier 2 review indicated that ESA-listed species have known ranges that intersect the 2019 Study Area and habitat for these species may exist within the 2019 Study Area. While a large portion (approximately 39.4 percent) of the Project Area consists of active croplands; mixedgrass prairie, planted grasslands, and herbaceous riparian areas accounts for approximately 50.6 percent of the Project Area. These communities are present particularly in the northern and northeastern portions of the 2019 Study Area. Open water and wetland habitat (approximately 0.4 percent of the Project Area) is also present, including prairie potholes in the northeastern portion of the 2019 Study Area (USGS 2020a). These habitats may attract a variety of avian species of concern, including TES and SCP. Several species identified as SCP are also susceptible to grassland habitat fragmentation.

The potential for maternity roosts of protected bat species to occur within the 2019 Study Area is low, as minimal habitat exists within the 2019 Study Area. Several bat species are likely to migrate through the 2019 Study Area. While bald eagle nests are not known from Logan or McIntosh Counties, the nesting bald eagle population in North Dakota is increasing, and habitat within the

vicinity of the 2019 Study Area may support nests that were not previously known. Furthermore, bald eagles may move through the 2019 Study Area during migration or travel between foraging and breeding or roosting sites. Similarly, a variety of other breeding and migratory raptors, land birds, waterfowl, and shorebirds are likely to use the 2019 Study Area and surrounding region.

Tier 3 field studies provide additional information to further assess potential impact risk to bird and bat species that may use the 2019 Study Area, such as migratory tree bats, breeding and migratory land birds, sharp-tailed grouse, and nesting and migratory raptors. Tier 3 surveys also help to determine whether the habitat is being used by any protected species. Therefore, based on Tier 1 and 2 analysis, Tier 3 pre-construction studies were concluded to be warranted to further assess the potential for direct and indirect impacts from the Project on bird and bat species. In the interest of completing a more robust due diligence Badger Wind completed a full suite of Tier 3 field studies including bat acoustic surveys, nesting eagle and raptor surveys, grouse lek surveys, avian point count surveys for a more robust due diligence.

5. TIER 3—FIELD STUDIES TO DOCUMENT SITE WILDLIFE AND HABITAT AND PREDICT PROJECT IMPACTS

As described previously, the Badger Wind Project Area boundary has been reconfigured over the course of project development. Tier 3 field studies that are described in **Section 5** were designed in April 2019 for a larger survey area that has since been refined to the current Project Area (referred to as the 2019 Study Area). Approximately 97 percent of the current project boundary is contained within the 2019 Study Area. All map figures included in this BBCS show the current project boundary in relation to the 2019 Study Area boundary that was used during Tier 3 field studies.

Avian and bat pre-construction studies for the Project were conducted from May 2019 to April 2021, based on Tier 1 and Tier 2 analyses and coordination with USFWS and NDGF (see **Table 1**). Final reports for these studies are provided in **Appendix B**.

Tier 3 studies completed for the Project included the following studies:

- Bat Acoustic Survey, Year 1: Acoustic bat monitoring occurred within the 2019 Study Area from May 23–October 16, 2019, at one meteorological evaluation tower (MET tower) and at four ground-based locations representative of potential turbine locations within the Project (**Figure 6, Bat Resources**). The raised MET tower location was paired with a ground-based location. Two of the four ground locations were within the current Project Area boundary and the raised MET tower location was located just south of the current Project Area boundary. Song Meter full spectrum ultrasonic detectors (SM3 or SM4) were used throughout the duration of the study. The four ground-based units were deployed on May 23rd and remained in place over the course of the entire survey period (with the exception of one unit, which only recorded through October 9th due to technical issues). The one raised MET tower unit was not deployed until July 30, 2019, due to damaged MET tower components that delayed deployment until repairs were made. Calls were recorded from ½ hour before sunset to ½ hour after sunrise. Calls were then analyzed for species identification using Kaleidoscope Pro 4.2.0 (Kaleidoscope), which is approved for analysis by the USFWS. All calls underwent qualitative analysis by a biologist with sufficient bat acoustic call vetting experience through visual comparison of echolocation call metrics (i.e., call sequence activity and call duration, call slope, minimum frequency, and individual call characteristics representative of individual species) (Atwell 2020b).

- Bat Acoustic Survey, Year 2: Acoustic bat monitoring occurred within the 2019 Study Area from April 14–October 15, 2020, at two MET towers and at four ground-based locations representative of potential turbine locations within the Project (**Figure 6, Bat Resources).** Raised MET tower locations were paired with ground-based locations. Two of the four ground locations and one MET tower location were within the current Project Area boundary. Song Meter full spectrum ultrasonic detectors (SM3 or SM4) were used throughout the duration of the study. The one raised MET tower was deployed on April 14, 2020, and the four ground-based units were deployed on April

15, 2020. All detectors remained in place over the course of the entire survey period. Calls were recorded from ½ hour before sunset to ½ hour after sunrise. Calls were then analyzed for species identification using Kaleidoscope, which is approved for analysis by the USFWS. All calls identified by the software as a potential *Myotis* species or unidentified species underwent qualitative analysis by a biologist with sufficient bat acoustic call vetting experience through visual comparison of echolocation call metrics (i.e., call sequence activity and call duration, call slope, minimum frequency, and individual call characteristics representative of individual species) (Atwell 2021b).

- Eagle Use and Diurnal Avian Activity Surveys, Year 1: Eagle use and avian use point count studies occurred between May 2019 and April 2020. During year-1 eagle use surveys, all 53 point-count stations within the 2019 Study Area were surveyed for eagles and other raptors out to 800 m (meters) (the sample plot) for 60 minutes, typically once per month, when feasible. Due to the inaccessibility of some point count stations between late fall and early spring, some points were not surveyed every month, whereas others were surveyed twice per month to achieve survey effort goals. For avian use surveys, the same 53 point count stations were surveyed for all avian species out to 150 m for small-bodied bird species and 800 m for larger-bodied bird species for 10 minutes, typically once per month (when feasible) during the spring (May 2019 and March and April 2020) and fall (August through November 2019) monitoring periods (Atwell 2020c).

- Eagle Use and Diurnal Avian Activity Surveys, Year 2: Eagle use and avian use studies occurred between May 2020 and April 2021. During year-2 eagle use surveys, all 53 point-count stations within the 2019 Study Area were surveyed for eagles and other raptors out to 800 m (the sample plot) for 60 minutes, typically once per month, when feasible. Due to the inaccessibility of some point count stations between late fall and early spring, some points were not surveyed every month, whereas others were surveyed twice per month to achieve survey effort goals. For diurnal avian activity surveys, the same 53 point count stations were surveyed for all avian species out to 300 m for small-bodied bird species and 800 m for larger-bodied bird species for 10 minutes, typically once per month (when feasible) during the spring (May 2020 and March and April 2021) and fall (August through November 2020) monitoring periods (Atwell 2021c).

- Bald Eagle and Raptor Nest Surveys, Year-1: Eagle and raptor nest surveys were conducted on May 1–3, 2019, for the 2019 Study Area and a 10-mile buffer of the 2019 Study Area (i.e., eagle nest survey area). Nests for all raptor species were recorded within the 2019 Study Area and a surrounding 2-mile buffer area (i.e., raptor nest survey area). All eagle nests were recorded within 10 miles from the 2019 Study Area boundary. Aerial transect surveys were flown via a fixed-wing Cessna Skyhawk 172M, with transects spaced 0.5 miles apart (Atwell 2020c).

- Bald Eagle and Raptor Nest Surveys, Year-2: Eagle and raptor nest surveys were conducted during April and May of 2020 through a combination of targeted aerial

surveys conducted on April 10, 2020, and ground-based surveys that continued through May 15, 2020. Flight time was restricted to one day of aerial surveys due to safety concerns regarding: (a) the COVID-19 coronavirus outbreak across the United States, and (b) recent aircraft incidents associated with aerial wildlife surveys at other proposed wind facilities in the region. Areas targeted for aerial surveys included the following:

  - Roadless portions of the eagle nest survey area.
  - Habitat-based focal areas within the eagle nest survey area, which were identified using desktop analysis of the eagle nest survey area. Large bodies of water, riparian areas, and areas with large trees that could serve as potential eagle nesting sites were prioritized when identifying target areas.
  - Known eagle nests and nests of other raptor species that were found during the year 1 survey in 2019.

- Within most targeted areas, north–south oriented transects were flown via a fixed-wing Cessna Skyhawk 172M with transects spaced 0.5 miles apart. However, riparian-based transects were flown along the northern and southern edges of the Beaver Creek riparian corridor between Beaver Lake and the western edge of the eagle nest survey area.

- In addition to aerial nest surveys, all raptor nests that were found during ground-based activities, including ground-based lek surveys (discussed below), avian use surveys, and incidentally were mapped, assessed for nesting status, and were added to the project nest database. Ground-based follow-up surveys were conducted to confirm species and status for nests that could not be attributed to species during the aerial survey (Atwell 2021c).

- Sharp-tailed Grouse Lek Surveys, Year 1: Sharp-tailed grouse lek surveys were conducted between May 2 and May 10, 2019. The grouse survey area included the 2019 Study Area and extended 1 mile from the 2019 Study Area boundary. Aerial transect surveys were flown via a fixed-wing Cessna Skyhawk 172M with transects spaced 0.5 miles apart. Surveys began approximately 10 minutes before sunrise and ended approximately two hours after sunrise. Confirmed leks were defined as two or more birds together, with at least one male displaying. Possible leks were defined as auditory detections of multiple grouse that could not be verified visually after their initial detection on a ground-based survey (Atwell 2020c).

- Sharp-tailed Grouse Lek Surveys, Year 2: Similar to the year 2 eagle and raptor nest surveys, year 2 sharp-tailed grouse lek surveys were also conducted using both aerial and ground-based survey methods. Targeted portions of the grouse survey area (specifically the 2019 Study Area plus a 1-mile buffer zone around the 2019 Study Area boundary) were assessed via aerial transects on April 10, 2020. As described above, safety concerns limited flight time to one morning of aerial surveys that targeted

specific areas within the broader grouse survey area and focused on portions of the grouse survey area that could not be reached or observed from publicly accessible roadside vantage points. Targeted aerial survey areas were believed to have a higher likelihood of harboring grouse leks based on the following:

- Results from 2019 aerial grouse lek surveys.
- Observations of grouse recorded incidentally during year 1 and avian use surveys.
- Identification of potential sharp-tailed grouse breeding habitat through desktop review.

- Additional portions of the grouse survey area were sampled using three rounds of ground-based surveys between April 11 and May 15, 2020. Each round of surveys was spaced approximately 8 to 10 days apart. During each survey round, a biologist surveyed 77 publicly accessible roadside points spaced 0.5 miles (800 m) apart for two minutes, scanning visually and listening for sharp-tailed grouse vocalizations and other non-vocal sounds associated with lekking behavior.

The results of these studies are further discussed on the following sections.

5.1. Question 1 and Response

Do field studies indicate that species of concern are present on or likely to use the proposed site?

In total, 37 species of concern, including ESA-listed threatened or endangered species, eagle species listed under the BGEPA, and species listed as SCP per North Dakota's SWAP, were detected during Tier 3 field studies (**Table 3**). One unknown *Myotis* bat species (little brown bat or northern long-eared) was detected during bat acoustic studies but could not be identified to species as the calls contained characteristics of both species. One bird species listed as endangered under the ESA (whooping crane) was detected within the 2019 Study Area during Tier 3 studies.

Table 3. Seasonal Occurrence of Species of Concern Detected during Tier 3 Field Studies (2019–2021)

Common Name[a] (*Scientific Name*)	Federal Status[b]	State Status[c]	Expected Seasonal Occurrence	Seasons Detected (Year 1)[d]	Seasons Detected (Year 2)[d]	References
Birds						
Whooping Crane* (*Grus americana*)	FE	SCP III	Spring/Fall Migration	SP	Not Detected	(Atwell 2020c)
Bald Eagle (*Haliaeetus leucocephalus*)	BGEPA; BCC[e]	SCP II	Year-round	SP, SU, FA, WI	SP, SU, FA, WI	(Atwell 2020c; Atwell 2021c)
Golden Eagle (*Aquila chrysaetos*)	BGEPA	SCP II	Spring/Fall Migration and Winter	SP, FA, WI	SP, FA, WI	(Atwell 2020c; Atwell 2021c)
American Avocet* (*Recurvirostra americana*)	N/A	SCP II	Spring/Fall Migration and Summer	SU, FA	FA	(Atwell 2020c; Atwell 2021c)
American Bittern (*Botaurus lentiginosus*)	BCC[e]	SCP I	Spring/Fall Migration and Summer	SU, FA	SP, SU, FA	(Atwell 2020c; Atwell 2021c)
American Kestrel (*Falco sparverius*)	N/A	SCP II	Spring/Fall Migration and Summer	SP, SU, FA	SP, SU, FA	(Atwell 2020c; Atwell 2021c)
American White Pelican (*Pelecanus erythrorhynchos*)	N/A	SCP II	Spring/Fall Migration and Summer	SU, FA	SP, SU, FA	(Atwell 2020c; Atwell 2021c)
Baird's Sparrow* (*Centronyx bairdii*)	BCC	SCP I	Spring/Fall Migration and Summer	SP	Not Detected	(Atwell 2020c)
Black Tern (*Chlidonias niger*)	BCC	SCP I	Spring/Fall Migration and Summer	SP, SU, FA	SP, SU, FA	(Atwell 2020c; Atwell 2021c)
Bobolink (*Dolichonyx oryzivorus*)	BCC	SCP II	Spring/Fall Migration and Summer	SP, SU, FA	SP, SU, FA	(Atwell 2020c; Atwell 2021c)
Burrowing Owl* (*Athene cunicularia*)	N/A	SCP II	Spring/Fall Migration and Summer	FA	Not Detected	(Atwell 2020c)
Canvasback (*Aythya valisineria*)	N/A	SCP II	Spring/Fall Migration and Summer	SU	SP, SU	(Atwell 2020c; Atwell 2021c)
Chestnut-collared Longspur (*Calcarius ornatus*)	BCC	SCP I	Spring/Fall Migration and Summer	SP, SU, FA	SP, SU, FA	(Atwell 2020c; Atwell 2021c)

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Common Name[a] (*Scientific Name*)	Federal Status[b]	State Status[c]	Expected Seasonal Occurrence	Seasons Detected (Year 1)[d]	Seasons Detected (Year 2)[d]	References
Dickcissel* (*Spiza americana*)	BCC[e]	SCP II	Spring/Fall Migration and Summer	SU	SU, FA	(Atwell 2020c; Atwell 2021c)
Ferruginous Hawk (*Buteo regalis*)	N/A	SCP I	Spring/Fall Migration and Summer	SP, SU, FA	SP, SU, FA	(Atwell 2020c; Atwell 2021c)
Franklin's Gull (*Leucophaeus pipixcan*)	BCC	SCP I	Spring/Fall Migration and Summer	SP, SU, FA	SP, SU, FA	(Atwell 2020c; Atwell 2021c)
Grasshopper Sparrow (*Ammodramus savannarum*)	BCC	SCP I	Spring/Fall Migration and Summer	SP, SU, FA	SP, SU, FA	(Atwell 2020c; Atwell 2021c)
Horned Grebe (*Podiceps auritus*)	BCC[e]	SCP I	Spring/Fall Migration and Summer	SP, SU	SP, SU	(Atwell 2020c; Atwell 2021c)
LeConte's Sparrow* (*Ammospiza leconteii*)	BCC[f]	SCP II	Spring/Fall Migration and Summer	Not Detected	SU, FA	(Atwell 2021c)
Lesser Scaup (*Aythya affinis*)	N/A	SCP II	Spring/Fall Migration and Summer	SP, SU	SP, SU	(Atwell 2020c; Atwell 2021c)
Loggerhead Shrike* (*Lanius ludovicianus*)	N/A	SCP II	Spring/Fall Migration and Summer	Not Detected	SP, SU	(Atwell 2021c)
Marbled Godwit (*Limosa fedoa*)	BCC	SCP I	Spring/Fall Migration and Summer	SP, SU	SP, SU	(Atwell 2020c; Atwell 2021c)
Nelson's Sparrow* (*Ammospiza nelsoni*)	BCC[e]	SCP I	Spring/Fall Migration and Summer	SU	SU, FA	(Atwell 2020c; Atwell 2021c)
Northern Harrier (*Circus hudsonius*)	BCC[f]	SCP II	Spring/Fall Migration and Summer	SP, SU, FA	SP, SU, FA	(Atwell 2020c; Atwell 2021c)
Northern Pintail (*Anas acuta*)	N/A	SCP II	Spring/Fall Migration and Summer	SP, SU	SP, SU, FA	(Atwell 2020c; Atwell 2021c)
Peregrine Falcon (*Falco peregrinus*)	BCC[e]	SCP III	Spring/Fall Migration	SP	SP	(Atwell 2020c; Atwell 2021c)
Prairie Falcon (*Falco mexicanus*)	N/A	SCP II	Year-round	FA	SU, FA, WI	(Atwell 2020c; Atwell 2021c)

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Common Name[a] (*Scientific Name*)	Federal Status[b]	State Status[c]	Expected Seasonal Occurrence	Seasons Detected (Year 1)[d]	Seasons Detected (Year 2)[d]	References
Red-headed Woodpecker (*Melanerpes erythrocephalus*)	BCC	SCP I	Spring/Fall Migration and Summer	SU, FA	SU, FA	(Atwell 2020c; Atwell 2021c)
Sharp-tailed Grouse (*Tympanuchus phasianellus*)	N/A	SCP II	Year-round	SP, SU, FA, WI	SP, SU, FA, WI	(Atwell 2020c; Atwell 2021c)
Sprague's Pipit (*Anthus spragueii*)	BCC	SCP I	Spring/Fall Migration and Summer	SU, FA	SU, FA	(Atwell 2020c; Atwell 2021c)
Swainson's Hawk (*Buteo swainsoni*)	BCC[e]	SCP I	Spring/Fall Migration and Summer	SP, SU, FA	SP, SU, FA	(Atwell 2020c; Atwell 2021c)
Upland Sandpiper (*Bartramia longicauda*)	BCC[e]	SCP II	Spring/Fall Migration and Summer	SP, SU	SP, SU, FA	(Atwell 2020c; Atwell 2021c)
Western Meadowlark (*Sturnella neglecta*)	N/A	SCP II	Spring/Fall Migration and Summer	SP, SU, FA	SP, SU, FA	(Atwell 2020c; Atwell 2021c)
Willet (*Tringa semipalmata*)	BCC	SCP II	Spring/Fall Migration and Summer	SP, SU, FA	SP, SU, FA	(Atwell 2020c; Atwell 2021c)
Wilson's Phalarope (*Phalaropus tricolor*)	N/A	SCP I	Spring/Fall Migration and Summer	SP, SU	SP, SU	(Atwell 2020c; Atwell 2021c)
Bats						
Big Brown Bat/ Silver-haired Bat[g] (*Eptesicus fuscus/ Lasionycteris noctivagans*)	N/A	SCP I	Spring/Fall Migration and Summer	SU, FA	SP, SU, FA	(Atwell 2020c; Atwell 2021c)
Little Brown Bat (*Myotis lucifugus*)	N/A	SCP I	Spring/Fall Migration and Summer	SU, FA	SU, FA	(Atwell 2020c; Atwell 2021c)
Unknown *Myotis* Species[h] (*Myotis sp.*)	N/A	SCP I	Spring/Fall Migration and Summer	Not Detected	FA	(Atwell 2021c)

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Common Name[a] (*Scientific Name*)	Federal Status[b]	State Status[c]	Expected Seasonal Occurrence	Seasons Detected (Year 1)[d]	Seasons Detected (Year 2)[d]	References

[a] Common names marked with an asterisk indicate that the species was as an incidental observation only during two years of avian surveys.
[b] Federal and state status: BCC= Bird of Conservation Concern (USFWS 2008); BGEPA = Bald and Golden Eagle Protection Act; FE = ESA Endangered; N/A = No federal and/or state status.
[c] State conservation listing status indicates North Dakota State Wildlife Action Plan (SWAP) (Dyke et al. 2015) Species of Conservation Priority (SCP) Level I, II, or III.
[d] For birds: SP = March–May; SU = June–July; FA = August–November; WI = December–February. Includes species detected incidentally within the 2019 Study Area. For bats: SP = April 1–May 15; SU = May 16–July 31; FA = August 1–October 16. Bat acoustic surveys were not conducted in the spring during year 1 studies.
[e] At the time of Tier 1 through 3 studies, this species was considered BCC (USFWS 2008). However, the USFWS has since removed this species from their list of BCC for the Prairie Pothole BCR (USFWS 2021a)
[f] At the time of Tier 1 through 3 studies, this species was not considered BCC (USFWS 2008). However, the USFWS has since added this species to their list of BCC for the Prairie Pothole BCR (USFWS 2021a)
[g] Big brown and silver-haired bats were lumped during analysis due to similarities in call characteristics between the two species. Big brown bat is considered a North Dakota SCP, but silver-haired bat is not currently listed as such.
[h] Calls had characteristics of northern long-eared bat and little brown bat so a species-level classification could not be determined.

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Bat acoustic surveys confirmed the presence of one bat SCP (little brown bat) and the likely presence of a second bat SCP (big brown bat) (see **Table 3**). Big brown and silver-haired bat calls were lumped during analysis due to similarities in call characteristics between the two species. This group was one of the more commonly detected species during acoustic surveys; however, while big brown bat is considered a North Dakota SCP, silver-haired bat is not currently listed as such. After excluding "noise", analysis of acoustic data with Kaleidoscope software identified 2,026 bat calls in 2019 and 1,134 calls in 2020. In 2019, this included 757 big brown bat/silver-haired bat calls and four little brown bat calls. In 2020, this included 485 big brown bat/silver-haired bat calls and three little brown bat calls. Two calls identified as an unknown *Myotis* species were also recorded but, as previously mentioned, were not identified to species as they contained characteristics of both northern long-eared and little brown bat and there were not a sufficient number of passes to identify to species (Atwell 2020b; Atwell 2021b).

One ESA-listed endangered bird species (whooping crane), two species protected under BGEPA (bald and golden eagle), and 35 North Dakota SCP (including whooping crane, bald eagle, and golden eagle) were detected incidentally and during avian use surveys (see **Table 3**).

Twelve SCP species in **Table 3** are also listed by the USFWS as BCC species for the Prairie Pothole BCR and/or throughout its range in the continental United States and Alaska (USFWS 2021b). An additional eight species were considered BCC at the time of Tier 1 through 3 studies (USFWS 2008) but have since been removed from the BCC list (USFWS 2021b). Although protected under the MBTA, similar to SCP, these species are not afforded additional protection under federal or state regulations but have been identified as part of conservation planning efforts by the USFWS.

Additional discussions of species listed in **Table 3** are included in **Section 5.3**.

5.2. Question 2 and Response

Do field studies indicate the potential for significant adverse impacts on affected populations of species of habitat fragmentation concern?

Based on Tier 3 studies, there is potential for impacts to species of habitat fragmentation concern. Although the Project Area comprises primarily cultivated croplands and pasture lands, approximately 43.9 percent of the Project Area is classified as mixed-grass prairie or planted grasslands (USGS 2020a); relatively large tracts of grassland are present, particularly within the northern and northeastern portions of the Project Area. In total, seven grassland bird SCP potentially susceptible to habitat fragmentation (WEST 2021) and likely to breed within the Project Area were documented during Tier 3 studies:

- Bobolink
- Chestnut-collared longspur
- Grasshopper sparrow (*Ammodramus savannarum*)
- Northern harrier

- Sharp-tailed grouse
- Sprague's pipit (*Anthus spragueii*)
- Upland sandpiper (Bartramia longicauda)

Habitat fragmentation is primarily relevant for these species during the breeding season.

The Project is not expected to have significant impacts on populations of species of habitat fragmentation concern because most infrastructure will be constructed within a previously fragmented agricultural landscape dominated by cultivated cropland. In these areas, habitat fragmentation impacts will have, for the most part, occurred prior to project development, and the Project is not expected to contribute additional cumulative impacts to habitat fragmentation. Some infrastructure may be placed within relatively larger tracts of grassland habitat; however, Badger Wind continues to coordinate with the USFWS and NDGF to refine design of the site layout to minimize grassland impacts. Furthermore, Badger Wind is working with NDGF to also address potential impacts to unbroken grasslands for upland game birds and wetlands for waterfowl.

Tier 1 and 2 desktop studies found that extensive forested habitat is not generally found within the 2019 Study Area and a high degree of woodland habitat fragmentation already exists (Atwell 2019; Atwell 2020a). Therefore, impacts to woodland species of habitat fragmentation concern are not likely to occur. Furthermore, results from Tier 3 bat surveys do not indicate that the Project will significantly and adversely impact threatened or endangered bat species by fragmenting roosting habitat.

5.3. Questions 3 and 4 and Responses

Question 3: 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 site?

Question 4: What are the potential risks of adverse impacts of the proposed wind energy site 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?)

Species of concern identified in Tiers 1 and 2 and documented within the 2019 Study Area as part of Tier 3 studies are summarized in **Tables 2 and 3**. Of the TES and eagle species protected under the BGEPA that were identified during the Tier 1 and 2 analyses, whooping crane, bald eagle, and golden eagle were observed within the 2019 Study Area during Tier 3 studies. Piping plover and red knot were identified as potentially present as part of Tier 1 and 2 analyses but were not observed within the 2019 Study Area during Tier 3 studies. Similarly, northern long-eared bats were not confirmed during Tier 3 bat acoustics studies, though calls of an unknown *Myotis* species were detected, as previously discussed.

Discussion of avian and bat TES currently afforded protection under the ESA and BGEPA, as well as North Dakota SCP (including species of habitat fragmentation concern listed in **Section 5.2**), observed during Tier 3 studies is provided below.

5.3.1. ESA-Listed Avian Species

Whooping crane (ESA-listed endangered): Whooping crane was the only bird species listed as threatened or endangered under the ESA that was observed during Tier 3 field studies. As previously mentioned, the Project Area is located within the 75 percent migration corridor for this species (i.e., the area containing 75 percent of all recorded observations). During year 1 avian use studies, three adult whooping cranes were detected within the 2019 Study Area during surveys on April 15, 2020. The cranes were initially observed flying north at heights ranging from 2 to 7 m above the ground (i.e., below the rotor-swept zone [RSZ]) but were observed foraging in corn throughout the day. The whooping cranes were again present on April 16 and 17, 2020, and they roosted 0.7 miles (1.1 km) from their foraging location on those days. The roosting location was at the confluence of two riverine wetlands with seasonally flooded water regime classifications within the western portion of the current Project Area.

Of note, due to poor harvesting conditions during the fall of 2019, the whooping cranes were foraging in unharvested stands of corn. Other areas of unharvested corn were also noted within the 2019 Study Area in April 2020, perhaps dispersing whooping crane stopover use farther from the migration corridor's centerline than expected.

Some data indicate that cranes in general are at low risk of collision with wind turbines (Nagy et al. 2012). To date, no known whooping crane mortality event has occurred at an operational wind turbine (USFWS 2009; NGPC 2018). Currently, the USFWS (2009) accepts that whooping cranes actively avoid wind energy facility infrastructure out to at least 0.5 miles. Similarly, USFWS acknowledges that whooping cranes typically migrate above typical industry standard rotor-swept heights. However, data and expert biologist opinion indicate that daily forage-to-roosting flights do occur at risky flight heights, and these low flights can occur for distances up to 2 miles. If visibility conditions are poor, USFWS indicates that risky flights may occur up to 5 miles from migration stopover sites.

In contrast, power-line collision represents a notable cause of mortality events during active migration (USFWS 2009; NGPC 2018). While the overhead electric transmission line is relatively short (approximately 0.75 miles), transmission line infrastructure associated with the Project could represent potential risk to migrating cranes. Badger Wind will follow Avian Power-Line Interaction Committee (APLIC) recommendations to reduce the potential for collisions with the Project's proposed 0.75-mile transmission line. In addition, if MET towers will require guy wires, these will be marked with avian flight diverters to reduce the potential for collisions. Limiting areas of unharvested crops, where feasible, would also help limit the potential to attract whooping cranes into the Project Area during operations. In addition, if a whooping crane is sighted within the Project Area during construction, construction activities will cease within a mile of the sighting until the whooping crane has left the area, further reducing the potential for impacts to this species.

Bald eagle (BGEPA and SCP II): Over the course of pre-construction eagle use studies, 69 bald eagle detections were recorded (34 during the first year of surveys and 35 during the second year of surveys) (Atwell 2020c; Atwell 2021c). Observations occurred throughout each year of eagle use

studies, though most detections occurred during the spring and fall migratory periods. Observations refer to detections recorded during eagle use surveys.

Bald eagle mean use rates were generally low across the 2019 Study Area. Thirteen of the 69 (19 percent) bald eagle observations across the 2019 Study Area in year 1 and year 2 were recorded at station 4 and were of individuals associated with an in-use nest that was occupied in 2019 and 2020.

Among the other 52 stations, stations 11 and 18 each recorded six bald eagle observations over year 1 and year 2 surveys cumulatively. Station 12 recorded five detections over the 2-year period. Observations of small migrating groups of two to three bald eagles, which were infrequent events during the year 1 and year 2 surveys, contributed to the relatively higher numbers recorded at these three stations. The remaining 39 bald eagle detections were recorded at 26 other point count stations.

Stations 11, 12, and 18 are proximate to one another, and all three points are within 2 miles of a creek that flows northward from Wishek to Beaver Lake. All of the eagles observed at these three stations appeared to be in active migration. It is possible that migrating eagles may loosely follow this watercourse while moving through the area, slightly increasing use rates in this portion of the 2019 Study Area (Atwell 2020c; Atwell 2021c).

One in-use bald eagle nest was found within the 2019 Study Area during both the 2019 and 2020 eagle and raptor nest surveys (**Figure 7, Avian Resources; and Figure 8, Eagle and Raptor Nest Survey Results**). This nest is also located within the current Project Area boundary. No other eagle nests were found throughout the eagle nest survey area during 2019 and 2020 eagle and raptor nest surveys (Atwell 2020c; Atwell 2021c). However, on March 10, 2021, a new in-use bald eagle nest was located within the Project Area (**Figure 7, Avian Resources; and Figure 8, Eagle and Raptor Nest Survey Results**). The nest was found incidentally during eagle use surveys. The 2019–2020 and 2021 nests are believed to belong to the same nesting territory. The 2021 bald eagle in-use nest is approximately 1.98 miles (3.19 km) east of the 2019–2020 nest. The 2019–2020 nest is now classified as an alternate nest site (USFWS 2013; USFWS 2016c). The 2019–2020 nest was checked repeatedly after the March 10 discovery of the 2021 nest, and it was found to be missing and may have fallen from its substrate. Bald eagles were not observed at the old nest site during these subsequent checks. Recent guidance issued by the USFWS notes that nesting bald eagles are not expected to roam beyond 2 miles from nest sites (USFWS 2020b). The 2019–2020 alternate nest site and the 2021 in-use nest are located 2.0 miles and 2.1 miles from the nearest proposed turbine locations, respectively.

Bald eagle collision mortality associated with wind farm operations within the United States has not been widely documented (Bay et al. 2016; USFWS 2018b). However, eagles migrating through the Project Area or using the Project Area for breeding or wintering are at risk of collision with turbines. Cumulatively, 157 total bald eagle flight minutes were recorded over two years of surveys, and bald eagles were often observed within the RSZ. Tier 4 post-construction monitoring will provide more clarity regarding any impacts to bald eagles. Badger Wind has sited turbines at least 2 miles from the known bald eagle nest to reduce the risk of collision with turbines. Badger Wind

continues to coordinate with USFWS to avoid and minimize potential impacts to eagles to the extent practical.

Golden eagle (BGEPA and SCP II): Over the course of pre-construction eagle use studies, 12 golden eagle detections were recorded, including six observations during both year 1 and year 2 surveys (Atwell 2020c; Atwell 2021c). During year 1, observations occurred across the spring, fall, and winter, whereas in year 2, observations only occurred in fall and winter. Standardized observations refer to detections recorded during eagle use surveys. There was no apparent spatial pattern to golden eagle detections during year 1 or year 2 surveys. The 12 golden eagle sightings were distributed across the 2019 Study Area (Atwell 2020c; Atwell 2021c).

Indirect impacts to golden eagles due to habitat loss are not expected to occur throughout construction of the Project. Cumulatively, 47 total golden eagle flight minutes were recorded over two years of surveys, and golden eagles were often observed within the RSZ. While studies conducted in the western United States have shown golden eagles to be susceptible to collision mortality at wind farms (Smallwood and Thelander 2008), low observed mean use rates (12 observations over 1,272 hours of survey effort) suggest that golden eagle use of the Project Area is minimal. Tier 4 post-construction monitoring will provide more clarity regarding impacts to golden eagles. Badger Wind continues to coordinate with USFWS to avoid and minimize potential impacts to eagles to the extent practical.

5.3.2. North Dakota Avian Species of Conservation Priority

Several non-raptor species that are listed as North Dakota SCP were detected during 10-minute diurnal avian activity point count surveys or incidentally (Atwell 2020c; Atwell 2021c). These species are summarized below:

Non-Passerines and Passerines

Red-headed woodpecker (SCP Level I): One red-headed woodpecker (*Melanerpes erythrocephalus*) was observed over the course of two years of avian use surveys. This observation occurred on August 6, 2020 (year 2), at station 37. This species was detected within the 2019 Study Area incidentally on several occasions, typically in the fall during year 1 and year 2 surveys. Observations occurred exclusively at stations 37, 41, and 48, which are all in the southwestern portion of the 2019 Study Area. Red-headed woodpeckers prefer deciduous woodlots and may use shelterbelts within agricultural landscapes for breeding (Dyke et al. 2015). While nesting is possible within the Project Area, it is not anticipated that this species will be a common breeder or will experience significant impacts, given the presence of limited habitat and general lack of detections within the 2019 Study Area.

Sprague's pipit (SCP Level I): No spring detections and two fall detections were recorded incidentally and during year 2 avian use surveys. All observations occurred during fall migration, after July 28, 2020. Eleven of the 13 year 2 observations of individuals or groups occurred in the northern half of the 2019 Study Area, within Logan County. It was not apparent why more observations were recorded over the year 2 study period than during year 1, when Sprague's pipits were observed on only two occasions (also in the fall). Behaviors that would confirm local breeding

(e.g., song displays, nesting material carries, food carries to dependent young, dependent fledglings) were not observed during the 13 detections. Observations occurred in wheat stubble and on grassy hilltops, habitat features found throughout the 2019 Study Area. While nesting is possible within the Project Area, it is not anticipated that this species will be a common breeder or would experience significant impacts, given the general lack of detections within the 2019 Study Area. Furthermore, Badger Wind intends to minimize impacts to native grasslands to the greatest extent feasible.

Baird's sparrow (SCP Level I): Baird's sparrow (*Centronyx bairdii*) was not observed during avian use surveys. During year 1, two individuals were detected incidentally in May of 2019, one each at stations 3 and 53 in the northern and northeastern portions of the 2019 Study Area. This species prefers large, contiguous tracts of native prairie, though it will also use non-native grasslands and pastures (Dyke et al. 2015). Suitable nesting habitat may exist within the 2019 Study Area, particularly in the northern and northeastern portions, but the lack of observations over the course of two years of surveys indicates that breeding is unlikely and the observed individuals likely represented migrants. Therefore, this species is not likely to experience significant impacts as a result of the Project given the general lack of detections within the 2019 Study Area.

Grasshopper sparrow (SCP Level I): Four spring detections and one fall detection were recorded during year 1 avian use surveys, and four spring detections and zero fall detections were made during year 2 avian use surveys. Grasshopper sparrows were also incidentally observed at approximately 50 percent of point count stations during year 2, were observed throughout the 2019 Study Area, and were often associated with grassland habitats. Grasshopper sparrows were detected much more frequently during the summer survey period and likely breed within the Project Area. The majority of incidental observations occurred in June or July, which was outside of the spring and fall survey periods. Given this species' level of use of the 2019 Study Area and the presence of suitable habitat throughout much of the Project Area, development and operation of the Project may impact this species. Badger Wind intends to minimize impacts to native grasslands to the greatest extent feasible, though collisions with turbines are still possible. Tier 4 post-construction monitoring will provide more clarity regarding any impacts to grasshopper sparrows.

Nelson's sparrow (SCP Level I): Nelson's sparrow was not observed during avian use surveys. During year 1, one individual was detected incidentally at station 6, and two detections (representing 1–2 individuals) occurred at station 37. During year 2, one individual was detected incidentally at station 37. This species prefers shallow marsh edges and wet meadows (Dyke et al. 2015) and may nest locally in appropriate habitats within the Project Area. Station 6 is near a riverine wetland that flows into Doyles Lake. Station 37 is near riverine wetland associated with a tributary of the south branch of Beaver Creek. Riparian areas north and west of Wishek may also support riverine wetlands that are favorable to this species. While nesting is possible within the Project Area, it is not anticipated that this species will be a common breeder or experience significant impacts, given the general lack of detections within the 2019 Study Area.

Chestnut-collared longspur (SCP Level I): In total, 22 spring detections and 11 fall detections occurred during year 1 avian use surveys, and 55 spring detections and 92 fall detections were made during year 2 avian use surveys. Chestnut-collared longspur were also incidentally observed

at 70 percent of point count stations in year 2. Over the year 1 study period, chestnut-collared longspur mean use rates were 0.14 detections/10-minute survey/150 m plot during the spring and 0.05 detections/10-minute survey/150 m plot during the fall. Over the year 2 study period, chestnut-collared longspur mean use rates were 0.35 detections/10-minute survey/300 m plot during the spring and 0.43 detections/10-minute survey/300 m plot during the fall. Males were frequently seen singing, and this species likely breeds within the Project Area. While observed throughout the 2019 Study Area, chestnut-collared longspurs were most frequently observed in the northern and northeastern portions of the 2019 Study Area that are higher in elevation and are dominated by herbaceous cover as shown in **Figure 2, Land Cover Types within the Project Area**. Given this species level of use of the 2019 Study Area and the presence of suitable habitat throughout much of the Project Area, development and operation of the Project may impact this species. Badger Wind intends to minimize impacts to native grasslands to the greatest extent feasible, though collisions with turbines are still possible. Tier 4 post-construction monitoring will provide more clarity regarding any impacts to chestnut-collared longspurs.

Loggerhead shrike (SCP Level II): One incidental detection of loggerhead shrike (*Lanius ludovicianus*) occurred on April 17, 2021 (year 2), at station 30 in the central portion of the 2019 Study Area. This species was also detected incidentally in the summer while traveling between points during year 1 surveys, but no detections occurred during year 2. These observations likely represent migrating individuals. While nesting is possible within the Project Area, it is not anticipated that this species will be a common breeder or experience significant impacts, given the general lack of detections within the 2019 Study Area.

LeConte's sparrow (SCP Level II): LeConte's sparrow (*Ammospiza leconteii*) was not observed during avian use surveys; however, singing males were detected incidentally in July at stations 37 and 57 during year 2 avian use surveys. Stations 37 and 57 are near riverine wetlands associated with tributaries of Beaver Creek. The wet/riparian areas associated with station 57 are west and outside of the current Project Area. Similar to Nelson's sparrow, LeConte's sparrows may nest locally in and near riverine habitats similar to those within the Project Area. While nesting is possible within the Project Area, it is not anticipated that this species will be a common breeder or experience significant impacts, given the general lack of detections within the 2019 Study Area.

Dickcissel (SCP Level II): Dickcissels (*Spiza americana*) were not observed during avian use surveys during year 1 or year 2; however, this species was observed on multiple occasions throughout the 2019 Study Area during the summer season when surveys for small-bodied species did not take place. As such, this species is likely to breed within the 2019 Study Area. Dickcissel is a fairly common to uncommon species that will nest in a variety of grassland types, including hayfields and road ROW (Dyke et al. 2015). Given this species' level of use of the 2019 Study Area and presence of suitable habitat throughout much of the Project Area, development and operation of the Project may impact this species. Tier 4 post-construction monitoring will provide more clarity regarding any impacts to Dickcissels.

Bobolink (SCP Level II): During year 1 surveys, bobolink was detected 11 times in the fall and 22 times in spring. During year 2 surveys, bobolink was detected 22 times in the fall and 30 times in spring. During year 2 surveys, bobolinks were incidentally observed at 98 percent of point count

stations in June and July, and dependent fledglings were observed in early August at station 32, confirming breeding. Bobolink mean use rates during year 1 surveys were 0.12 detections/10-minute survey/150 m plot in the spring and 0.02 detections/10-minute survey/150 m plot in the fall. Bobolink mean use rates during year 2 surveys were 0.14 detections/10-minute survey/300 m plot during both the spring and fall. Bobolink is a fairly common to abundant species that will use a variety of open habitats, including native grasslands, hayfields and pastures, old fields, and no-till cropland (Dyke et al. 2015). Given this species' level of use of the 2019 Study Area and presence of suitable habitat throughout much of the Project Area, development and operation of the Project may impact this species. Tier 4 post-construction monitoring will provide more clarity regarding any impacts to bobolinks.

Western meadowlark (SCP Level II): In total, 66 spring detections and 22 fall detections of western meadowlark (*Sturnella neglecta*) were recorded during avian use surveys in year 1. In year 2, 171 spring detections and 114 fall detections of western meadowlark were recorded during avian use surveys. During year 2, western meadowlarks were incidentally observed at all point count stations in June and July. Western meadowlark mean use rates during year 1 were 0.42 detections/10-minute survey/150 m plot during the spring and 0.10 detections/10-minute survey/150 m plot during the fall. Western meadowlark mean use rates during year 2 were 1.08 detections/10-minute survey/300 m plot during the spring and 0.54 detections/10-minute survey/300 m plot during the fall. Western meadowlark is a common to uncommon species that prefers native grasslands but will also occur in hayfields, weedy fields, and within the grassy margins of croplands and roadsides (Davis and Lanyon 2008; Dyke et al. 2015). Given this species' level of use of the 2019 Study Area and presence of suitable habitat throughout much of the Project Area, development and operation of the Project may impact this species. Tier 4 post-construction monitoring will provide more clarity regarding any impacts to western meadowlarks.

Shorebirds

Marbled godwit (SCP Level I): Four spring detections of five individuals and no fall detections of marbled godwit were made during year 1 avian use surveys. During year 2, seven spring detections of nine individuals and no fall detections of marbled godwit were made. During year 2, marbled godwits were observed incidentally at 19 percent of point count stations. Marbled godwits may nest within the Project Area in low numbers, but specific favored locations were not apparent during year 1 and year 2 surveys. During the year 1 study period, agitated behavior was recorded at station 16 on June 10, 2019, suggesting that a nest or brood was nearby. Breeding behaviors were not observed during year 2 surveys, and godwits were not observed at station 16 during the year 2 study period. Similarly, during year 2, agitated behavior was recorded at station 5 in the northern portion of the 2019 Study Area on June 11, 2021, suggesting that breeding was possible at a wetland west of the station. However, no marbled godwits were detected from this point count station during year 1 surveys. It is not anticipated that this species would experience significant impacts given the relatively low number of detections during avian use surveys; however, this species moves through the Project Area while migrating and foraging and may be at risk of collision with operational turbines. Breeding is likely within the Project Area and impacts to wetland habitat from project infrastructure may affect this species; however, Badger Wind has sited project

infrastructure to generally avoid wetlands. Tier 4 post-construction monitoring will provide more clarity regarding any impacts to marbled godwits.

Wilson's phalarope (SCP Level I): Two detections of six Wilson's phalarope individuals were made during avian use surveys in year 1, and three detections of four individuals were made in year 2. Wilson's phalaropes were observed at stations 15 and 22 in both year 1 and year 2, suggesting that they may locally breed at some wetlands within the Project Area. It is not anticipated that this species will experience significant impacts given the limited number of detections during avian use surveys; however, breeding is likely within the Project Area, and impacts to wetland habitat would affect this species although, as previously mentioned, impacts to wetland habitat will be avoided to the extent feasible.

American avocet (SCP Level II): American avocets (*Recurvirostra americana*) were only observed incidentally during year 1 and year 2 avian use surveys at scattered locations throughout the 2019 Study Area, typically during the fall. One summer observation of four birds flying to the northeast occurred at station 5 in the northeastern portion of the Project. This species generally prefers to nest in sparsely vegetated areas on exposed shorelines of wetlands or lakes (Dyke et al. 2015). Nesting habitat for American avocets is more prevalent outside of the 2019 Study Area to the northeast; however, wetlands in the northeastern portion of the 2019 Study Area may provide suitable habitat as well. It is not anticipated that this species will experience significant impacts given the overall low number of detections (incidentals only) and the fact that breeding habitat appears limited within the Project Area. Construction of project infrastructure is also not anticipated in the vicinity of prairie potholes where breeding habitat is most prevalent.

Willet (SCP Level II): One willet was observed over the course of two years of avian use surveys. This observation occurred on May 15, 2020 (year 2), at station 52. This species was detected within the 2019 Study Area incidentally on multiple occasions throughout the spring, summer, and fall during year 1 and year 2 surveys. Most observations occurred in the northern and northeastern portions of the 2019 Study Area, particularly at stations 51, 52, and 53, which are located outside of the current Project Area boundary and contain the highest degree of suitable breeding habitat (i.e., large tracts of grassland habitat with adjacent shallow, wetland features with sparsely vegetated shoreline) (Dyke et al. 2015). However, one individual at station 7 (northern portion of the 2019 Study Area) appeared to display territorial behavior and may have been nesting nearby. Therefore, while breeding habitat primarily occurs outside of the 2019 Study Area to the northeast, limited suitable breeding habitat within the 2019 Study Area may support nesting willets. It is not anticipated that this species will experience significant impacts given that breeding habitat appears limited within the Project Area and construction of project infrastructure is not anticipated in the vicinity of prairie potholes where most detections of this species occurred.

Upland sandpiper (SCP Level II): During year 1 avian use surveys, 9 detections of 11 individual upland sandpipers were observed in the spring only. During year 2 avian use surveys, 26 detections of 34 individual upland sandpipers were observed in the spring and fall into mid-August of year 2. Upland sandpipers were detected at 36 percent of point count stations in year 2. Upland sandpipers likely nest in roadside habitats/ditches, grasslands, and cropland (particularly no-till) habitats throughout the 2019 Study Area. Given this species level of use of the 2019 Study Area and

presence of suitable habitat throughout much of the Project Area, development and operation of the Project may impact this species. Tier 4 post-construction monitoring will provide more clarity regarding any impacts to upland sandpipers.

Waders

American bittern (SCP Level I): American bitterns nest in wetlands with tall emergent vegetation (Dyke et al. 2015), and one was observed vocalizing at a wetland near station 53 on May 15, 2020 (during year 2 surveys). Bitterns were not observed at this location on subsequent surveys, but individuals are difficult to detect from roadsides when silent and may nonetheless nest at this location. Station 53 is outside of the current Project Area boundary, though this species may nest in similar habitats within the current Project Area. American bitterns were also detected as incidental observations during year 1 surveys near station 52 (July 26, 2019; outside current Project Area boundary) and station 8 (August 28, 2019; adjacent to current Project Area boundary). It is not anticipated that this species will experience significant impacts given the overall low number of detections and the fact that breeding habitat appears limited within the Project Area. Construction of project infrastructure is not anticipated in areas where this species was detected, particularly in the vicinity of prairie potholes where breeding habitat is most prevalent.

Waterbirds

Horned grebe (SCP Level I): Horned grebe (*Podiceps auritus*) was only observed during avian use surveys in the spring and summer in year 1 at station 52. Station 52 is near several prairie potholes and is not within the current Project Area boundary. This species was also observed incidentally within the 2019 Study Area during the spring and summer in year 2 but not during surveys (i.e., while driving between survey points). It is not anticipated that this species will experience significant impacts given the general lack of detections within the 2019 Study Area. Construction of project infrastructure is not anticipated in the vicinity of prairie potholes where this species is most likely to breed.

American white pelican (SCP Level II): Two spring detections of 7 individuals and one fall detection of 21 individuals were recorded during year 1 avian use surveys for American white pelican (*Pelecanus erythrorhynchos*). Three spring detections of 62 individuals and one fall detection of two individuals were recorded during year 2 avian use surveys. American white pelicans were also incidentally observed in the spring, summer, and fall. Nesting colonies were not observed and are not known to exist within the 2019 Study Area. Flocks of up to 60 individuals were encountered at 20 of 53 point count stations (38 percent) throughout the 2019 Study Area during year 2 surveys. While breeding is not likely within the Project Area, this species can migrate through the Project Area in large numbers and may be at risk of collision with operational turbines. Tier 4 post-construction monitoring will provide more clarity regarding any impacts to American white pelicans.

Black tern (SCP Level I): One fall detection of black tern occurred during year 1 avian use surveys, and five spring detections and one fall detection occurred during year 2 avian use surveys. This species was also observed on numerous occasions throughout the 2019 Study Area incidentally in the spring, summer, and fall. Black terns were generally observed in low numbers in the

northeastern portion of the 2019 Study Area in association with greater wetland density. Nesting colonies were not observed within the 2019 Study Area. While breeding is not likely within the Project Area, this species moves through the Project Area while migrating and foraging and may be at risk of collision with operational turbines. Tier 4 post-construction monitoring will provide more clarity regarding any impacts to black terns.

Franklin's gull (SCP Level I): Franklin's gulls were observed flying through the 2019 Study Area more frequently in the fall than the spring over both the year 1 and year 2 study periods (year 1: 2 spring detections and 2,023 fall detections; year 2: 199 spring detections and 342 fall detections). There are no known Franklin's gull nesting colony sites within the 2019 Study Area, and fall detections appear to represent post-breeding movements from locations beyond the 2019 Study Area. Reasons for diminished numbers observed during the fall period in year 2 are unclear. During year 1, large flocks were found opportunistically foraging in agricultural habitats following harvesting and haying activities (e.g., single flock of 500 individuals observed on August 27, 2019). This is an expected observation for gulls moving in large numbers over agricultural cropland habitats, yet one not observed during surveys during the fall period in year 2. The observed decrease in fall Franklin's gull detections may have been due to chance. A large group of approximately 1,000 individuals was detected incidentally on September 22, 2020, at station 23, demonstrating the presence of Franklin's gull flocks during year 2 surveys. While breeding is not likely within the Project Area, this species moves through the Project Area while migrating and foraging and may be at risk of collision with operational turbines. Tier 4 post-construction monitoring will provide more clarity regarding any impacts to Franklin's gulls.

Waterfowl

Northern Pintail (SCP Level II): A total of 109 spring detections of northern pintail were documented during year 1 avian use surveys. A total of 31 spring detections and five fall detections of northern pintail were documented during year 2 avian use surveys. Northern pintails were also observed at 66 percent of point count stations during the year 2 study period. Northern pintails were usually observed singly or in small groups of less than five individuals in wetlands and cropland habitats throughout the 2019 Study Area, though groups of up to 20 were occasionally observed. Pintail fledglings were not noted during year 1 or year 2 surveys, but this species may nest near wetland complexes in associated prairie habitats. While breeding has not been confirmed within the Project Area, this species is relatively common and moves through the Project Area while migrating and foraging. Therefore, it may be at risk of collision with operational turbines. Tier 4 post-construction monitoring will provide more clarity regarding any impacts to northern pintail.

Canvasback (SCP Level II): Four canvasback were observed during year 1 surveys, and two canvasback were observed during year 2 surveys. All four individuals detected during year 1 surveys were at station 16 in the western portion of the 2019 Study Area in early April. Both year 2 observations occurred in the northeastern portion of the 2019 Study Area at stations 5 and 53 in May. No evidence of breeding within the 2019 Study Area was observed. It is not anticipated that this species will experience significant impacts given the general lack of detections within the 2019 Study Area. Construction of project infrastructure is not anticipated in the vicinity of prairie potholes where this species is most likely to breed.

Lesser Scaup (SCP Level II): Five lesser scaup were observed during year 1 surveys. All five individuals were observed in the northeastern portion of the 2019 Study Area at stations 5 and 53 in May. This species was also observed incidentally in the summer during year 1 surveys. During year 2 surveys, lesser scaup were only observed incidentally in the northeastern portion of the 2019 Study Area in spring and summer. It is not anticipated that this species will experience significant impacts given the general lack of detections within the 2019 Study Area. Construction of project infrastructure is not anticipated in the vicinity of prairie potholes where this species is most likely to breed.

Prairie Grouse (Sharp-tailed Grouse)

One confirmed sharp-tailed grouse lek location and two possible lek locations were observed within the grouse survey area during the year 1 grouse lek surveys. All three lek locations were along the edge of the 2019 Study Area boundary (**Figure 7, Avian Resources**) (Atwell 2020c).

Thirteen confirmed sharp-tailed grouse lek locations and two possible lek locations were found within the grouse survey area through a combination of aerial and ground-based efforts during the year 2 lek survey (**Figure 7, Avian Resources**). The same area was surveyed in 2019 and 2020, which included the 2019 Study Area and a surrounding 1-mile survey buffer (Atwell 2021c).

Two confirmed lek locations were observed within the current Project Area boundary, four confirmed and one possible lek location were observed within 1 mile of the current Project Area boundary, and seven confirmed and one possible lek location were observed beyond the current Project Area's 1-mile buffer (**Figure 7, Avian Resources**). Confirmed leks held 4 to 27 individuals (Atwell 2021c). Confirmed and possible leks are depicted in **Figure 7, Avian Resources** with 0.5-mile-radius buffers to represent likely nesting areas for females (Dyke et al. 2015).

During year 1 diurnal avian activity surveys, 38 sharp-tailed grouse were detected: 32 in the spring and six in the fall. This resulted in a mean use of 0.20 detections/10-minute survey/800-m plot in the spring and 0.03 detections/10-minute survey/800-m plot in the fall. During year 2 diurnal avian activity surveys, 18 sharp-tailed grouse were detected: 9 in the spring and 9 in the fall. This resulted in a mean use of 0.06 detections/10-minute survey/800 m plot in the spring and 0.04 detections/10-minute survey/800 m plot in the fall (Atwell 2020c; Atwell 2021c).

It is not anticipated that this species will experience significant impacts. While this species is relatively common within the 2019 Study Area, sharp-tailed grouse tend to remain below RSZ. Also, wind turbines were sited within agricultural areas and a 1-mile buffer was established for leks to the extent feasible to limit potential impacts to sharp-tailed grouse lek and nesting habitat. This species may experience impacts via displacement (Shaffer and Buhl 2016). However, Badger Wind intends to avoid siting wind turbines within native grasslands to the greatest extent feasible, thereby reducing displacement impacts.

Nesting Raptor Species

The 2019 Study Area was surveyed for nesting raptors in May 2019 and April and May 2020 via aerial and ground-based surveys. Nests of the following non-eagle raptor species were identified

within the raptor nest survey area during the 2019 survey (**Figure 8a, Year 1 Eagle and Raptor Nest Survey Results):** ferruginous hawk (*n*=5), red-tailed hawk (*n*=4), great horned owl (*Bubo virginianus; n*=2,), Swainson's Hawk (*n*=1), and unknown raptor (*n*=1) (Atwell 2020c; Atwell 2021c). Non-eagle raptor nests identified during the 2020 eagle and raptor nest survey that are within the current Project Area boundary and a surrounding 2-mile buffer (**Figure 8b, Year 2 Eagle and Raptor Nest Survey Results**) include red-tailed hawk (*n*=8), great horned owl (*n*=5), ferruginous hawk (*n*=4; a fifth occupied nest was found in May 2021), Swainson's hawk (n=4), and unknown raptor (*n*=9; two additional nests were found in May 2021).

Of the non-eagle nests located during year 1 studies, three ferruginous hawk nests, three red-tailed hawk nests, one Swainson's hawk nest, one great horned owl nest, and one unknown raptor species nest were found within the 2019 Study Area boundary. Of the nests located during year 2 studies and 2021 micrositing activities, one bald eagle nest, one great horned owl nest, one red-tailed hawk nest, one Swainson's hawk nest, and six unknown raptor nests were found within the current Project Area boundary. Recommended setbacks to raptor nests were used to assist with siting project infrastructure.

Non-eagle raptor species of concern observed within the 2019 Study Area during Tier 3 field studies included American kestrel (*Falco sparverius*; SCP Level II), burrowing owl (*Athene cunicularia*; SCP Level II), ferruginous hawk (SCP Level I), northern harrier (SCP Level II), peregrine falcon (*Falco peregrinus*; SCP Level III), prairie falcon (*Falco mexicanus;* SCP Level II), and Swainson's hawk (SCP Level I). Standardized observations of peregrine falcon and prairie falcon were relatively infrequent, and burrowing owl was only detected once incidentally within the 2019 Study Area while traveling between point count stations. These species are likely uncommon migrants through the Project Area, and significant impacts from project operation are not anticipated.

Raptor mean use recorded during avian use surveys was primarily driven by detections of red-tailed hawks, Swainson's hawks, and northern harriers. During year 1, these species collectively accounted for approximately 68 percent of raptor detections in the spring season and 82 percent of detections in the fall season (Atwell 2020c). During year 2, these species collectively accounted for approximately 66 percent of raptor detections in the spring season and about 65 percent of detections in the fall (Atwell 2021c). Ferruginous hawks accounted for approximately 4.5 percent of raptor detections in the spring and about 0.7 percent of detections in the fall of year 1 surveys, and approximately 4.9 percent of detections in spring of year 2 surveys. No ferruginous hawks were detected during the fall year 2 surveys. American kestrels accounted for approximately 4.5 percent of raptor detections during spring and approximately 2.2 percent of detections in the fall of year 1 surveys. During year 2 surveys American kestrels represented about 7.3 percent of raptor detections in the spring and 5.5 percent of detections in the fall (Atwell 2020c; Atwell 2021c).

In particular, red-tailed hawks, Swainson's hawks, and ferruginous hawks are often found within the RSZ, though northern harriers and American kestrels tend to fly below the RSZ (Atwell 2020c; Atwell 2021c). These species may be at relatively higher risk because of their level of use of the 2019 Study Area; however, measures taken to avoid and minimize potential impacts of the Project to non-cultivated habitat along with proposed measures to avoid and minimize potential impacts, including establishing species-specific raptor nest buffers for wind turbines, are expected to reduce

this risk, and population-level impacts are not expected when accounting for these measures. Collisions with project infrastructure may occur, though population-level risk is not anticipated.

5.3.3. ESA- Listed Bat Species

Northern long-eared bat (Threatened): Tier 1 and 2 studies found that ESA-listed threatened northern long-eared bats could occur within the 2019 Study Area. However, the Project is located outside of the core range for northern long-eared bats. Acoustic monitoring was conducted in 2019 and 2020 at one MET tower location, and some ground-based monitoring was conducted in the vicinity of woodlot patches. Northern long-eared bats were not detected during acoustic monitoring in 2019 and 2020 (Atwell 2020b; Atwell 2021b), though unknown *Myotis* species calls were detected. While the potential for these calls to be attributed to northern long-eared bats could not be ruled out, there was not a sufficient number of pulse calls to attribute these calls to species.

Badger Wind considered establishing 1,000-foot buffers from all woodland patches greater than 10 acres in size, which is a standard practice for minimizing potential impacts associated with potential roost habitat for projects located outside of core range for northern long-eared bats. The habitat assessment indicated, as previously mentioned, that potential roosting habitat is highly fragmented and found that no woodland patches were greater than 10 acres. It is noted, however, that that majority of wind turbines are sited at least 1,000 feet from smaller, fragmented woodlot patches (**Figure 6, Bat Resources**).

Given that the Project is located outside of core range, that summer roosting habitat for this species is highly fragmented within the Project Area, that direct and indirect impacts to woodlots will generally be avoided, and that Tier 3 studies did not confirm use by this species within the 2019 Study Area, the Project is not expected to pose notable risk to northern long-eared bats. Operation of the Project is not expected to result in take of northern long-eared bats over the lifespan of the Project. Most wind turbines are located at least 1,000 feet from the smaller, fragmented woodlots that are present in the Project Area, and direct disturbance to woodlots with trees that contain potential roost trees (snags with diameter at breast height greater than 3 inches and exfoliating bark/cavities) will be avoided to the extent feasible. Any unavoidable tree removal that may occur within the Project Area will follow guidelines in accordance with the 4(d) rule for northern long-eared bat, as presented in **Section 6.2**. Once construction is complete, no further loss of summer bat habitat due to project activities is expected to occur for the remainder of the 30-year life of the Project. Tier 4 post-construction monitoring will also provide more clarity regarding any impacts to northern long-eared bats.

5.3.4. North Dakota Bat Species of Conservation Priority

Big brown bat (SCP Level I): Due to similarities in call signatures between big brown bat and silver-haired bat (non-SCP), these two species were grouped during acoustic analysis. This group had the highest frequency of bat calls (485 calls; 42.8 percent of bat calls) during year 2 studies and the second highest frequency of bat calls during year 1 studies (757 calls; 37.3 percent of bat calls). Big brown bat/silver-haired bat activity was detected at all acoustic monitoring stations during year 1 and year 2 surveys. While peaks in activity during spring and fall are likely attributable to silver-

haired bat activity, which are not year-round residents in the 2019 Study Area, summer activity is likely from big brown bats as they are year-round residents throughout North Dakota (Atwell 2020b; Atwell 2021b). Big brown bat mortality is possible as a result of project operation, particularly during migration or summer periods; however, it is expected to reflect the national trends of mortality for this species (Arnett and Baerwald 2013; Allison 2018; AWWI 2018), and no population-level effects are expected to occur as a result of project operation.

To reduce the risk of turbine collision to bat species, Badger Wind established a 1,000-foot forest buffer around suitable bat habitat. The number of turbines within this forest buffer will be reduced to the extent feasible, and tree clearing of suitable bat habitat is expected to be minimal. Any proposed tree clearing will follow guidelines presented in **Section 6.2**. Tier 4 post-construction monitoring will provide more clarity regarding any impacts to big brown bats.

Little brown bat (SCP Level I): Little brown bats were infrequently detected during Tier 3 acoustic monitoring studies. In total, four calls (0.2 percent of bat calls) attributed to this species were recorded during year 1 studies, and three calls (0.3 percent of bat calls) were recorded during year 2 studies. Calls were recorded at acoustic monitoring stations BMg1 (south of the current Project Area boundary) and BMg2 (in the southern portion of the current Project Area boundary) in year 1. In year 2, calls were recorded at acoustic monitoring stations BMg1 (in the northeastern portion of the current Project Area boundary), BMg2 (same location as year 1), and BMg3 (same location as BMg1 in year 1) (**Figure 6, Bat Resources**) (Atwell 2020b; Atwell 2021b). Little brown bat mortality due to project operation is possible, particularly during migration or summer periods; however, it is expected to reflect the relatively low national trends of mortality for this species (Arnett and Baerwald 2013; Allison 2018; AWWI 2018), and no population-level effects are expected to occur as a result of project operation.

As previously mentioned, to reduce the risk of turbine collision to bat species, Badger Wind will avoid direct impacts to bat habitat to the extent feasible. The number of turbines located near woodlots has been limited to the extent feasible, and tree clearing of suitable bat habitat and specifically removal of potential roost trees is expected to be minimal. Any proposed tree clearing will follow guidelines presented in **Section 6.2**. Tier 4 post-construction monitoring will provide more clarity regarding any impacts to little brown bats.

5.4. Question 5 and Response

How can developers mitigate identified significant adverse impacts?

Badger Wind is voluntarily adhering to guidance included in the WEG, ECPG, and 2016 Eagle Rule revision to minimize potential effects from the Project on birds and bats through development and implementation of this BBCS. A Critical Issues Analysis and agency coordination were used to inform Tier 3 study design. Results from Tier 3 studies and agency coordination were then used to develop and refine the Project Area boundary and locations of project infrastructure. The Project was designed to avoid and minimize use of high-quality habitat and/or areas that may be suitable for TES and other sensitive species of concern to the greatest extent feasible. Badger Wind intends to site most infrastructure in locations that are predominantly agricultural and lack large tracts of

contiguous woodland habitat; such areas generally do not include conservation areas where development is precluded by law.

Placement of turbines and associated infrastructure within large tracts of grassland may result in the displacement of some grassland bird species (Shaffer and Buhl 2016). Badger Wind has conducted field verification of grassland habitat conditions to refine understanding of areas defined by NDGF as unbroken that have been converted to agricultural use (WEST 2021). Badger Wind has used the results of this study, in coordination with USFWS and NDGF to design a project layout that minimizes potential impacts to unbroken grasslands. Badger Wind is also coordinating with USFWS and NDGF to determine potential voluntary offsets for indirect impacts to grassland species. The results of this analysis will help to guide additional conservation measures that can be implemented such as the preservation of existing grassland habitat or creation of new habitat that can support grassland bird species.

Approximately 1,453.7 acres (approximately 4.6 percent of the Project Area) will be disturbed during construction, with approximately 1,361.4 acres of temporary disturbance that will be reclaimed, and a permanent disturbance footprint of 92.3 acres. Badger Wind has employed avoidance and minimization strategies to mitigate minor temporary and permanent impacts as well as identified potential impacts to potential breeding and roosting habitat for birds and bats. These include, but are not limited to, re-siting several construction access roads and turbines to be located outside non-cultivated areas to the extent practical, establishing setback buffers for raptor nests, and minimizing tree removal. Additional measures employed to avoid and reduce impacts are further discussed in **Section 6** of this BBCS.

5.5. Question 6 and Response

Are there studies that should be initiated at this stage that would be continued in post-construction?

Other than those studies conducted adhering to the WEG, no other Tier 3 studies are proposed at this time. While the Project is not likely to have significant impacts to species of concern based on Tier 1, 2, and 3 analyses, the Project will conduct post-construction avian and bat mortality monitoring for at least one year following construction and adhering to the WEG. Post-construction surveys will serve to estimate mortality rates of birds and bats for the Project to further assess potential impacts and validate the efficacy of avoidance, minimization, and mitigation measures. Tier 4 monitoring methods are summarized in **Section 7.1**.

5.6. Tier 3 Decision Point

Tier 3 analyses indicate that the Project presents a low to moderate risk to TES and other sensitive species of concern. Grassland bird species may be impacted if turbine infrastructure is placed within grassland habitat; however, Badger Wind proposes to minimize impacts to native grasslands to the extent feasible and mitigate for unavoidable impacts through the use of a biodiversity offset. Badger Wind has decided to voluntarily proceed to Tier 4 surveys per WEG recommendations to further assess potential impacts to birds and bats and validate the efficacy of avoidance, minimization, and mitigation measures. Mortality monitoring will be based upon USFWS and NDGF

recommendations and industry standards. **Table 4** summarizes specific Tier 3 results and Badger Wind's decision to continue with further Tier 4 studies and analysis.

Table 4. WEG Tier 3 Decision Analysis per Ecological Constraint

Species/Resource	Resource Constraints within the Project Area	Status of Resource Constraint within the Project Area	Tier 3 Decision Point	Direct Impact Avoidance	Tier 4 Analysis Procedure
Avian Resources					
Grasslands	Presence of herbaceous grassland habitat through Tier 2 land-cover analysis (e.g., **Figure 2**).	Present as contiguous grassland parcels, particularly within the northern and northeastern portions of the 2019 Study Area.	Proceed to Tier 4b through assessment of resource impact to specific wildlife species. Proceed to Tier 4a to help validate predictions about likely minimal direct impacts to grassland avian species.	Avoid operational infrastructure development within grassland habitat to greatest extent feasible; implement habitat mitigation protocols including voluntary offsets for impacts to native prairie.	Incorporate avoidance and minimization measures for herbaceous grassland into BBCS; Preliminary Post-Construction Fatality Monitoring; revision of BBCS, as needed.
Whooping Crane	Project is within 75 percent migration corridor for this species. Stopover habitat quantity and quality generally lower than reference areas.	Rare. One incidental detection of four whooping cranes.	Proceed to Tier 4a to help validate predictions about likely minimal direct impacts to the species. Conduct post-construction mortality monitoring and build adaptive response.	Avoid operational infrastructure development near high-quality stopover habitat to greatest extent feasible; Adhere to APLIC guidelines.	Conduct preliminary post-construction fatality monitoring; revision of BBCS, as needed. Badger Wind will also develop a Whooping Crane Contingency Plan that outlines measures to be taken in the event that whooping cranes are observed in the project vicinity during operations.

BW Exhibit 28

Species/Resource	Resource Constraints within the Project Area	Status of Resource Constraint within the Project Area	Tier 3 Decision Point	Direct Impact Avoidance	Tier 4 Analysis Procedure
Bald Eagle	Primarily spring and fall use of Project Area, with less summer and winter use. One known nest within the Project Area.	Uncommon to rare seasonally. One in-use nest within Project Area.	Proceed to Tier 4a to help validate predictions about likely minimal direct impacts to the species. Conduct post-construction mortality monitoring and build adaptive response.	Situate Project to avoid construction of turbines within 2 miles of known eagle nest.	Conduct preliminary post-construction fatality monitoring; revision of BBCS, as needed. Badger Wind continues to coordinate with USFWS to avoid and minimize potential impacts to eagles to the extent practical.
Golden Eagle	Primarily fall and spring use of Project Area. Not likely to breed within Project Area.	Relatively rare within the Project Area, but occurrence in small numbers likely regular.	Proceed to Tier 4a to help validate predictions about likely minimal direct impacts to the species. Conduct post-construction mortality monitoring and build adaptive response.	Situate project operational infrastructure to avoid potential foraging habitat.	Conduct preliminary post-construction fatality monitoring; revision of BBCS, as needed.

BW Exhibit 28

Species/Resource	Resource Constraints within the Project Area	Status of Resource Constraint within the Project Area	Tier 3 Decision Point	Direct Impact Avoidance	Tier 4 Analysis Procedure
Other Nesting Raptors (including North Dakota SCP)	Known nesting raptors within Project Area, primarily red-tailed hawks, ferruginous hawks, Swainson's hawks and great horned owls.	Uncommon and sparsely distributed within isolated woodlots.	Proceed to Tier 4a to help validate predictions about likely minimal direct impacts to the species. Conduct post-construction mortality monitoring and build adaptive response.	Site wind turbines away from known nests. Review on case-by-case basis if woodland habitat is proposed for removal. Site infrastructure outside of recommended nest setback buffers. Monitor nests for disturbance during construction when timeline overlaps with nesting season.	Conduct preliminary post-construction fatality monitoring; revision of BBCS, as needed.
North Dakota Avian Species of Conservation Priority	Thirty-two avian SCP detected within the 2019 Study Area during Tier 3 surveys and incidentally (excluding species list above). Primarily grassland and wetland species.	Rare to common within the Project Area, depending on species and time of year. Many are likely breeders, particularly in the northern and northeastern portions of the Project Area.	Proceed to Tier 4a to help validate predictions about likely minimal direct impacts to the species. Conduct post-construction mortality monitoring and build adaptive response.	Avoid operational infrastructure development within grasslands and wetlands to greatest extent feasible.	Conduct preliminary post-construction fatality monitoring; revision of BBCS, as needed.

BW Exhibit 28

Species/Resource	Resource Constraints within the Project Area	Status of Resource Constraint within the Project Area	Tier 3 Decision Point	Direct Impact Avoidance	Tier 4 Analysis Procedure
Bat Resources					
Deciduous Woodland	Presence of some deciduous woodland (about 0.2 percent of total Project Area acreage).	Few isolated deciduous woodlots and shelterbelts scattered throughout Project Area; largest woodlots in southern portion of Project Area.	No need to proceed to Tier 4b through assessment of resource impact to specific wildlife species. Bat impacts already assessed in Tier 2.	Adhere to 4(d) rule; avoid forested habitat removal during June through July; avoid siting infrastructure in the vicinity of potential bat habitat. Avoid tree removal and specifically removal of potential roost trees to extent feasible.	Incorporate avoidance and minimization measures for deciduous woodland into BBCS. In cases where tree removal cannot be avoided, 4(d) rule would inform tree removal. Revision of BBCS, as needed.
Northern long-eared bat	Potential migration through project airspace; summer roosting possible but not likely.	Not confirmed during Tier 3 field studies.	Proceed to Tier 4a to validate predictions of low impacts from operation of the Project and efficacy of avoidance and minimization measures. The 4(d) rule would apply in this development scenario.	Adhere to 4(d) rule; avoid forested habitat removal during June through July; avoid siting infrastructure in the vicinity of potential bat habitat. Avoid tree removal and specifically removal of potential roost trees to extent feasible.	Conduct preliminary post-construction fatality monitoring; revision of BBCS, as needed.

BW Exhibit 28

Species/Resource	Resource Constraints within the Project Area	Status of Resource Constraint within the Project Area	Tier 3 Decision Point	Direct Impact Avoidance	Tier 4 Analysis Procedure
North Dakota bat Species of Conservation Priority	Potential use of project air space while foraging or migrating.	Little brown bat confirmed during Tier 3 acoustic studies. Big brown bat likely present but difficult to separate calls from silver-haired bat (not SCP).	Proceed to Tier 4a to validate predictions of low impacts from operation of the Project and efficacy of avoidance and minimization measures. The 4(d) rule would apply in this development scenario.	Adhere to 4(d) rule; avoid forested habitat removal during June through July; avoid siting infrastructure in the vicinity of potential bat habitat. Avoid tree removal and specifically removal of potential roost trees to extent feasible.	Conduct preliminary post-construction fatality monitoring; revision of BBCS, as needed.

BW Exhibit 28

6. FACILITY DESIGN TO REDUCE WILDLIFE CONFLICT

6.1. Project Facilities Design and Consideration

6.1.1. Turbine Locations and Design

The project layout includes 74 primary and 5 alternate WTG locations. Turbines are primarily sited within upland and agricultural portions of the Project Area. The WTG site layout has been configured to avoid areas with higher documented use by raptors and other species of wildlife protected under the ESA, BGEPA, and MBTA, to the extent feasible. Habitat that was identified as potentially suitable for species of concern was also avoided to the maximum extent feasible when siting the Project. The Project will also use state-of-the-art wind turbines, which yield more megawatts per turbine, resulting in a lower number of turbines on the landscape to achieve the same level of electricity production. In addition, un-guyed tubular towers will be used for the Project wind turbines, which are documented to lower the potential for raptor and other bird collisions (Gehring et al. 2009). Bird flight diverters will be installed in the event that guyed MET towers are used for the Project.

6.1.2. Facilities

The Project's associated facilities will be sited and designed to avoid and reduce potential impacts to birds and bats, and the collection and communication system will be buried underground in accordance with industry standards. Impacts of these systems on birds and bats will be eliminated since they are underground. The Project Area and associated project infrastructure will be primarily located within cultivated agriculture areas, thereby minimizing project-related land disturbance of habitat for sensitive species. New land disturbance will be limited to the extent feasible. The existing road system will be utilized to the maximum extent feasible, thereby reducing additional land disturbance. Newly constructed access roads will be placed along section lines, within agricultural fields, and outside of wetlands and waterbodies to the extent practicable to reduce habitat fragmentation. The short (0.75-mile) overhead transmission line will be located primarily within agricultural upland habitat. Some wetlands and small forested patches will be encountered along the route; pole placement in wetlands will be avoided to the extent possible. The transmission line will parallel existing roadways and transmission lines for large portions of the route, thereby helping to reduce additional disturbance to bird and bat habitat. Furthermore, the transmission line will be designed to APLIC standards, including the use of avian flight diverters, in order to reduce the risk of electrocution and collision to birds.

6.1.3. Lighting

Wind Turbines: The Project will comply with Federal Aviation Administration (FAA) guidelines. Gehring et al. (2009) reported that flashing red lights attract much lower numbers of nocturnal migrants compared to steady red lights and, in turn, should reduce avian and bat fatalities. The FAA recently amended its recommended lighting standards for wind facilities to follow this recommendation of utilizing flashing red lights in an effort to reduce the potential impacts to migratory species (FAA 2015), and the Project will comply with this standard. Furthermore, the

Project will utilize an Aircraft Detection Lighting System (ADLS), which will turn on lights when and aircraft is in proximity to the Project. As such, the amount of time lights are on will be reduced, thereby reducing the potential for lighting to attract birds.

Project Facilities: Lighting of ancillary structures will be minimized and downward-facing lights and/or motion-sensing lights will be installed, as practicable, to minimize attracting birds/bats. This approach to lighting should further minimize the attractiveness of the Project Area to nocturnal avian and bat migrants and thus reduce bird and bat mortalities (Gehring et al. 2009).

6.2. Specific Avoidance and Minimization Measures

Badger Wind has implemented the policy of avoidance, minimization, and mitigation as part of developing the Project. In past discussions regarding the Project, the USFWS and NDGF have outlined their preferences for avoidance and minimization of unbroken native prairie grasslands, where possible. Avoidance and minimization measures have included: relocating large portions of the Project to the south 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. With respect to offsets, Badger Wind will implement the model outlined in Shaffer et al. (2019). Badger Wind is currently actively pursuing a partnership with a locally existing body in North Dakota in order to best implement voluntary mitigation.

In addition, the following measures will be implemented to avoid and minimize potential impacts to birds and bats:

- Electrocution
    - APLIC best practices will be followed to reduce potential for electrocution and collision.
    - Electrical collection lines will be buried.
- Collision
    - Tubular wind turbine towers will be used (not lattice towers) to minimize perching opportunities.
    - All guy wires on MET towers (if applicable) and aboveground transmission lines will be marked with avian flight diverters.
    - Wind turbine and MET tower lighting will comply with FAA requirements, including use of an FAA-approved ADLS, which will activate lights when an aircraft is detected in the vicinity of the Project. As such lighting that may attract birds will be reduced. Lighting of ancillary structures will be minimized and downward-facing lights and/or motion-sensing lights will be installed, as practicable, to minimize attracting birds/bats.

- Habitat Loss
    - Surface disturbance footprints will be limited to the extent feasible to minimize habitat disturbance.
    - Existing roads will be used wherever possible.
    - Badger Wind has voluntarily implemented the following avoidance and minimization measures for unbroken grasslands
        - Results of the grassland field verification study (WEST 2021) were used to evaluate and inform project infrastructure siting decisions to avoid and minimize potential impacts to unbroken grassland habitat.
        - The Project Area was revised to avoid large areas of intact unbroken grasslands.
        - Focused leasing efforts on more actively managed agricultural lands.
        - Placed access roads along section lines and within agricultural fields, to the extent practicable, to minimize further fragmentation.
        - Sited the majority of wind turbines within agricultural lands.
    - Access roads have been sited outside of wetlands and waterbodies to the extent feasible. Where impacts are unavoidable, potential impacts to potential wildlife habitat, wetlands, and forested areas will be limited to the extent feasible.
    - Impacts to jurisdictional wetlands and waters will be limited to the maximum extent feasible.
    - The final site plan for the Project will exclude all WMAs, WPAs, PLOTs, and other protected federal and state lands.
    - The final site plan for the Project will avoid protected USFWS easements, including wetland and grassland easements. Coordination with the USFWS Kulm Office is ongoing.
    - Badger Wind is coordinating with USFWS and NDGF on potential offsets.
    - A Stormwater Pollution Prevention Plan will be developed and implemented to limit potential for erosion-related impacts to wildlife or sensitive habitats.
- Tree Removal
    - Removal of trees will be avoided to the extent feasible.
    - As appropriate, wooded areas will be checked for potential bat roosts prior to disturbance. If northern long-eared bat (NLEB) presence is detected, the following

voluntary measures will be undertaken by Badger Wind in accordance with the USFWS 4(d) rule:

- Tree removal can occur at distances greater than 0.25 miles (0.4 km) from a known, occupied hibernaculum.
- Tree removal will avoid cutting or destroying known, occupied roost trees during the pup season (June 1 – July 31).
- Tree removal will avoid clear-cuts (and similar harvest methods – e.g., seed tree, shelterwood, and coppice) within 0.25 miles (0.4 km) of a known, occupied roost tree during the pup season (June 1 – July 31).

- Construction Measures
  - As appropriate, areas will be checked for nests and potential bat roosts prior to disturbance and/or surface disturbance, and tree removal will be completed outside the nesting season.
    - The following measures will be implemented to avoid and minimize potential impacts to sharp-tailed grouse leks:
      - Badger Wind has voluntarily sited all wind turbines away from known sharp-tailed grouse leks and within previously fragmented areas in coordination with USFWS and NDGF.
      - The above-ground transmission line was not sited within one mile of sharp-tailed grouse leks, to the extent practical.
      - The area disturbed for siting and construction activities will be minimized to the extent practical.
      - Off-road travel will be minimized and on-site speed limits on roads will be implemented
  - The following measures will be implemented to avoid and minimize potential impacts to nests:
    - Direct impacts to bird nests will be avoided to the extent feasible.
    - Roads and laydown areas will be located in previously disturbed areas, such as cultivated agricultural areas, to the extent practical.
    - Wind turbines were sited at least two miles from eagle nests and 0.25 mile from identified active, occupied raptor nests to the extent practical.
    - Construction activities will be limited in the vicinity of raptor nests during the construction season to the extent practical.

- Construction activities will be initiated prior to the raptor nesting season, to the extent practical.
- In cases where construction activity occurs in proximity to active nests, the nest activity will be monitored during the nesting season by a qualified biologist.
- Where turbines cannot be sited away from a raptor nest, Badger Wind will consult with USFWS and NDGF to determine appropriate mitigation measures, including potentially removing or relocating the nest outside of the nesting season.

  - If a whooping crane is sighted in the Project Area during construction, construction will stop within one mile until the whooping crane has left the area.
  - Temporary disturbance areas will be reclaimed, fertilized, and reseeded according to Natural Resource Conservation Service recommendations, unless otherwise specified by the landowner and approved by the North Dakota Public Service Commission, as detailed in the Badger Wind Reclamation and Weed Management Plan.

- Construction/Operational Measures
  - All contractors and sub-contractors will be required to attend wildlife awareness training.
  - Vehicles will be limited to roads or specific construction paths and will adhere to established on-site speed limits.
  - Good housekeeping measures will be implemented during the construction period and over the operational life of the Project (e.g., collection and disposal of trash, debris, and limiting unharvested crops, as feasible).
  - Wildlife carrion and/or roadkill identified by operations and maintenance (O&M) staff within the project footprint will be promptly removed and disposed of to avoid attracting scavenger wildlife or prey species.
  - Noxious weeds will be managed in accordance with applicable regulations and the Badger Wind Reclamation and Noxious Weed Management Plan.
  - Pesticide, herbicide, fertilizer, and other chemical treatments will be used in accordance with federal and state regulations and laws to minimize drift and other potential impacts on native habitat.
  - A Spill Prevention, Control, and Countermeasure (SPCC) Plan will be developed to outline spill response/containment and clean up procedures.
  - Post-Construction Mortality Monitoring (PCMM) will be conducted for at least one-year after construction. The PCMM program will include searches for bird and bat

carcasses and will correct for potential searcher efficiency and carcass removal biases.

- An adaptive management program will be implemented in accordance with this BBCS.

This BBCS is considered a living document and will be updated over the operational life of the Project as deemed necessary.

6.3. Bird and Bat Conservation Strategy

As part of due diligence efforts and the adaptive management program Badger Wind is implementing for the Project, this BBCS has been developed to document the studies completed to help understand potential risk to avian and bat species from the Project and measures to avoid and minimize these potential impacts, including conservation strategies that will be implemented over the life of the Project. The BBCS outlines the progression of the Project from the preliminary due diligence phases of site assessment through the field studies and discusses minimization measures implemented by Badger Wind based on the results of the Tier 1 desktop analysis through Tier 3 field studies. Tier 4 studies (**Section 7**) will be used to evaluate the efficacy of avoidance and minimization measures designed to limit potential impacts to birds and bats. This document is considered a living document and will be updated as deemed necessary.

7. TIER 4—POST-CONSTRUCTION STUDIES TO ESTIMATE IMPACTS

To substantiate the findings of the Tier 1 through Tier 3 assessment process, Badger Wind proposes to conduct PCMM studies, following completion of construction, to assess risk and estimate impacts to avian and bat species, including TES and other species of concern. The Tier 4 PCMM study design will incorporate guidelines presented in the USFWS Land-based WEG (USFWS 2012).

7.1. Monitoring Methods

Once the Project is operational, PCMM studies will be conducted for one year, as follows:

- Searches for birds and bats will occur in the spring, summer, and fall.
- Searches will occur on roads and pads at 33 percent of project turbines.
- Mortality rates will be calculated for both birds and bats on a per megawatt and per turbine basis, accounting for potential searcher efficiency and carcass removal biases.

Importantly, the complex task of determining fatality rate estimates will follow a rigorous approach to provide the best possible data for calculating these statistics. An annual report will be compiled upon completion of the mortality monitoring study. Items discussed will include:

- Standardized carcass searches of search plots at selected turbines.
- Combined searcher efficiency and carcass removal/persistence bias trials to estimate the probability that a carcass was available to be detected.

Estimates of project-related fatalities will be based on:

- Latest available estimator models (e.g., Generalized Mortality Estimator) (Dalthorp et al. 2018).
- Observed number of carcasses found during searches within the monitoring survey period for which the cause of death is either unknown or is probably project related.
- Measured rates of availability and detectability (by taxa size class).
- Area searched.

Generalized Mortality Estimator (GenEst) software (Dalthorp et al. 2018) or other appropriate estimator will be used to calculate estimates.

7.2. Reporting Mechanisms

The proposed avian and bat mortality monitoring studies will follow parameters set forth within a study plan completed prior to the start of monitoring. An annual report will be compiled detailing findings for the current year's mortality study. The annual report will be shared with the USFWS and NDGF and Badger Wind will coordinate with these agencies to determine if adaptive

management measures are warranted. Should operations staff or contractors confirm fatality of a species protected under the ESA or BGEPA, USFWS and NDGF will be notified within 24 hours. Key contacts for reporting avian and bat wildlife incidents, if applicable, are included in **Appendix C**.

7.3. Adaptive Management

This BBCS addresses the potential for "*significant adverse impacts*" (i.e., USFWS 2012) to species of concern and their habitats. Potential significant adverse impacts to a broad spectrum of wildlife resources have not been identified as a possible outcome of developing and operating the Project, and this BBCS was created to provide an efficient means of navigating through project operations. If significant adverse impacts are found to have occurred, adaptive management measures may be used to develop new measures to avoid, minimize, and mitigate these impacts and to monitor the efficacy of these measures. Federal and state wildlife agencies have not set potential impact threshold scenarios (e.g., species group per-megawatt collision mortality thresholds) that would qualify as significant adverse impacts in this region of North Dakota. However, certain scenarios, such as the discovery of a new eagle nest within the Project Area or the discovery of a fatality confirmed to be an ESA-listed TES or eagle species, will trigger agency coordination to assess whether adaptive management responses are warranted.

Similarly, population-level bird and bat effects and significant avian-bat mortality events (e.g., "mass mortality events") at the Project are not expected based on the analysis of Tier 3 study data as presented within this BBCS. A certain level of avian-bat fatality is expected at any modern wind energy generation facility (Arnett et al. 2008; Loss et al. 2013), and residual fatality events do not necessarily equate to significant adverse impacts, as described by USFWS (2012). This BBCS has laid out a comprehensive pathway by which Badger Wind has taken a multi-tiered approach toward reducing potential direct and indirect impacts to both birds and bats.

Relatively speaking "mass mortality events" at operational wind energy facilities remain rare events (e.g., Loss et al. 2013). The occurrence of abnormally large mortality events often have been associated with inclement weather conditions and deviations from facility lighting best management practices (Johnson et al. 2000; Kerns and Kerlinger 2004; American Bird Conservancy 2011). In the unlikely event of a mass fatality, the wind site manager will determine a best course of action regarding communication to appropriate agency personnel. Recurring mortality of species of concern or species susceptible to population-level impacts (see Beston et al. 2016) will also be considered when coordinating with appropriate agency personnel.

8. IMPLEMENTAION OF THE BADGER WIND PROJECT BBCS

8.1. Document Availability

This BBCS is subject to future revisions, as needed, and will be maintained by Badger Wind environmental staff. This BBCS will be kept on site throughout the operation of the Project.

8.1. Reporting

Any documented mortality of ESA-listed species or of either eagle species will be reported to the USFWS within 24 hours of discovery for the life of the Project. Badger Wind will communicate and coordinate with the USFWS and/or NDGF, as appropriate.

9. REFERENCES

AKN [Avian Knowledge Network]. 2019. Avian knowledge network. www.avianknowledge.net.

AKN [Avian Knowledge Network]. 2021. Avian knowledge network. www.avianknowledge.net.

Allison TD. 2018. Bats and Wind Energy: Impacts, Mitigation, and Tradeoffs. Washington (DC): American Wind Wildlife Institute. https://awwi.org/resources/bat-white-paper/.

American Bird Conservancy. 2011. Massive bird kill at West Virginia wind farm highlights national issue. American Bird Conservancy Press Releases. https://abcbirds.org/results/news/.

Arnett EB, Baerwald EF. 2013. Impacts of wind development on bats: implications for conservation (chapter 21). In: Adams RA, Pedersen SC, editors. Bat Evolution, Ecology, and Conservation. New York: Springer Science+Business Media. p. 435–456.

Arnett EB, Brown W, Erickson WP, Fiedler JK, Hamilton BL, Henry TH, Jain A, Johnson GD, Kerns J, Koford RR, et al. 2008. Patterns of bat fatalities at wind energy facilities in North America. The Journal of Wildlife Management. 72(1):61–78.

Atwell [Atwell LLC]. 2019. Critical issues Analysis. Badger Wind Project. Lakewood (CO).

Atwell [Atwell LLC]. 2020a. Bat habitat assessment memorandum. Badger Wind Project. Southfield (MI).

Atwell [Atwell LLC]. 2020b. Year 1 migration acoustic monitoring. Badger Wind Project.

Atwell [Atwell LLC]. 2020c. Pre-construction avian studies: year 1, May 2019 through April 2020. Badger Wind Project, Logan and McIntosh counties, North Dakota. Boulder (CO).

Atwell [Atwell LLC]. 2021a. Whooping crane stopover habitat assessment. Badger Wind Project. Logan and McIntosh counties, North Dakota. Revised.

Atwell [Atwell LLC]. 2021b. Year 2 acoustic bat monitoring. Badger Wind Project.

Atwell [Atwell LLC]. 2021c. Year 2 pre-construction avian studies. Badger Wind Project. Logan and McIntosh counties, North Dakota. Boulder (CO).

AWWI [American Wind Wildlife Institute]. 2018. AWWI technical report: a summary of bat fatality data in a nationwide database. Washington (DC). https://awwi.org/wp-content/uploads/2019/02/AWWI-Bat-Technical-Report_07_25_18_FINAL.pdf.

Bay K, Nasman K, Erickson W, Taylor K, Kosciuch K. 2016. Predicting eagle fatalities at wind facilities. The Journal of Wildlife Management. 80(6):1000–1010. doi:10.1002/jwmg.21086.

BCI [Bat Conservation International]. 2019. Species profiles. http://www.batcon.org/resources/media-education/species-profiles.

Beason RC. 2020. Horned lark (*Eremophila alpestris*). In: Poole A, Gill F, editors. Birds of the World. Ithaca (NY): Cornell Lab of Ornithology. https://birdsoftheworld.org/bow/species/horlar/cur/introduction.

Beston JA, Diffendorfer JE, Loss SR, Johnson DH. 2016. Prioritizing avian species for their risk of population-level consequences from wind energy development. PLOS ONE. 11(3):e0150813. doi:10.1371/journal.pone.0150813.

Bryce SA, Omernik JM, Pater DA, Ulmer M, Schaar J, Freeouf J, Johnson P, Kuck P, Azevedo SH. 1996. Ecoregions of North Dakota and South Dakota. Reston, Virginia: U.S. Geological Survey.

Buehler DA. 2000. Bald eagle *(Haliaeetus leucocephalus)*, version 2.0. In: Poole AF, Gill FB, editors. The birds of the world. Ithaca (NY): Cornell Lab of Ornithology. http://bna.birds.cornell.edu/bna/species/506.

Carter TC, Feldhamer GA. 2005. Roost tree use by maternity colonies of Indiana bats and northern long-eared bats in southern Illinois. Forest Ecology and Management. 219:259–269. doi:10.1016/j.foreco.2005.08.049.

Chipley RM, Fenwick GH, Parr MJ, Pashley DN. 2003. The American Bird Conservancy Guide to the 500 Most Important Bird Areas in the United States. 1st ed. Random House Publising Group.

Clayton L. 1962. Glacial Geology of Logan and McIntosh Counties North Dakota. Grand Forks, North Dakota: North Dakota Geological Survey Report No.: Bulletin 37. https://www.dmr.nd.gov/ndgs/documents/outofprint/Bulletins/Bulletin%2037.pdf.

Comer PJ, Faber-Langendoen D, Evans R, Gawler S, Josse C, Kittel G, Menard S, Pyne M, Reid M, Schulz K, et al. 2003. Ecological Systems of the United States: a Working Classification of U.S. Terrestrial Systems. Arlington, Virginia: NatureServe.

Dalthorp DH, Simonis J, Madsen L, Huso M, Rabie P, Mintz JM, Wolpert R, Studyvin J, Korner-Nievergelt F. 2018. Generalized mortality estimator (GenEst) - R code and GUI: U.S. Geological Survey software release. Reston (VA): U.S. Geological Survey. https://www.usgs.gov/software/genest-a-generalized-estimator-mortality.

Davis SK, Lanyon WE. 2008. Western Meadowlark *(Sturnella neglecta)*. Poole A, Gill F, editors. The Birds of North America Online. doi:10.2173/bna.104. [accessed 2018 May 13]. https://birdsna.org/Species-Account/bna/species/wesmea/introduction.

Devokaitis M. 2018. Whooping crane population hits historic high in 2018. All About Birds - Cornell Lab of Ornithology. https://www.allaboutbirds.org/news/whooping-crane-population-hits-historic-high-in-2018/.

Dyke S, Johnson S, Isakson P. 2015. North Dakota State Wildlife Action Plan 2015. Bismarck (ND): North Dakota Game and Fish Department. https://gf.nd.gov/sites/default/files/publications/swap-2015_0.pdf.

EPA [U.S. Environmental Protection Agency]. 2002. Level IV Ecoregions of the Continental United States.

Erickson WP, Johnson GD, Strickland MD, Young Jr DP, Sernka KJ, Good RE. 2001. Avian collisions with wind turbines: a summary of existing studies and comparisons to other sources of avian collision mortality in the United States. RESOLVE, Inc.(US). http://www.osti.gov/energycitations/product.biblio.jsp?osti_id=822418.

Erickson WP, Wolfe MM, Bay KJ, Johnson DH, Gehring JL. 2014. A comprehensive analysis of small-passerine fatalities from collision with turbines at wind energy facilities. PLoS ONE. 9(9):e107491. doi:10.1371/journal.pone.0107491.

FAA [Federal Aviation Administration]. 2015. Advisory circular: obstruction marking and lighting. https://www.faa.gov/documentLibrary/media/Advisory_Circular/AC_70_7460-1L_.pdf.

Fitzgerald JA, Pashley DN, Pardo B. 1999. Partners in Flight Bird Conservation Plan for the Northern Mixed-Grass Prairie (Physiographic Area #37). 1.0. Jefferson City, Missouri. https://www.partnersinflight.org/wp-content/uploads/2017/02/PA-37-Northern-Mixed-Grass-Prairie.pdf.

Foster RW, Kurta A. 1999. Roosting ecology of the northern bat (*Myotis septentrionalis*) and comparisons with the endangered Indiana bat (*Myotis sodalis*). Journal of Mammalogy.:659–672.

Gehring J, Kerlinger P, Manville AM. 2009. Communication towers, lights, and birds: successful methods of reducing the frequency of avian collisions. Ecological Applications. 19(2):505–514. doi:10.1890/07-1708.1.

Johnson GD, Erickson WP, Strickland MD, Shepherd MF, Shepherd DA. 2000. Avian monitoring studies at the Buffalo Ridge Wind Resource Area, Minnesota: results of a 4-year study. Prepared for Northern States Power Company, Minneapolis, Minnesota. https://tethys.pnnl.gov/sites/default/files/publications/JohnsonBuffalo-2000.pdf.

Johnson S. 2009. North Dakota Bald Eagle Nest Summary. https://efotg.sc.egov.usda.gov/references/public/ND/ND_Bald_Eagle_Nest_Summary_2009.pdf.

Kerns J, Kerlinger P. 2004. A study of bird and bat collision fatalities at the Mountaineer Wind Energy Center, Tucker County, West Virginia: Annual report for 2003. Prepared for FPL Energy and Mountaineer Wind Energy Center Technical Review Committee. http://www.fwspubs.org/doi/suppl/10.3996/032012-JFWM-024/suppl_file/10.3996_032012-jfwm-024.s1.pdf?code=ufws-site.

Kochert MN, Steenhof K, McIntyre CL, Craig EH. 2002. Golden eagle *(Aquila chrysaetos)*. In: Poole A, Gill FB, editors. The birds of world. Ithaca (NY): Cornell Lab of Ornithology. https://birdsoftheworld.org/bow/species/goleag/cur/introduction.

Liguori J. 2005. Hawks from every angle: how to identify raptors in flight. Princeton (NJ): Princeton University Press.

Loss SR, Will T, Marra PP. 2013. Estimates of bird collision mortality at wind facilities in the contiguous United States. Biological Conservation. 168:201–209. doi:10.1016/j.biocon.2013.10.007.

NABCI. 2021. Bird Conservation Region 11 (Prairie Potholes). North American Bird Conservation Initiative (NABCI). http://nabci-us.org/resources/bird-conservation-regions-map/#bcr11.

Nagy L, Gibson B, Kosciuch K, Taylor J, Gunderman B, TetraTech EC, Inc., BP Wind Energy. 2012. Whooping and Sandhill Crane Behavior at an Operating Wind Farm.

National Audubon Society. 2019. Important bird areas. https://www.audubon.org/important-bird-areas.

NCSU [North Carolina State University]. 2021. The U.S. national vegetation classification. http://usnvc.org/.

NDGF [North Dakota Game and Fish Department]. 2016a. Northern Long-eared Bat. North Dakota Game and Fish Department. https://gf.nd.gov/wildlife/id/bats/northern-long-eared.

NDGF [North Dakota Game and Fish Department]. 2016b. Bald Eagle. North Dakota Game and Fish Department. https://gf.nd.gov/wildlife/id/raptors/bald-eagle.

NDGF [North Dakota Game and Fish Department]. 2016c. Little Brown Bat. North Dakota Game and Fish Department. https://gf.nd.gov/wildlife/id/bats/little-brown-bat.

NDGF [North Dakota Game and Fish Department]. 2016d. Big Brown Bat. North Dakota Game and Fish Department. https://gf.nd.gov/wildlife/id/bats/big-brown-bat.

NDGF [North Dakota Game and Fish Department]. 2019. Sharp-tailed grouse lek. https://gf.nd.gov/wildlife-notes/sharp-tailed-grouse-lek.

NDGF [North Dakota Game and Fish Department]. 2021. NDGISHUB PLOTS lands. Geographic Information Systems Information Technology. https://gishubdata-ndgov.hub.arcgis.com/datasets/NDGOV::ndgishub-plots-lands/about.

Nelson JJ, Barnhart PR, Gillam EH. 2015. Distribution and Occurrence of Bat Species in North Dakota. The Prairie Naturalist. 47:87–93.

NGPC [Nebraska Game and Parks Commission]. 2018. Wind energy and Nebraska's wildlife: avian assessment guidance for wind energy facilities, draft 3.5. July. Lincoln (NE). http://outdoornebraska.gov/wp-content/uploads/2018/09/Avian-risk.pdf.

Pearse AT, Brandt DA, Harrell WC, Metzger KL, Baasch DM, Hefley TJ. 2015. Whooping Crane Stopover Site Use Intensity within the Great Plains (Open-File Report 2015–1166). Reston, Virginia: US Geological Survey. http://dx.doi. org/10.3133/ofr20151166.

Pearse AT, Rabbe M, Juliusson LM, Bidwell MT, Craig-Moore L, Brandt DA, Harrell W. 2018. Delineating and identifying long-term changes in the whooping crane (*Grus americana*) migration corridor. PLoS ONE. 13(2):e0192737.

Sauer JR, Niven DK, Ziolkowski, Jr. DJ, Pardieck KL, Fallon JE, Link WA. 2017. The North American breeding bird survey, results and analysis 1966 - 2015. Version 12.23.2015. February 7. Laurel (MD): USGS Patuxent Wildlife Research Center. http://www.mbr-pwrc.usgs.gov/bbs/bbs.html.

Shaffer JA, Buhl DA. 2016. Effects of wind-energy facilities on breeding grassland bird distributions. Conservation Biology. 30(1):59–71.

Shaffer JA, Loesch CR, Buhl DA. 2019. Estimating offsets for avian displacement effects of anthropogenic impacts. Ecological Applications. 0(0):15.

Shank C, Gutzmer M, Tooley K, Kelly J. 2015. Documentation of the northern long-eared myotis, Myotis septentrionalis on Standing Rock Indian Reservation. 2015 Transactions of the Nebraska Academy of Sciences.:1–5.

Smallwood KS, Thelander C. 2008. Bird mortality in the Altamont Pass Wind Resource Area, California. The Journal of Wildlife Management. 72(1):215–223. doi:10.2193/2007-032.

Smith KG, Macwhirter RB, Bildstein KL, Wittenberg SR. 2011. Northern harrier (*Circus cyaneus*). Poole A, editor. The Birds of North America Online. doi:10.2173/bna.210. http://bna.birds.cornell.edu/bna/species/210.

Strickland D, Arnett E, Erickson W, Johnson D, Johnson G, Morrison M, Shaffer J, Warren-Kicks W. 2011. Comprehensive guide to studying wind energy/wildlife interactions. National Wind Coordinating Collaborative. https://www.nationalwind.org/wp-content/uploads/assets/publications/Comprehensive_Guide_to_Studying_Wind_Energy_Wildlife_Interactions_2011_Updated.pdf.

Timpone JC, Boyles JG, Murray KL, Aubrey DP, Robbins LW. 2010. Overlap in roosting habits of Indiana bats (*Myotis sodalis*) and northern bats (*Myotis septentrionalis*). American Midland Naturalist. 163:115–123.

Urbanek RP, Lewis JC. 2015. Whooping crane *Grus americana*. In: Poole A, editor. Birds of the World. Ithaca (NY): Cornell Lab of Ornithology. https://birdsoftheworld.org/bow/species/whocra/cur/introduction?login.

U.S. Fish and Wildlife Service. 2009. Whooping Cranes and wind development: an issue paper.

USFWS [U.S. Fish and Wildlife Service]. 2008. Birds of conservation concern 2008. Arlington (VA): Division of Migratory Bird Management. https://www.fws.gov/migratorybirds/pdf/grants/BirdsofConservationConcern2008.pdf.

USFWS [U.S. Fish and Wildlife Service]. 2009. Whooping cranes and wind development - an issue paper. Prepared by USFWS Regions 2 and 6. April. Washington (DC): U.S. Fish and Wildlife Service.

https://www.fws.gov/southwest/es/oklahoma/documents/te_species/wind%20power/whooping%20crane%20and%20wind%20development%20fws%20issue%20paper%20-%20final%20%20april%202009.pdf.

USFWS [U.S. Fish and Wildlife Service]. 2012. U.S. Fish and Wildlife Service land-based wind energy guidelines. U.S. Fish and Wildlife Service. http://www.fws.gov/ecological-services/es-library/pdfs/WEG_final.pdf.

USFWS [U.S. Fish and Wildlife Service]. 2013. Eagle conservation plan guidance: module 1 - land-based wind energy, version 2. April. Washington (DC): Division of Migratory Bird Management. https://www.fws.gov/migratorybirds/pdf/management/eagleconservationplanguidance.pdf.

USFWS [U.S. Fish and Wildlife Service]. 2015a. 50 CFR Part 17- Endangered and Threatened Wildlife and Plants; Threatened Species Status for the Northern Long-eared Bat with 4(d) Rule.

USFWS [U.S. Fish and Wildlife Service]. 2015b. Northern long-eared bat (*Myotis septentrionalis*) - Fact Sheet. http://www.fws.gov/midwest/endangered/mammals/nleb/pdf/NLEBFactSheet01April2015.pdf.

USFWS [U.S. Fish and Wildlife Service]. 2016a. Species Profile for Whooping crane *(Grus americana)*. ECOS: Environmental Conservation Online System. https://ecos.fws.gov/ecp0/profile/speciesProfile?spcode=B003.

USFWS [U.S. Fish and Wildlife Service]. 2016b. Endangered and threatened wildlife and plants: threatened species status for the northern long-eared bat, 4(d) Rule. https://www.fws.gov/midwest/endangered/mammals/nleb/pdf/FRnlebFinal4dRule14Jan2016.pdf.

USFWS [U.S. Fish and Wildlife Service]. 2016c. Eagle Permits; Revisions to Regulations for Eagle Incidental Take and Take of Eagle Nests. https://www.federalregister.gov/documents/2016/12/16/2016-29908/eagle-permits-revisions-to-regulations-for-eagle-incidental-take-and-take-of-eagle-nests.

USFWS [U.S. Fish and Wildlife Service]. 2018a. Northern Long-eared Bat Range Map. https://www.fws.gov/midwest/endangered/mammals/nleb/pdf/RangeMapwForestNLEB02Jan2018.pdf.

USFWS [U.S. Fish and Wildlife Service]. 2018b. Updated Collision Risk Model Priors for Estimating Eagle Fatalities at Wind Energy Facilities. https://www.federalregister.gov/documents/2016/05/06/2016-10542/eagle-permits-revisions-to-regulations-for-eagle-incidental-take-and-take-of-eagle-nests.

USFWS [U.S. Fish and Wildlife Service]. 2019a. IPaC - information for planning and consultation. Environmental Conservation Online System (ECOS). http://ecos.fws.gov/ipac/.

USFWS [U.S. Fish and Wildlife Service]. 2019b. Northern long-eared bat hibernacula and maternity roost tree location information. https://www.fws.gov/midwest/endangered/mammals/nleb/nhisites.html.

USFWS [U.S. Fish and Wildlife Service]. 2019c. Range-wide Indiana bat survey guidelines. https://www.fws.gov/midwest/endangered/mammals/inba/surveys/pdf/2019_Rangewide_IBat_Survey_Guidelines.pdf.

USFWS [U.S. Fish and Wildlife Service]. 2019d. Critical habitat for threatened & endangered species. https://fws.maps.arcgis.com/home/webmap/viewer.html?webmap=9d8de5e265ad4fe09893cf75b8dbfb77.

USFWS [U.S. Fish and Wildlife Service]. 2019e. Species profile for little brown bat *(Myotis lucifugus)*. Environmental Conservation Online System (ECOS). https://ecos.fws.gov/ecp0/profile/speciesProfile?spcode=A0JF.

USFWS [U.S. Fish and Wildlife Service]. 2019f. Northern long-eared bat: range map. https://www.fws.gov/midwest/endangered/mammals/nleb/nlebRangeMap.html.

USFWS [U.S. Fish and Wildlife Service]. 2019g. Northern long-eared bat final 4(d) rule: white-nose syndrome buffer zone around WNS/Pd positive counties/districts. https://www.fws.gov/Midwest/endangered/mammals/nleb/pdf/WNSZone.pdf.

USFWS [U.S. Fish and Wildlife Service]. 2020a. National wetlands inventory. US Fish and Wildlife Service - NWI Wetland Mapper. http://www.fws.gov/wetlands/Data/Mapper.html.

USFWS [U.S. Fish and Wildlife Service]. 2020b. Updated eagle nest survey protocol. https://www.fws.gov/migratorybirds/pdf/management/EagleNestSurveyGuidanceUpdated.pdf.

USFWS [U.S. Fish and Wildlife Service]. 2021a. IPaC - information for planning and consultation. Environmental Conservation Online System (ECOS). https://ecos.fws.gov/ipac/.

USFWS [U.S. Fish and Wildlife Service]. 2021b. Birds of conservation concern 2021. Falls Church (VA): USFWS Migratory Bird Program. https://www.fws.gov/sites/default/files/documents/birds-of-conservation-concern-2021.pdf.

USFWS [U.S. Fish and Wildlife Service]. 2021c. National wetlands inventory. US Fish and Wildlife Service - NWI Wetland Mapper. http://www.fws.gov/wetlands/Data/Mapper.html.

USFWS [U.S. Fish and Wildlife Service]. 2022. IPaC - information for planning and consultation. Environmental Conservation Online System (ECOS). https://ecos.fws.gov/ipac/.

USGS [U.S. Geological Survey]. 2018. Gap analysis program (GAP). Protected areas database of the United States (PAD-US). http://gapanalysis.usgs.gov/data/.

USGS [U.S. Geological Survey]. 2020a. LANDFIRE Remap 2016 existing vegetation type CONUS. USGS Earth Resources Observation and Science Center, Sioux Falls, SD. https://landfire.gov/.

USGS [U.S. Geological Survey]. 2020b. Gap analysis program (GAP). Protected areas database of the United States (PAD-US) 2.1. http://gapanalysis.usgs.gov/data/.

USGS [U.S. Geological Survey]. 2020c. National hydrography dataset. https://www.usgs.gov/core-science-systems/ngp/national-hydrography/national-hydrography-dataset.

WEST [Western EcoSystems Technology Inc], Piorkowski MD. 2021. Grassland habitat assessment. Badger Wind Farm, Logan and McIntosh Counties, North Dakota. Final Report. Prepared for Badger Wind, LLC. Chicago, Illinois. Prepared by WEST, Bismarck, North Dakota. November 24, 2021.

Whalen R, Krusac D. 2014. Biological Assessment for activities affecting northern long-eared bats on southern region national forests. USDA Forest Service Southern Region.

FIGURES

Badger Wind

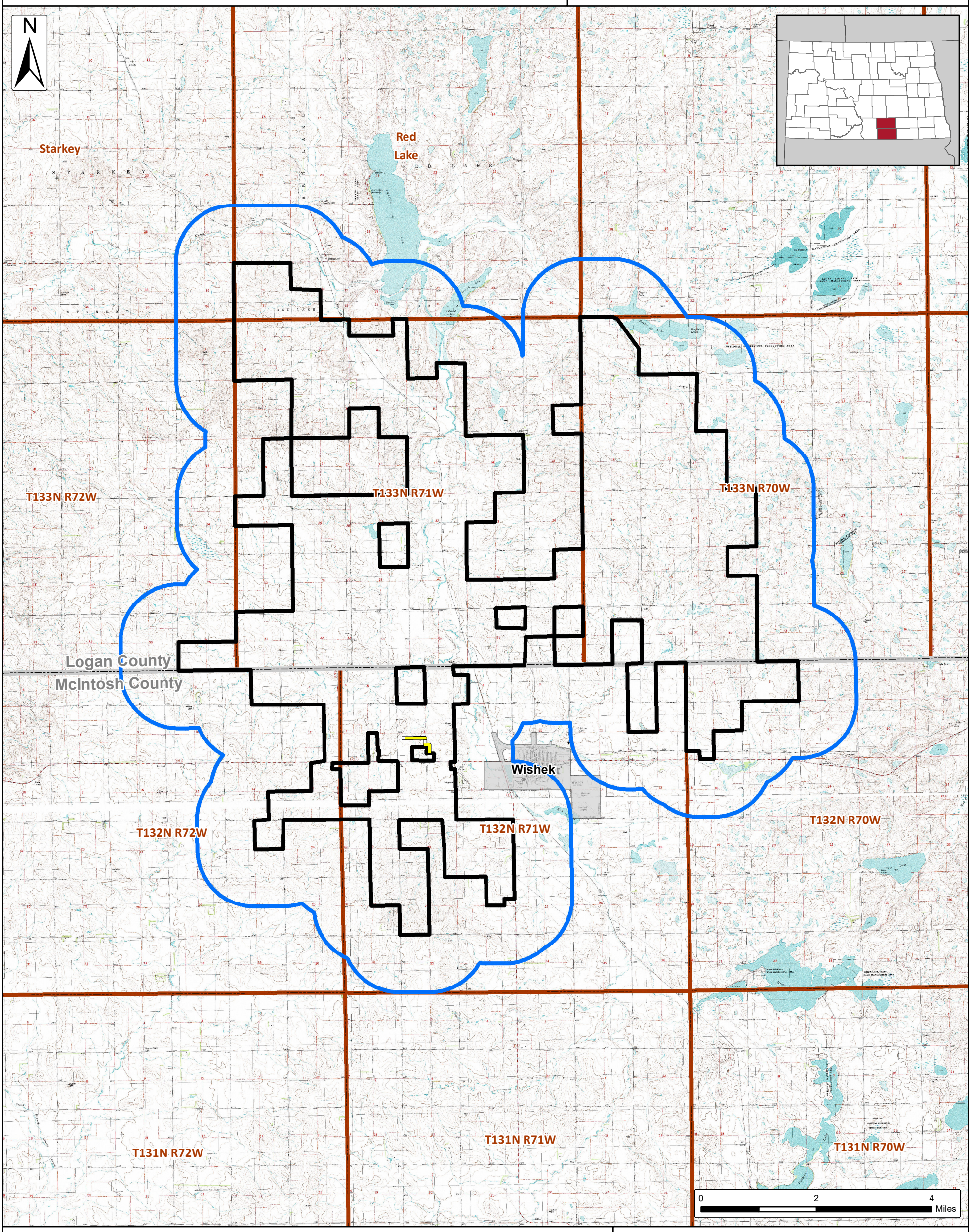
Figure 1. Site Location

Logan and McIntosh Counties, North Dakota

Client:
Badger Wind, LLC

Issue Date:
2/11/2022

Atwell, LLC Project:
19000785



Project Area
02/10/2022 (~31,514 acres)
1-mile Buffer
Proposed Transmission Line
Township
City/Village
Counties

Source: USGS Topographic Quadrangle

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Badger Wind

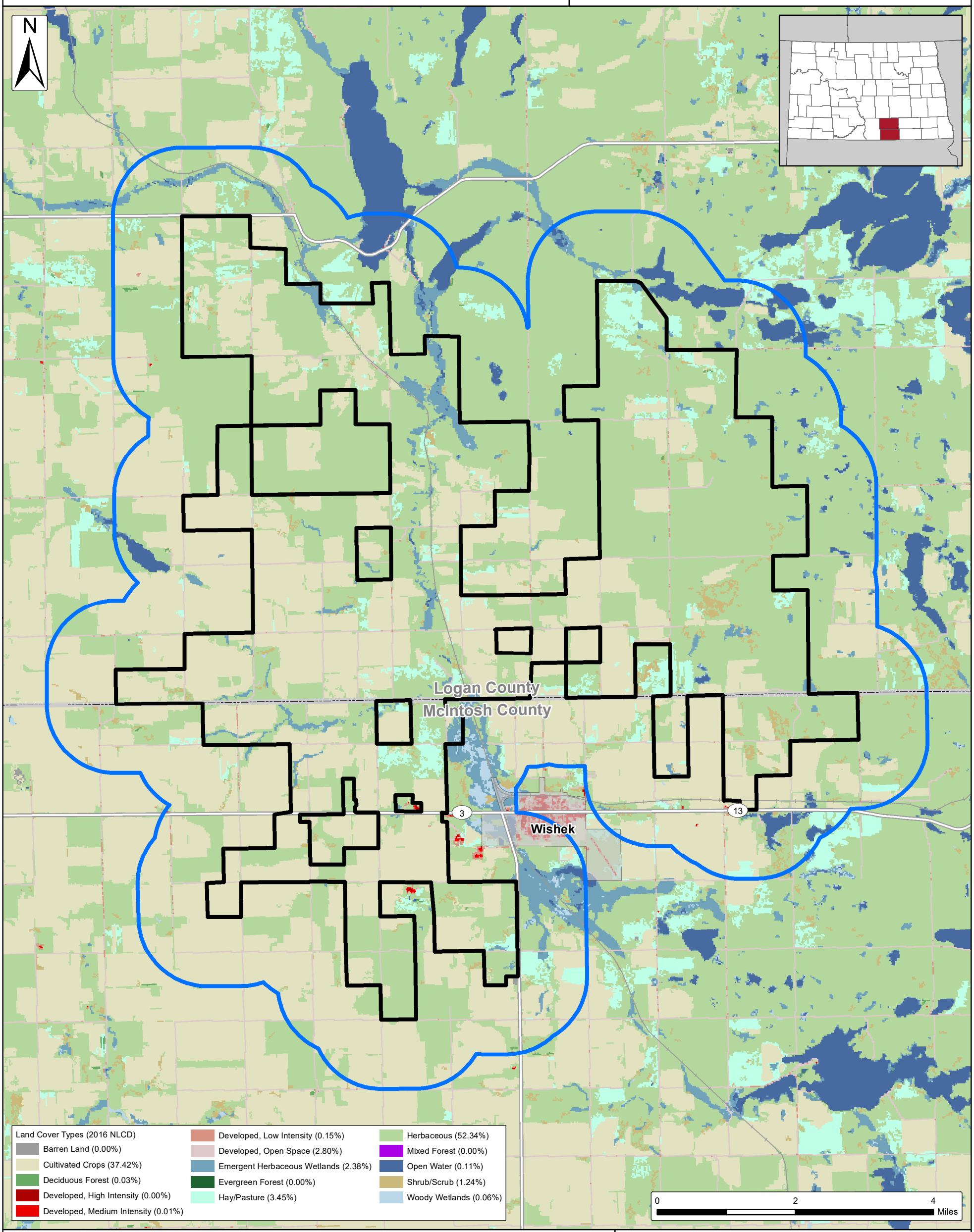
Figure 2. Land Cover Types within the Project Area

Logan and McIntosh Counties, North Dakota

Client:
Badger Wind, LLC

Issue Date:
2/11/2022

Atwell, LLC Project:
19000785



Project Area
02/10/2022 (~31,514 acres)

1-mile Buffer

City/Village

Counties

Source: National Land Cover Database (USGS, 2016)

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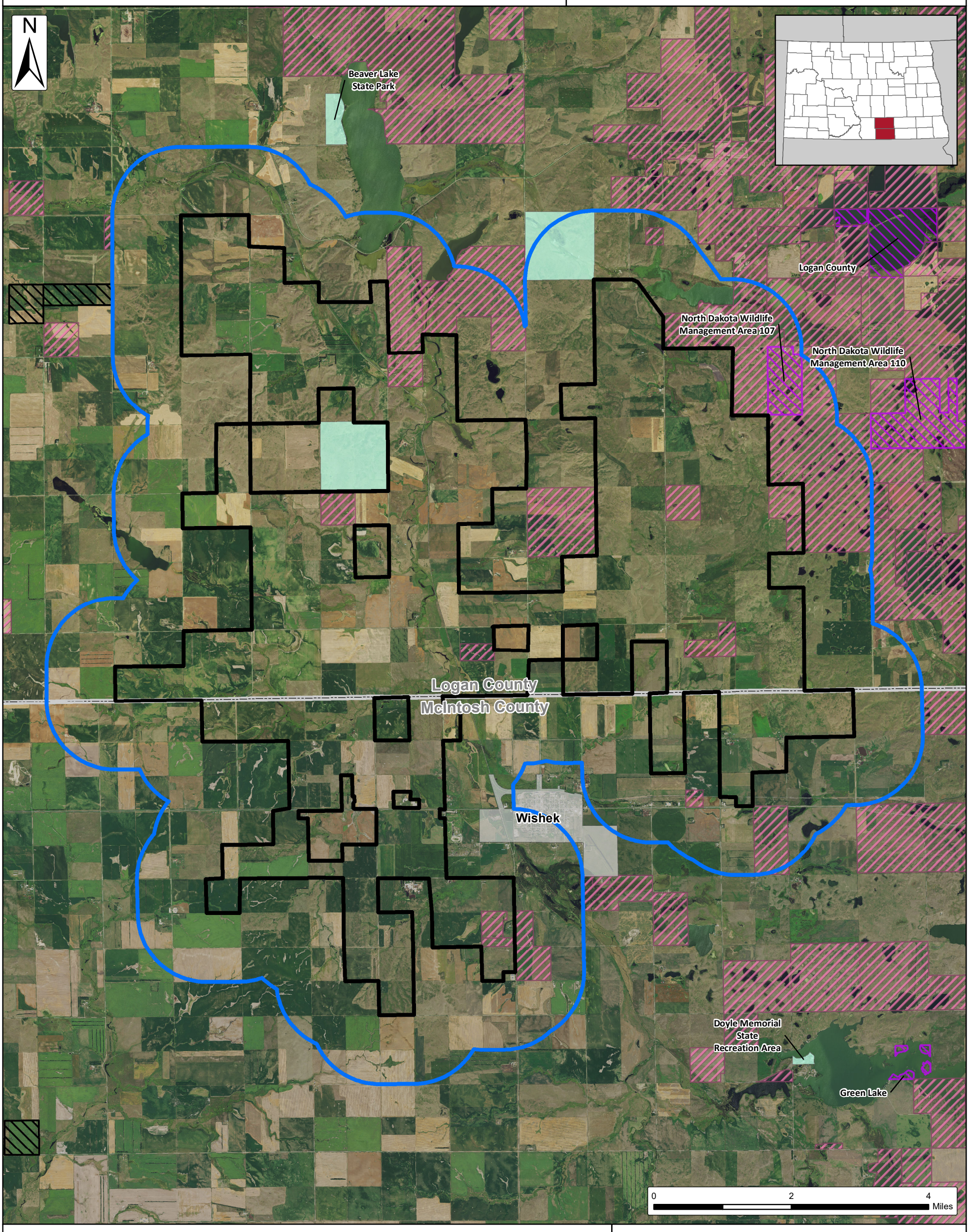
Figure 3. Public Lands

Logan and McIntosh Counties, North Dakota

Client:
Badger Wind, LLC

Issue Date:
2/11/2022

Atwell, LLC Project:
19000785



Project Area
02/10/2022 (~31,514 acres)
1-mile Buffer
PLOTS (NDGF)
North Dakota Wildlife Management Area
Waterfowl Production Area
State Lands
City/Village
Counties

Source: National Agriculture Imagery Program (2020)

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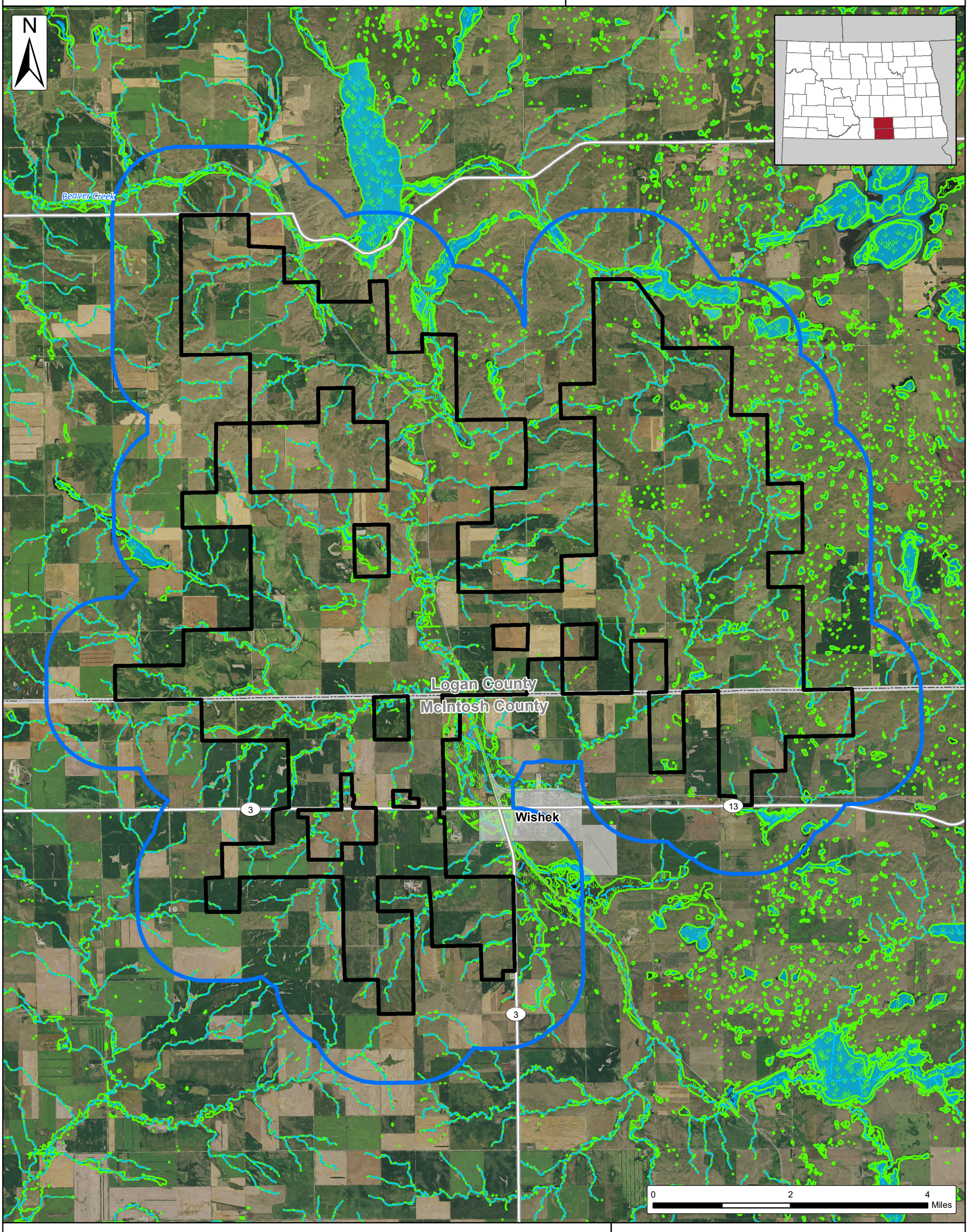
Figure 4. Water Resources

Logan and McIntosh Counties, North Dakota

Client:
Badger Wind, LLC

Issue Date:
2/11/2022

Atwell, LLC Project:
19000785



Project Area
02/10/2022 (~31,514 acres)
1-mile Buffer
Watercourse (NHD)
Waterbody (NHD)
Wetland (NWI)
City/Village
Counties

Source: National Agriculture Imagery Program (2020)

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Badger Wind

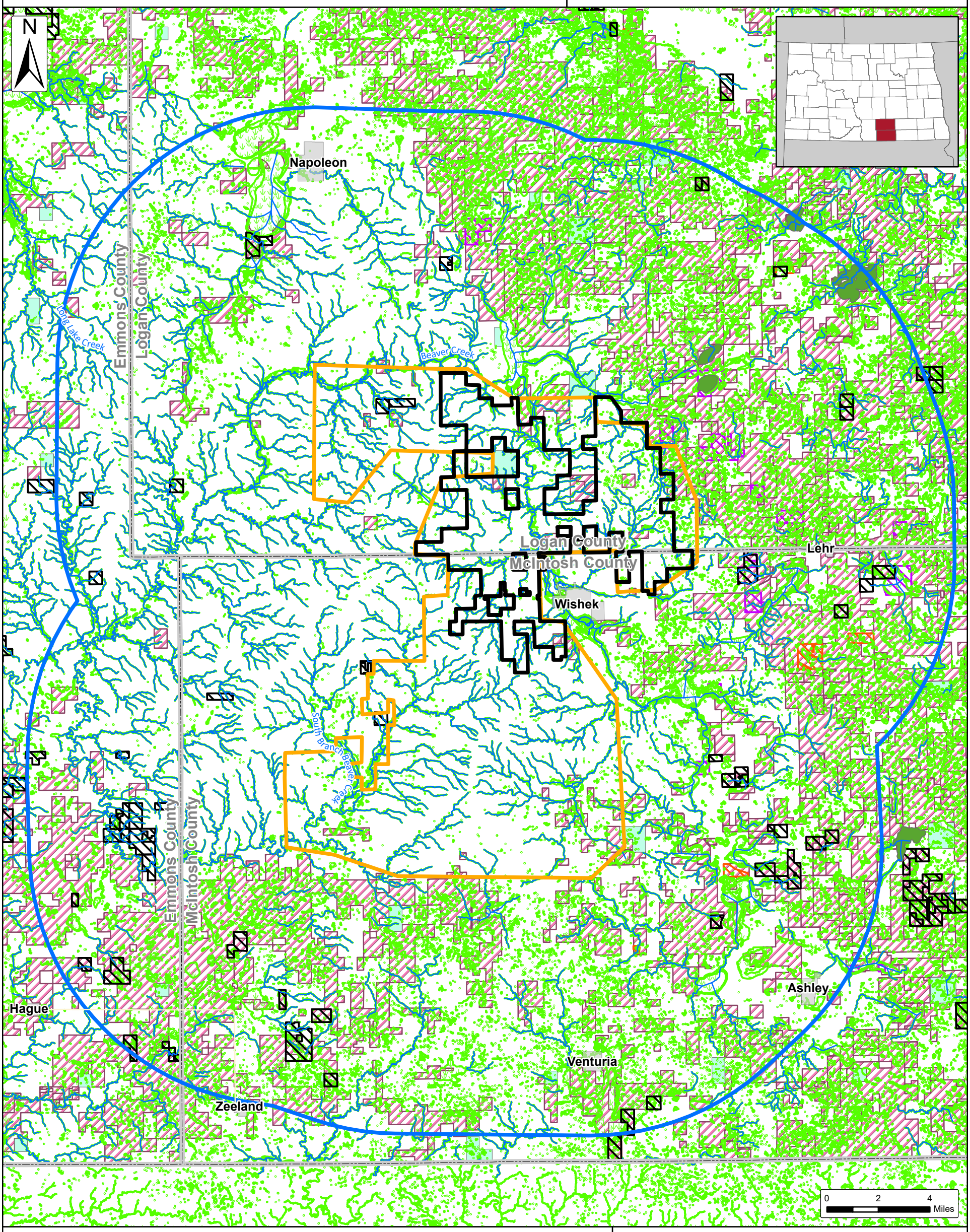
Figure 5. Site Evaluation

Logan and McIntosh Counties, North Dakota

Client:
Badger Wind, LLC

Issue Date:
2/11/2022

Atwell, LLC Project:
19000785



Project Area
01/28/2022 (~31,590 acres)
Study Area (2019)
10-mile Buffer
Watercourse (NHD)
Wetland (NWI)
Critical Habitat

PLOTS (NDGF)
North Dakota Wildlife Management Area
Waterfowl Production Area
State Lands
Wetland Reserve Program
City/Village
Counties

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Badger Wind

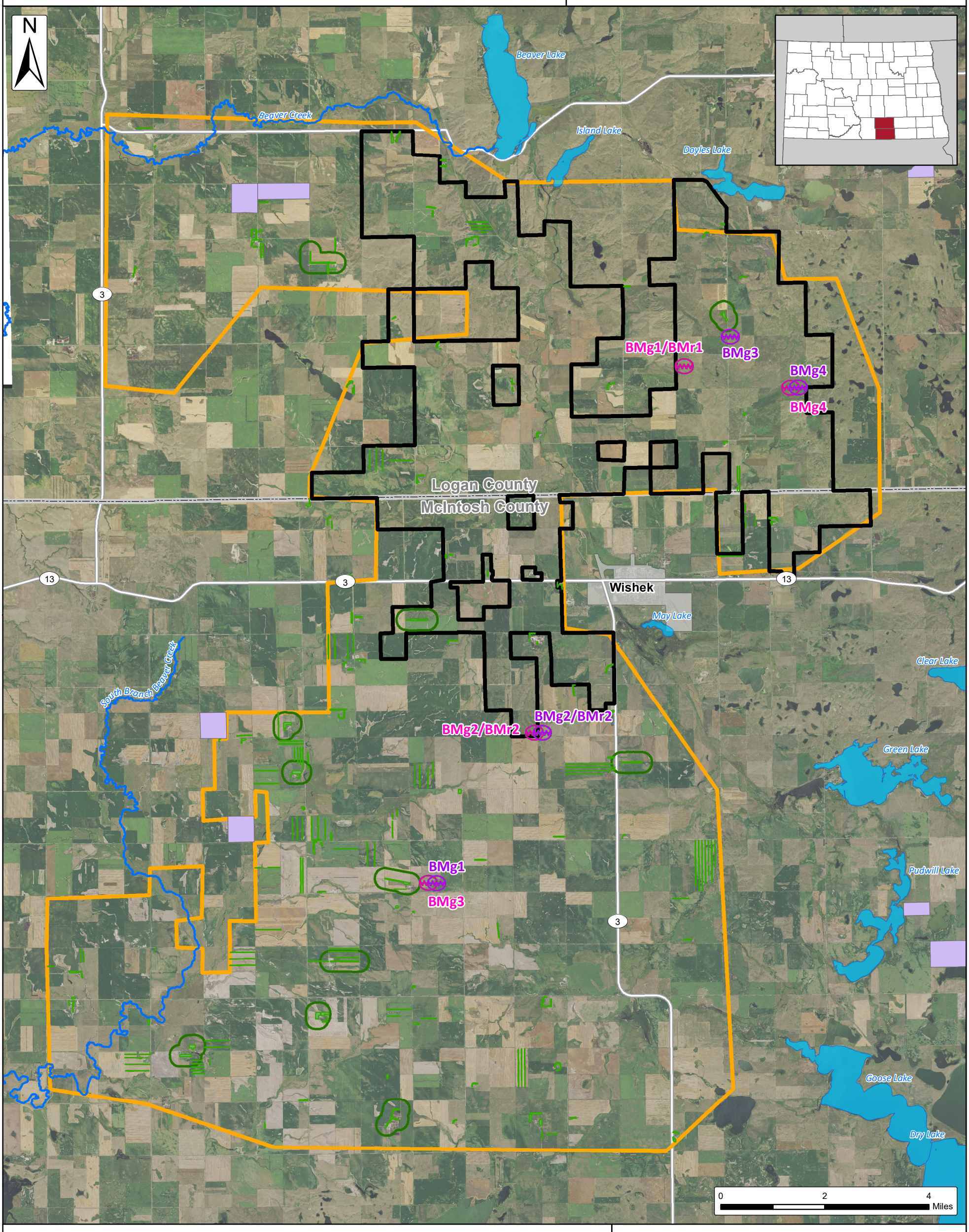
Figure 6. Bat Resources

Logan and McIntosh Counties, North Dakota

Client:
Badger Wind, LLC

Issue Date:
2/11/2022

Atwell, LLC Project:
19000785



Project Area
02/10/2022 (~31,514 acres)

Study Area (2019)

City/Village

Counties

Bat Habitat

Forested Areas Greater than 5 Acres and Connective Woodlots 1,000-foot Buffer

Major Watercourse (NHD)

Waterbody (NHD)

Acoustic Monitor (2019)

Acoustic Monitor (2020)

Source: National Agriculture Imagery Program (2020)

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Badger Wind

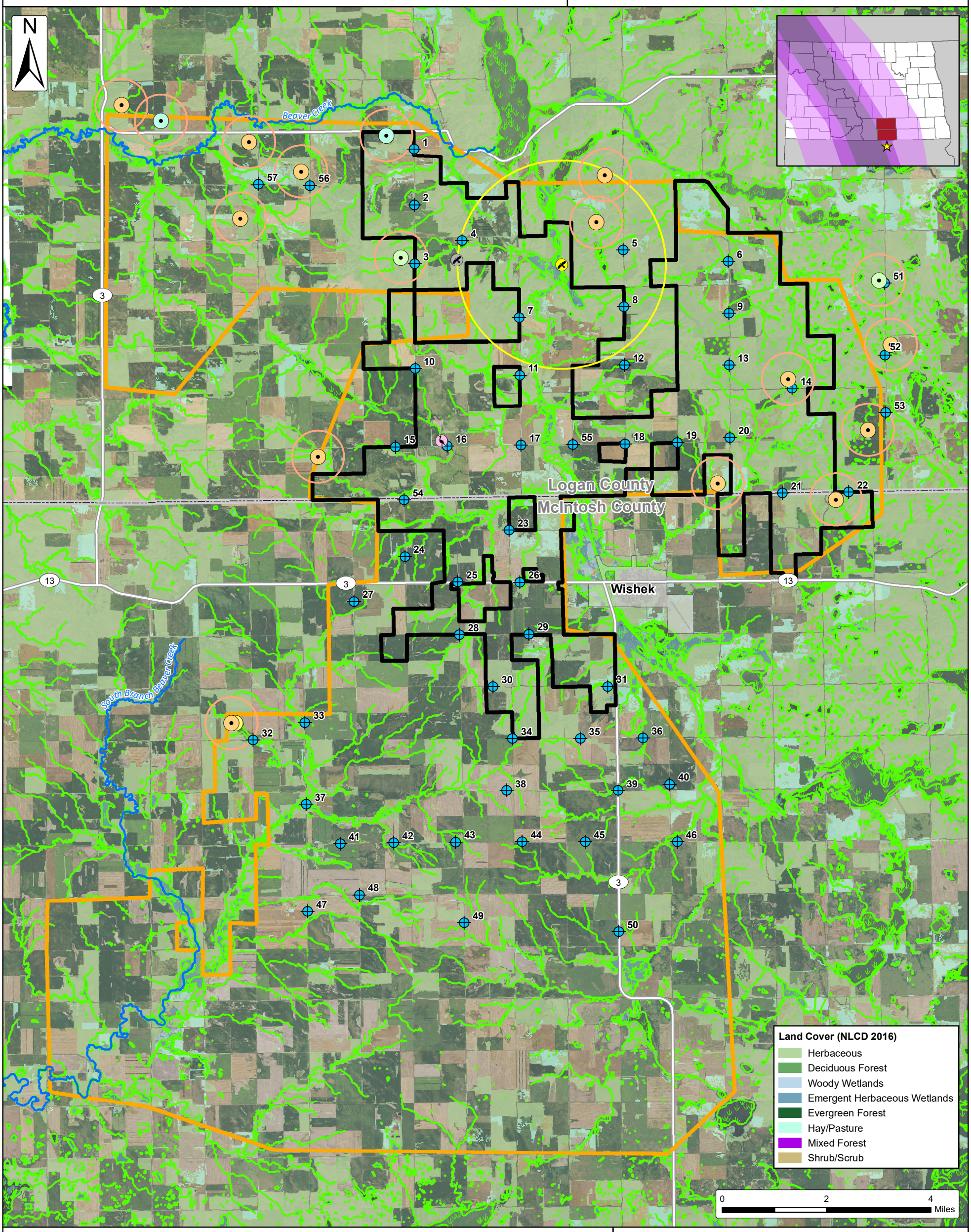
Figure 7. Avian Resources

Logan and McIntosh Counties, North Dakota

Client:
Badger Wind, LLC

Issue Date:
2/11/2022

Atwell, LLC Project:
19000785



Confirmed Lek (2019)
Possible Lek (2019)
Confirmed Lek (2020)
Possible Lek (2020)
Lek 0.5-mile Buffer
Whooping Crane Sighting (2020)

Bald Eagle Nest (In-Use)
Bald Eagle Nest (Alternate Site)
Bald Eagle Active Nest 2-mile Buffer
Major Watercourse (NHD)
Waterbody (NHD)
Wetland (NWI)
Avian Point Count Location

Stations 27 and 28 replaced with 54 and 55 in August 2019.
Stations 35 and 36 replaced with 56 and 57 in May 2020.

Project Area
02/10/2022 (~31,514 acres)
Study Area (2019)
City/Village
Counties

Whooping Crane Migration Corridor (USFWS)
50%
75%
95%

Source: National Agriculture Imagery Program (2020)

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Badger Wind

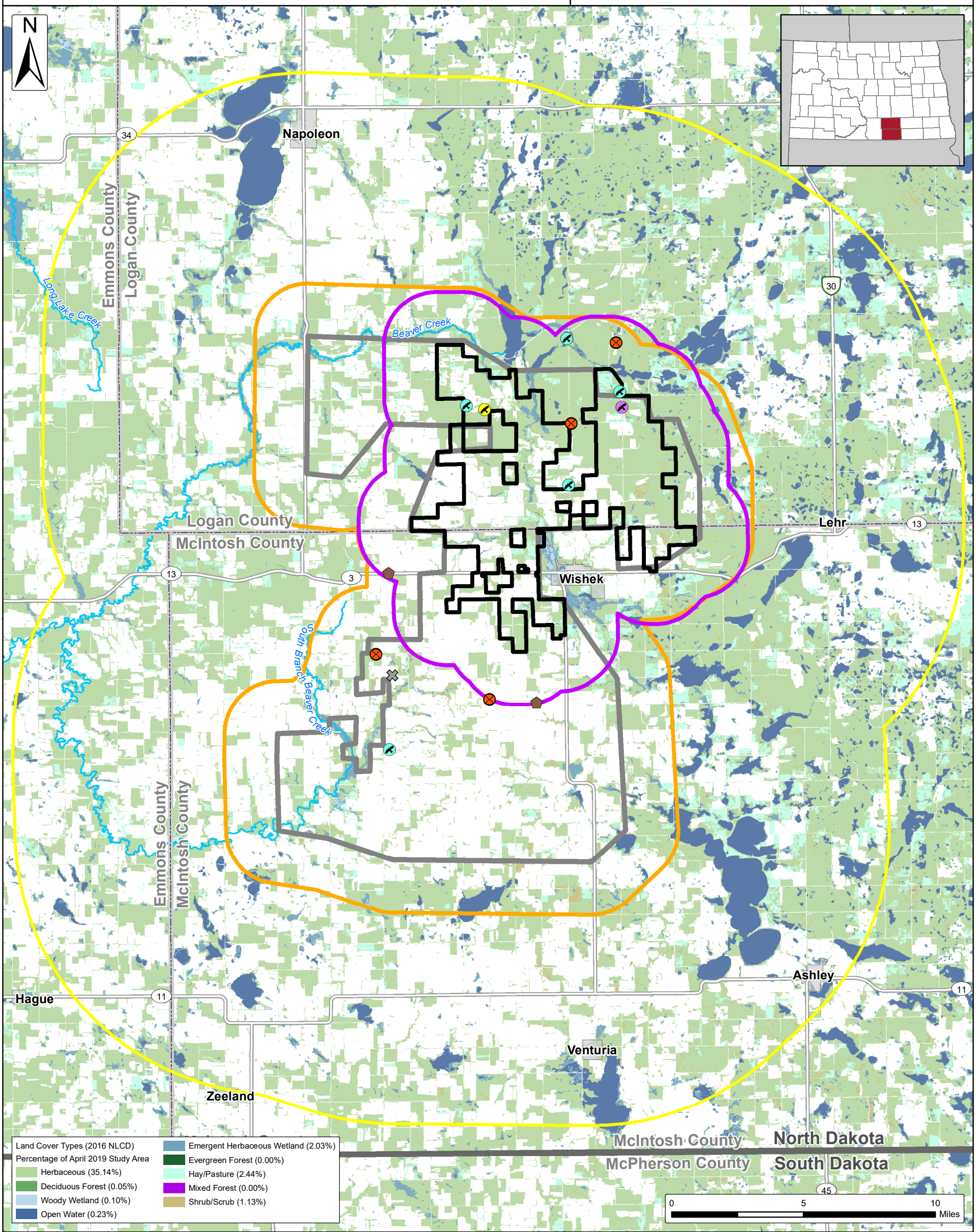
Figure 8a. Year 1 Eagle and Raptor Nest Survey Results

Logan and McIntosh Counties, North Dakota

Client:
Badger Wind, LLC

Issue Date:
2/11/2022

Atwell, LLC Project:
19000785



Raptor Nests Identified during Year 1 Surveys
- Bald Eagle, In-Use
- Ferruginous Hawk, In-Use
- Great Horned Owl, In-Use
- Red-tailed Hawk, In-Use
- Swainson's Hawk, Nest Building
- Unknown, Not Occupied

- Major Watercourse (National Hydrography Dataset)
- Project Area 01/28/2022 (~31,590 acres)
- Project Area 2-mile Buffer
- Study Area (2019)
- Raptor Nest Survey Area (2-mile Buffer)
- Eagle Nest Survey Area (10-Mile Buffer)
- City/Village
- County
- State Boundary

SOURCE: USGS NATIONAL LAND COVER DATABASE (NLCD) 2016

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BW Exhibit 28

Badger Wind

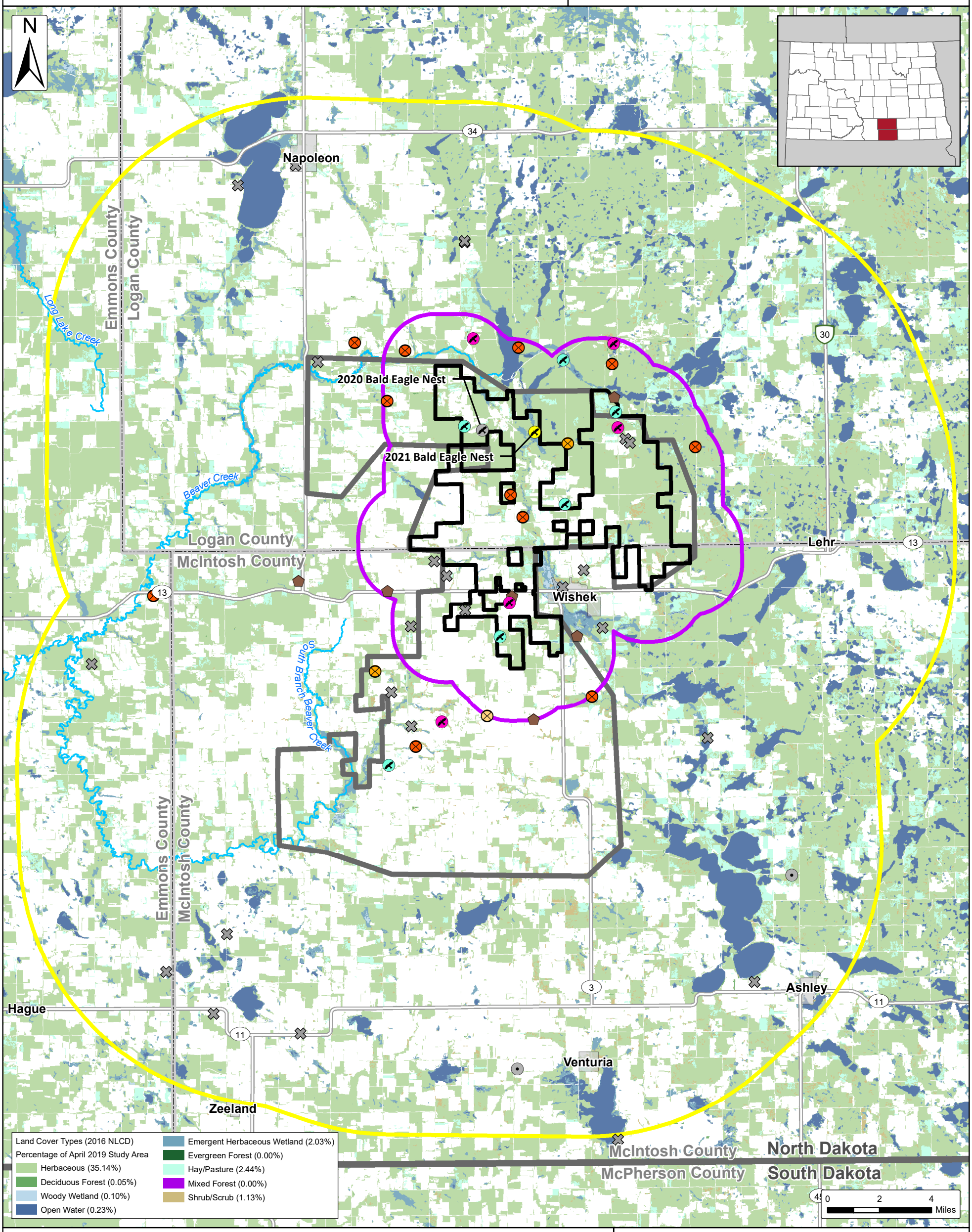
Figure 8b. Year 2 Eagle and Raptor Nest Survey Results

Logan and McIntosh Counties, North Dakota

Client:
Badger Wind, LLC

Issue Date:
2/11/2022

Atwell, LLC Project:
19000785



Raptor Nests Identified during Year 2 Surveys

- Bald Eagle, In-Use
- Bald Eagle, Unoccupied*
- Ferruginous Hawk, In-Use
- Great Horned Owl, In-Use
- Red-tailed Hawk, Missing
- Red-tailed Hawk, In-Use
- Red-tailed Hawk, Status Unknown
- Swainson's Hawk, In-Use
- Unknown raptor, In-Use
- Unknown raptor, Status Unknown

* This bald eagle nest was occupied during year 2 raptor nest surveys but went missing prior to spring 2021 point count surveys. The 2020 and 2021 bald eagle nests indicated on the map are believed to belong to the same nesting territory.

- Major Watercourse (NHD)
- Project Area 02/10/2022 (~31,514 acres)
- Project Area 2-mile Buffer
- Study Area (2019)
- Eagle Nest Survey Area (4/15/2019 10-mile Buffer)
- City/Village
- County
- State Boundary

Source: National Land Cover Database (USGS, 2016)

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APPENDICES

APPENDIX A

2019 AND 2022 IPAC ANALYSES

IPaC **U.S. Fish & Wildlife Service**

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.

NOT FOR CONSULTATION

Location

Logan and McIntosh counties, 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/northdakotafieldoffice/endspecies/endangered_species.htm

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[1] and their critical habitats are managed by the Ecological Services Program of the U.S. 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

NOT FOR CONSULTATION

Northern Long-eared Bat Myotis septentrionalis No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/9045	Threatened

Birds

NAME	STATUS
Piping Plover Charadrius melodus There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/6039	Threatened
Red Knot Calidris canutus rufa No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/1864	Threatened
Whooping Crane Grus americana There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/758	Endangered

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.

NOT FOR CONSULTATION

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

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.

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

- 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 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.

NOT FOR CONSULTATION

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 THAT THE BIRD DOES NOT LIKELY BREED IN YOUR PROJECT AREA.)
American Bittern Botaurus lentiginosus 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/6582	Breeds Apr 1 to Aug 31
American Golden-plover Pluvialis dominica This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds elsewhere

Black Tern Chlidonias niger 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/3093	Breeds May 15 to Aug 20
Bobolink Dolichonyx oryzivorus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 20 to Jul 31
Chestnut-collared Longspur Calcarius ornatus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 1 to Aug 10
Franklin's Gull Leucophaeus pipixcan This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 1 to Jul 31
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 elsewhere
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 Jul 31
Nelson's Sparrow Ammodramus nelsoni This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 15 to Sep 5
Willet Tringa semipalmata This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Apr 20 to Aug 5

NOT FOR CONSULTATION

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.

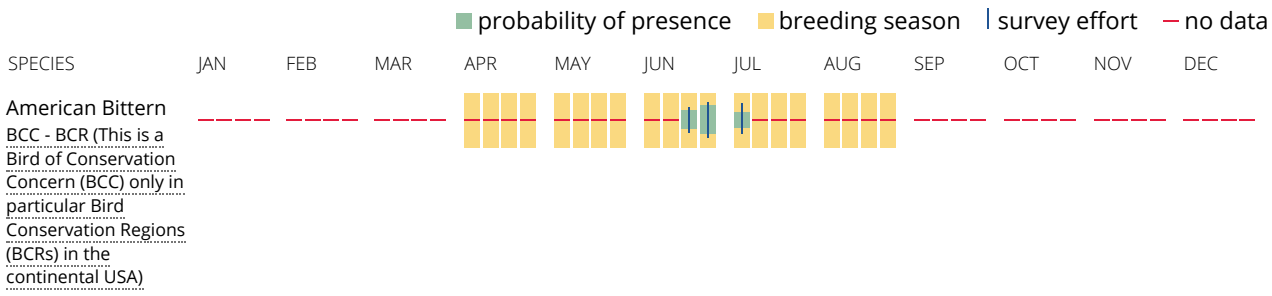
Breeding Season (▪)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
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.



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American Golden-plover
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Black Tern
BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)

Bobolink
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Chestnut-collared Longspur
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Franklin's Gull
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

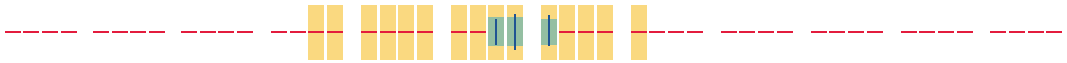
Lesser Yellowlegs
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Marbled Godwit
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Nelson's Sparrow
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

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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.

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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.

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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?

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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.

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

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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
Kulm Wetland Management District	1,358.57 acres

(701) 647-2866
(701) 647-2221

MAILING ADDRESS
P.O. Box E
Kulm, ND 58456-0170

PHYSICAL ADDRESS
1 First Street Sw
Kulm, ND 58456-7112

https://www.fws.gov/refuges/profiles/index.cfm?id=62630

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.

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.

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FRESHWATER EMERGENT WETLAND

- PEM1A
- PEM1C
- PEM1Ax
- PEM1F
- PEM1Cx

FRESHWATER FORESTED/SHRUB WETLAND

- PFOA

FRESHWATER POND

- PABFh
- PABFx

RIVERINE

- R4SBC
- R5UBH

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 tuberficid 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.

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IPaC **U.S. Fish & Wildlife Service**

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.

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Location

Logan and McIntosh counties, 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/northdakotafieldoffice/endspecies/endangered_species.htm

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[1] and their critical habitats are managed by the Ecological Services Program of the U.S. 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. IPaC only shows species that are regulated by USFWS (see FAQ).
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

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NAME	STATUS
Northern Long-eared Bat Myotis septentrionalis Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/9045	Threatened

Birds

NAME	STATUS
Piping Plover Charadrius melodus There is **final** critical habitat for this species. The location of the critical habitat is not available. https://ecos.fws.gov/ecp/species/6039	Threatened
Red Knot Calidris canutus rufa Wherever found There is **proposed** critical habitat for this species. The location of the critical habitat is not available. https://ecos.fws.gov/ecp/species/1864	Threatened
Whooping Crane Grus americana There is **final** critical habitat for this species. The location of the critical habitat is not available. https://ecos.fws.gov/ecp/species/758	Endangered

Insects

NAME	STATUS
Monarch Butterfly Danaus plexippus Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/9743	Candidate

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

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Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

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.

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
- 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 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

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	THAT THE BIRD DOES NOT LIKELY BREED IN YOUR PROJECT AREA.)
American Golden-plover Pluvialis dominica This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds elsewhere
Black Tern Chlidonias niger This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/3093	Breeds May 15 to Aug 20
Bobolink Dolichonyx oryzivorus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 20 to Jul 31
Chestnut-collared Longspur Calcarius ornatus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 1 to Aug 10
Franklin's Gull Leucophaeus pipixcan This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 1 to Jul 31
Golden-winged Warbler Vermivora chrysoptera This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8745	Breeds May 1 to Jul 20
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 elsewhere
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 Jul 31
Willet Tringa semipalmata This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Apr 20 to Aug 5

NOT FOR CONSULTATION

Probability of Presence Summary

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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.

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.

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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
LOGAN COUNTY WATERFOWL PRODUCTION AREA	1,358.57 acres

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.

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
- PEM1/ABF

FRESHWATER POND

- PAB/EM1F
- PABFh
- PABFx
- PABF

LAKE

- L1UBG
- L2ABG

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.

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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 tuberficid 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

APPENDIX B

SELECTED TIER 2 AND 3 BIRD AND BAT STUDY REPORTS FOR THE BADGER WIND PROJECT

YEAR 1 ACOUSTIC BAT MONITORING
YEAR 1 PRE-CONSTRUCTION AVIAN STUDIES
WHOOPING CRANE STOPOVER HABITAT ASSESSMENT
YEAR 2 ACOUSTIC BAT MONITORING
YEAR 2 PRE-CONSTRUCTION AVIAN STUDIES

YEAR 1 MIGRATION ACOUSTIC MONITORING

BADGER WIND PROJECT

Prepared for

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Atwell Project No. 19000785

Submitted by Atwell, LLC

April 18, 2020

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APPENDICES

Appendix A **Figure 1. Land cover in the project area (NLCD 2016)**

Figure 2. Acoustic monitoring locations

Figure 3. Nightly mean use

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Figure 5. Species by detector

Figure 6. Call files by species and station

Figure 7. Species by week

Appendix B **Table 1. Nightly mean bat use per detector location**

Table 2. Hourly mean bat use per detector location

Table 3. Frequency of recorded bat calls at each detector (noise excluded).

Table 4. Frequency of all recordings at each detector (noise included).

Appendix C **Photo log**

1 INTRODUCTION

Ørsted Onshore North America (Ørsted) retained Atwell, LLC (Atwell) to conduct migration acoustic monitoring in accordance with the North Dakota Native Wildlife Resources: Guidelines for Reducing Impacts from Wind Energy Development for the Badger Wind Project (the project), an approximate 121,695-acre potential wind energy development site located in Logan and McIntosh counties, North Dakota (the project area) (Figure 1). The purpose of this monitoring is to conduct preconstruction surveys to evaluate bat activity at meteorological (MET) tower locations and ground stations representative of turbine locations.

1.1 STUDY AREA

Ørsted is currently in the early stages of developing a wind energy project in rural south-central North Dakota. The approximate center of the project area is near 46.239702N, -99.626697E. The project area, situated in Logan and McIntosh counties, is approximately 36 miles east of the Missouri River, 55 miles southeast of Bismarck, 54 miles southwest of Jamestown, and 11 miles north of the South Dakota border (Figure 1).

Approximately 60% (73,380 acres) of the 121,695-acre project area is in McIntosh County and approximately 40% (48,315 acres) is in Logan County. A network of paved and unpaved roads provides access throughout the project area. Farmsteads and associated buildings are scattered throughout the project area.

Based on topographic maps, satellite imagery, and review of the land-cover data, the project area consists predominantly of agricultural land and herbaceous land cover. Overall, the project area is dominated by agricultural land use and supports a mix of cultivated cropland, hayfields, pasturelands, and grasslands. A network of streams with herbaceous riparian buffers and scattered freshwater ponds, emergent wetlands, and livestock ponds are present. Emergent wetlands in this area are primarily classified as prairie potholes and are associated with a formerly glaciated landscape; however, the prairie pothole region primarily occurs to the north and east of the project area. Forested habitat is limited and highly fragmented, consisting primarily of planted shelterbelts. The general topography of the region and the project area can be described as undulating, with approximate elevations between 1,970 and 2,200 ft above mean sea level (amsl) within the project area.

1.2 NORTH DAKOTA STATE WILDLIFE ACTION PLAN

North Dakota Game and Fish Department (NDGFD) does not maintain a list of state-level threatened and endangered species (TES), but rather defaults to those species listed federally as those it recognizes with a threatened or endangered status (NDGFD 2015). The USFWS has primary oversight of TES in North Dakota.

The North Dakota State Wildlife Action Plan (SWAP) is the principle guiding document for safeguarding rare and declining species of fish and wildlife within the state. The plan places an emphasis on the protection of diverse native habitats to maximize the preservation of native wildlife diversity. The SWAP includes a list of 115 species of greatest conservation priority, and each has been given a priority designation based on conservation need (SCP Levels I, II, and III). SCP Level I are species that have declining populations in North Dakota or across their range, or are species that are at risk, range-wide, and have a high rate of occurrence in North Dakota constituting the core of the species breeding range. SCP Level I receives the most funding from the state wildlife grant. SCP Level II are species of moderate conservation priority, or species with a high level of conservation priority that receive a substantial level of monetary support from non-state wildlife grant funding. SCP Level III are species of moderate conservation priority but are peripheral or non-breeding in North Dakota (NDGFD 2016d). The SWAP has no regulatory authority over industrial development on private land (NDGFD 2016 pers. comm.). Should project development impact state-listed species of conservation concern on public lands, the SWAP could assist in providing steps to reduce or minimize these impacts.

1.3 BATS OF NORTH DAKOTA

Twelve species of bats are known to occur in North Dakota: Townsend's big-eared bat (*Corynorhinus townsendii*), big brown bat (*Eptesicus fuscus*), silver-haired bat (*Lasionycteris noctivagans*), eastern red bat (*Lasiurus borealis*), western red bat (*Lasiurus blossevillii*), hoary bat (*Aeorestes cinereus*), western small-footed bat (*Myotis ciliolabrum*), long-eared myotis (*Myotis evotis*), little brown bat (*Myotis lucifugus*), fringed myotis (*Myotis thysanodes*), long-legged myotis (*Myotis volans*), and northern long-eared bat (*Myotis septentronalis;* MYSE) (Nelson, Barnhart, and Gillam 2015). The MYSE is the only listed species and is federally threatened. NDGFD has classified Townsend's big-eared bat, big brown bat, little brown bat, and MYSE as SCP Level I, and western small-footed bat, long-eared myotis, and long-legged myotis as SCP Level III (Dyke, Johnson, and Isakson 2015).

According to Bat Conservation International species profiles, the ranges of Townsend's big-eared bat, western small-footed bat, long-eared myotis, and long-legged myotis include small portions of western North Dakota (BCI 2019). These four SCP are unlikely to occur within the project area and will not be discussed further.

Species that may occur, with varying likelihood, within the project area include (NDGFD 2016a; 2016b; 2016c; BCI 2019):

- eastern red bat (LABO)
- hoary bat (AECI)
- silver-haired bat (LANO)
- big brown bat (EPFU; SCP Level I)
- little brown bat (MYLU; SCP Level I)
- northern long-eared bat (MYSE; SCP Level I; Federally Threatened)

Additional information regarding these species and habitat within the project area can be found within the *Bat Habitat Assessment* dated January 23, 2020.

2 METHODS

2.1 Bat Migration Acoustic Monitoring

Acoustic surveys were completed during the summer (May 23 – July 14), and fall (July 15 – October 16) seasons in 2019. Five (5) Song Meter full spectrum ultrasonic detectors (SM3 or SM4; Wildlife Acoustics, Inc; www.wildlifeacoustics.com) were deployed at representative turbine locations utilizing available MET tower locations and ground locations within the project area.

2.2 Station Installment

Four ground-based stations (BMg1, BMg2, BMg3, BMg4) and one raised MET tower station (BMr2) were deployed using SM3 or SM4 detectors for the study (Figure 2). Detectors were positioned to record bat activity at approximately ground level and record activity within the rotary sweep zone (RSZ), in accordance with the North Dakota Native Wildlife Resources: Guidelines for Reducing Impacts from Wind Energy Development.

Each ground-based detector was secured to poly-vinyl chloride (PVC) tube encasing the microphone cable. Atop the PVC tubing was a 90-degree PVC elbow to secure the SMM-U1 external ultrasonic microphone. Allowing the microphone to sit parallel to the ground recording at an approximate height of 3m.

At BMr2, the microphone and microphone cable were raised using a K-bat pulley system installed on the MET tower. The SMM-U1 external ultrasonic microphone recorded at an approximate height of 50m, representative of the RSZ.

A photo log of all stations can be found in **Appendix C**.

2.3 Detector Deployment

All ground-based units were deployed on May 23, 2019 (BMg1, BMg2, BMg3, BMg4). The raised MET tower unit was deployed on July 30, 2019 (BMr2). Two MET towers were originally intended to be utilized at locations BM1 and BM2; however, damaged components prevented a raised deployment at BM1 and delayed deployment at BMr2 until MET tower repairs were made. BMg1 and BMr2 were initially deployed with SM3 units and switched to SM4 units on June 12, 2019, and September 4, 2019 respectively. All stations except BMg4 recorded activity through October 16, 2019. BMg4 had technical issues and recorded through October 9, 2019. Detectors monitored from approximately 30 minutes before sunset to 30 minutes after sunrise each night. Detectors were visited routinely to ensure units worked properly, to collect data, and to change data cards and batteries.

2.4 Call Analysis

Bat calls were identified using USFWS- approved Kaleidoscope Pro software (Wildlife Acoustics, Inc. v. 4.2.0) automated ID software. The following parameters were applied to the software (approved for use by USFWS):

- Classifier: NA 4.1.0
- "0" Sensitivity
- Approved for both Indiana bat and northern long-eared bat calls
- Analysis was set to include all species with ranges overlapping with project area

All bat calls underwent qualitative analysis by a biologist with sufficient bat acoustic call vetting experience through visual comparison of echolocation call metrics (i.e., call sequence activity and call duration, call slope, minimum frequency, and individual call characteristics representative of individual species). Species categories for analysis consisted of AECI (hoary bat), EPFU/LANO (big brown bat and silver-haired bat), LABO (eastern-red bat), little brown bat (MYLU), high frequency call (HF), and low frequency call (LF). Big brown bats and silver-haired bats were paired due to similar call characteristics. High frequency calls were distinguished as bat calls that exhibited call characteristics above 30khz (i.e., LABO, MYLU, MYSE, but either had degraded call sequence quality, limited amount of quality call pulses, or did not provide a quality search phase call to accurately apply a species identification. Similarly, the low frequency category included calls under 30khz that couldn't be classified to species. Recorded calls that did not exhibit any bat call pulses were categorized as "noise" and censored from species specific analysis.

2.5 Data Analysis

Data were organized and analyzed with Microsoft Excel, Program R, and Program RStudio (R Core Team 2018), RStudio TEAM 2018). The following statistics/data appearing in this report include:

- Detector Recording Effectiveness

- Site species richness
- High frequency and low frequency mean use
    - Nightly mean use
    - Hourly mean use
- Species Proportions
- Location Distribution of Species

Acoustic call data were standardized across time. Mean use statistics were calculated for each call frequency group (e.g., high frequency, low frequency, and all bats) per detector station per deployment period (e.g., detector nights or detector hours).

A detector night is equivalent to one detector properly operating for one entire night. Detector hours are defined as the number of hours a detector was properly operating for each detector night. It is important to note that mean use does not reflect absolute density of a particular call frequency group, and the number of a individuals present cannot be determined by number of calls identified. Standard errors (SE) are reported alongside of total bat calls per station mean use values. 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.

Frequency of bat calls is the percentage that a particular species was recorded on completed detector nights per site and for completed detector nights per project area.

3 RESULTS

3.1 Survey Effectiveness

SM3 and SM4 units collected data for 602 detector nights, an overall 90.25% effectiveness for the study period. Survey effectiveness per detector unit ranged from 76.9% (BMg4) to 100% (BMg2). Stations BMr2, BMg3, and BMg1 accounted for 94.9%, 94.6%, and 87.1% effectiveness, respectfully. BMg4 detector malfunctioned late in the season, which hindered the detector's overall survey effectiveness.

3.2 Mean Use

Mean use by site and detector nights are displayed in Table 1 and Figure 3. Ground stations had a mean of 3.18 ± 0.31 SE bat passes per detector night and the MET tower station had a mean of 4.65 ± 1.60 SE bat passes per detector night.

All detectors were operational for 8,428 hours for the 602 detector nights. Ground stations and the MET station operated for 7,378 hours and 1,050 hours respectively. Mean use by hour and detector site are displayed in Table 2 and Figure 4. Ground stations had a mean of 0.21 ± 0.01 SE bat passes per hour and the MET tower station had a mean use of 0.31 ± 0.08 SE bat passes per hour.

Overall, bat mean use by night and by hour for each site is relatively low.

3.3 Species Percentages and Spatial Distribution

Throughout the survey period, 26,850 total files were recorded. Of these, 24,824 files (92.45%) were categorized as "Noise" and filtered out during automated and manual call analysis, leaving 2,026 total bat calls (Table 4).

Approximately 89% of all recorded bat activity came from low frequency species (AECI, EPFU, LANO, LF calls; Table 3). The remaining 11% of calls included LABO, MYLU, and HF calls. No federally threatened or endangered bat species were identified in analysis through either Kaleidoscope software or manual vetting of calls.

AECI had the highest frequency of calls across all stations (937 calls; 3.49% of call files; 46.3% of bat calls) followed by EPFU/LANO (757 calls; 2.82% of call files; 37.3% of bat calls), LABO (202 calls; 0.75% of call files; 9.97%), and MYLU (4 calls; .01% of call files; 0.20% of bat calls) (Table 3). HF and LF categorized bat calls made up 5.13% and 1.09% of bat calls, respectfully.

BMg4 (39.09%), BMg2 (18.36%), and BMr2 (17.23) had the highest percentage of bat calls across the project area. It is important to note that BMr2 was not deployed until late July, so there were fewer detector nights than any other station despite having a high percentage of overall bat call recordings.

AECI and EPFU/LANO had the highest percentage of bat calls per station (46.25% and 47.36%, respectfully). However, AECI made up a relatively low amount of total bat recordings at the raised (BMr2) station. EPFU/LANO had the highest percent of bat calls at BMg1, BMg2, BMr2. AECI had the highest percent of bat calls at BMg3 and BMg4 (Table 3; Figure 5). Additionally, a majority of all bat calls identified at location BMr2 were EPFU/LANO (7.90%) and LABO (6.81%). Approximately 68% of all LABO calls were collected at BMr2.

Only four *Myotis spp.* (all identified as MYLU; 0.2% of bat recordings) were recorded during the study. MYLU calls were dispersed across ground stations and were not concentrated at any detector location.

3.4 Temporal Species Distribution

All call files identified as bat calls are displayed by species categories and detector site across date and time in Figure 6. AECI exhibited peaks in activity in the evening, shortly after sunset, and also again just prior to sunrise throughout the season. EPFU/LANO activity was more distributed throughout the night, but had more concentrated activity in June, September and October. Activity was substantially lower for these species in July and August months. LABO species had distributions of activity throughout the survey period but were most notable in September. In addition, this peak in LABO activity occurred mostly at the raised station, BMr2 (Table 3).

Seasonal distribution of species is grouped by week in Figure 4. Overall bat passes recorded across the project area peaked in late-May and also again in late August/early September (Figure 7). Recorded bat passes across all species rapidly declined by late September.

Throughout most of the survey season, AECI was the dominant species detected across all stations and accounted for 46.25% of all bat recordings (Table 3). AECI exhibited the greatest frequency of bat passes during completed nights in the summer season (May 23 – July 14) while EPFU/LANO species had peak activity in the fall season (July 15 – October 16) (Figure 4). EPFU/LANO species accounted for 37.36% of all bat recordings and accounted for the second most recorded category. LABO accounted for the third highest percentage of all recorded bat calls (9.97%) and had the greatest total bat passes the week of September 2nd. Total bat calls were driven by AECI in May and June with EPFU/LANO species dominating most of the bat species activity in mid-August and September. No temporal distribution was evident of MYLU due to low total recorded calls.

4 DISCUSSION AND CONCLUSIONS

No federally threatened or endangered bat species were detected throughout the acoustic migration monitoring study.

Overall bat activity for throughout the project was low. Bat activity between ground-based stations and the MET tower station were similar (3.18 bat passes per detector nights, and 4.65 respectively). However, the MET tower station, BMr2, had significantly fewer detector nights and a shorter survey period than the ground-based units, making the sample size smaller and incurring a higher standard error (SE) than the ground-based bat passes per night (0.31 SE and 1.60 SE respectively). Thus, evaluating operational mortality risk during normal operations based on the MET tower station with year one data may not adequately depict comparable bat data between the RSZ and ground units within the project area.

The MET tower station recorded more HF bats compared to the ground-based stations, primarily due to increased LABO activity in the fall season. BMg4 had the highest bat activity compared to all stations, and this margin was largely driven by AECI (91 .9% of bat calls). BMg4 has very limited suitable habitat and/or shelterbelts within the vicinity of the station. However, the station is located on the northeast side of the project adjacent to the prairie pothole region described in the *Study Area* section of this report. AECI are large bats and accustomed to foraging in open areas, which may have yielded the increase in activity by this species. BMg3 had the lowest bat activity compared to all stations, with only 0.69% of all recording files were categorized as bat calls at BMg3. BMg3 is in a very open area of the project area and, comparative to other station locations, has the least amount of attractive bat habitat features within the surrounding area.

The majority of bat passes over the monitoring period were made by LF bats and a seasonal bimodal distribution was largely driven by LF bats in mid-May through mid-June (AECI activity dominating) and mid-August through mid-September (dominated by EPFU/LANO) (Figure 7). AECI also exhibited a nightly bimodal distribution (eavening and morning peaks), particulalry in June and July months, but AECI bat activity becomes less concentrated and more distributed across the night in the fall season (Figure 6).

EPFU and LANO species can exhibit similar call characteristics and can be difficult to adequately distinguish between. However, it is likely that EPFU/LANO peaks were driven by LANO migration, with May influxes being triggered by by the end of migration, and this migration may be more indicative of activity being more evenly distributed throughout the night rather than exhibiting a bimodal distribution. In September and October, this distribution is very likely driven by LANO migrations as well. Migratory tree bat species (AECI, LABO, LANO) are commonly recorded bat fatalities at wind facilities and are expected to be the most common fatalities at the project (AWWI 2018; Arnett et al. 2013). EPFU are common bat species and are also likely to occur within the project area as well.

Unlike low frequency species, high frequency species, such as MYLU and LABO, did not reflect these strong bimodal distributions in nightly activity. LABO did exhibit increased activity in late the fall season. Due to the relative absence of activity earlier in the study, it is likely that these influxes were more related to seasonal migration. MYLU call data is limitted (only four total calls), and no distinctive trends in activity are evident. Additionally, no MYSE (federally threatened) calls were detected. Suitable habitat within the project is limited for each of these species. MYSE is dependent on forest habitat for foraging and roosting during the summer season. There is minimal suitable habitat for MYSE within the project area as discussed in the *Bat Habitat Assessment Memorandum* submitted by Atwell. Migration monitoring is not intended to replace summer presence/absence studies for federally threatened and endangered species. Protocols for addressing threatened and endangered bat species presence/absence surveys at the project should be discussed with USFWS.

REFERENCES

Arnett, Edward B., Gregory D. Johnson, Wally P. Erickson, and Cris D. Hein. 2013. "A Synthesis of Operational Mitigation Studies to Reduce Bat Fatalities at Wind Energy Facilities in North America." http://www.batsandwind.org/pdf/Operational%20Mitigation%20Synthesis%20FINAL%20REPORT%20UPDATED.pdf.

AWWI, [American Wind Wildlife Institute]. 2018. "AWWI Technical Report: A Summary of Bat Fatality Data in a Nationwide Database." Washington (DC). https://awwi.org/wp-content/uploads/2019/02/AWWI-Bat-Technical-Report_07_25_18_FINAL.pdf.

Barnhart, Paul R., and Erin H. Gillam. 2017. "Documentation of Overwintering Bat Species Presence and Hibernacula Use In the Badlands of North Dakota." *Northwestern Naturalist* 98 (1): 48–56.

BCI, [Bat Conservation International]. 2019. "Species Profiles." 2019. http://www.batcon.org/resources/media-education/species-profiles.

Christopher Shank, Michael Gutzmer, Kurt Tooley, and Jeffrey Kelly. 2015. "Documentation of the Northern Long-Eared Myotis, Myotis Septentrionalis on Standing Rock Indian Reservation." *2015 Transactions of the Nebraska Academy of Sciences*, 1–5.

Dyke, Steve, Sandra Johnson, and Patrick Isakson. 2015. "North Dakota State Wildlife Action Plan 2015." Bismarck, ND: North Dakota Game and Fish Department. http://gf.nd.gov/gnf/conservation/swap-2015/docs/swap-2015.pdf.

Foster, Rodney W., and Allen Kurta. 1999. "Roosting Ecology of the Northern Bat (Myotis Septentrionalis) and Comparisons with the Endangered Indiana Bat (Myotis Sodalis)." *Journal of Mammalogy*, 659–672.

Gillam, Erin H., Paul Barnhart, Terry Steinwand, and Greg Link. 2012. "Distribution and Habitat Use of the Bats of North Dakota (Project #T2-5-R)." Bismarck, ND: North Dakota Game and Fish Department. https://gf.nd.gov/sites/default/files/publications/T2-5-R%20Bat%20Survey%20Final%20Report%202012_0.pdf.

NDGFD. 2015. "Threatened and Endangered Species." North Dakota Game and Fish Department. 2015. https://gf.nd.gov/wildlife/endangered.

———. 2016a. "Big Brown Bat." North Dakota Game and Fish Department. 2016. https://gf.nd.gov/wildlife/id/bats/big-brown-bat.

———. 2016b. "Little Brown Bat." North Dakota Game and Fish Department. 2016. https://gf.nd.gov/wildlife/id/bats/little-brown-bat.

———. 2016c. "Northern Long-Eared Bat." North Dakota Game and Fish Department. 2016. https://gf.nd.gov/wildlife/id/bats/northern-long-eared.

———. 2016d. "State Wildlife Action Plan." North Dakota Game and Fish. 2016. https://gf.nd.gov/wildlife/swap.

NDWWC. 2018. "North Dakota Native Wildlife Resources: Guidelines for Reducing Impacts from Wind Energy Development. Draft, April 10." The North Dakota Wind and Wildlife Collaboration. https://static1.squarespace.com/static/588b55d046c3c4372c9bbfcb/t/5b913b8121c67c0efe6e23ee/1536244617824/ND+Wind+Energy-Wildlife+Guidelines_draft4-10-2018+%28002%29.pdf.

Nelson, Josiah J., Paul R. Barnhart, and Erin H. Gillam. 2015. "Distribution and Occurrence of Bat Species in North Dakota." *The Prairie Naturalist* 47: 87–93.

R Core Team. 2018. *R: A Language and Environment for Statistical Computing*. Vienna, Austria: R Foundation for Statistical Computing. https://www.R-project.org.

USFWS, [U.S. Fish and Wildlife Service]. 2018. *Northern Long-Eared Bat Range Map*. https://www.fws.gov/midwest/endangered/mammals/nleb/pdf/RangeMapwForestNLEB02Jan2018.pdf.

———. 2019a. "Species Profile for Little Brown Bat *(Myotis Lucifugus)*." Environmental Conservation Online System (ECOS). 2019. https://ecos.fws.gov/ecp0/profile/speciesProfile?spcode=A0JF.

———. 2019b. "Northern Long-Eared Bat Hibernacula and Maternity Roost Tree Location Information." https://www.fws.gov/midwest/endangered/mammals/nleb/nhisites.html.

White-Nose Syndrome.org. 2018. "White-Nose Syndrome Map; April 6, 2018." April 6, 2018. https://www.whitenosesyndrome.org/resources/map.

APPENDIX A

FIGURES

APPENDIX B

TABLES

Table 1. Nightly mean bat use per detector location.

Station	Type	Bat Calls			Detector Nights	Mean Nightly Bat Passes (± SE)
		High Frequency	Low Frequency	Total		
BMg1	Ground	38	289	327	128	2.55 ± 0.35
BMg2	Ground	18	354	372	147	2.53 ± 0.40
BMg3	Ground	12	174	186	139	1.34 ± 0.25
BMg4	Ground	17	775	792	113	7.01 ± 1.18
BMr2	Raised	143	206	349	75	4.65 ± 1.60
Total Ground	Ground	85	1592	1677	527	3.18 ± 0.31
Total Raised	Raised	143	206	349	75	4.65 ± 1.60
Total	--	228	1798	2026	602	--

Table 2: Hourly mean bat use per detector location.

Station	Type	Bat Calls			Detector Hours	Mean Hourly Bat Passes (± SE)
		High Frequency	Low Frequency	Total		
BMg1	Ground	38	289	327	1792	0.17 ± 0.02
BMg2	Ground	18	354	372	2058	0.17 ± 0.02
BMg3	Ground	12	174	186	1946	0.09 ± 0.01
BMg4	Ground	17	775	792	1582	0.47 ± 0.04
BMr2	Raised	143	206	349	1050	0.31 ± 0.08
Total Ground	Ground	85	1592	1677	7378	0.21 ± 0.01
Total Raised	Raised	143	206	349	1050	0.31 ± 0.08
Total	--	228	1798	2026	8428	--

Table 3: Frequency of recorded bat calls at each detector (noise excluded).

Site	Call Analysis ID	Passes	Site Percentage	Project Percentage
BMg1	AECI	43	13.15%	2.12%
	EPFU/LANO	221	67.58%	10.91%
	HF	6	1.83%	0.30%
	LABO	30	9.17%	1.48%
	LF	25	7.65%	1.23%
	MYLU	2	0.61%	0.10%
	Station Total	*327*	-	*16.14%*
BMg2	AECI	21	5.65%	1.04%
	EPFU/LANO	300	80.65%	14.81%
	HF	5	1.34%	0.25%
	LABO	12	3.23%	0.59%
	LF	33	8.87%	1.63%
	MYLU	1	0.27%	0.05%
	Station Total	*372*	-	*18.36%*
BMg3	AECI	115	61.83%	5.68%
	EPFU/LANO	39	20.97%	1.92%
	HF	1	0.54%	0.05%
	LABO	11	5.91%	0.54%
	LF	20	10.75%	0.99%
	Station Total	*186*	-	*9.18%*
BMg4	AECI	728	91.92%	35.93%
	EPFU/LANO	37	4.67%	1.83%
	HF	5	0.63%	0.25%
	LABO	11	1.39%	0.54%
	LF	10	1.26%	0.49%
	MYLU	1	0.13%	0.05%
	Station Total	*792*	-	*39.09%*
BMr2	AECI	30	8.60%	1.48%
	EPFU/LANO	160	45.85%	7.90%
	HF	5	1.43%	0.25%
	LABO	138	39.54%	6.81%
	LF	16	4.58%	0.79%
	Station Total	*349*	-	*17.23%*
Totals	AECI	937	-	46.25%
	EPFU/LANO	757	-	37.36%
	HF	22	-	1.09%
	LABO	202	-	9.97%
	LF	104	-	5.13%
	MYLU	4	-	0.20%
Total Bat Calls		*2026*		100.00%

Table 4. Frequency of all recordings at each detector (includes noise).

Site	Call Analysis ID	Passes	Site Percentage	Project Percentage
BMg1	AECI	43	0.99%	0.16%
	EPFU/LANO	221	5.07%	0.82%
	HF	6	0.14%	0.02%
	LABO	30	0.69%	0.11%
	LF	25	0.57%	0.09%
	MYLU	2	0.05%	0.01%
	Noise	4028	92.49%	15.00%
BMg2	AECI	21	0.19%	0.08%
	EPFU/LANO	300	2.69%	1.12%
	HF	5	0.04%	0.02%
	LABO	12	0.11%	0.04%
	LF	33	0.30%	0.12%
	MYLU	1	0.01%	0.00%
	Noise	10762	96.66%	40.08%
BMg3	AECI	115	3.45%	0.43%
	EPFU/LANO	39	1.17%	0.15%
	HF	1	0.03%	0.00%
	LABO	11	0.33%	0.04%
	LF	20	0.60%	0.07%
	Noise	3147	94.42%	11.72%
BMg4	AECI	728	32.59%	2.71%
	EPFU/LANO	37	1.66%	0.14%
	HF	5	0.22%	0.02%
	LABO	11	0.49%	0.04%
	LF	10	0.45%	0.04%
	MYLU	1	0.04%	0.00%
	Noise	1442	64.55%	5.37%
BMr2	AECI	30	0.52%	0.11%
	EPFU/LANO	160	2.76%	0.60%
	HF	5	0.09%	0.02%
	LABO	138	2.38%	0.51%
	LF	16	0.28%	0.06%
	Noise	5445	93.98%	20.28%
Totals	AECI	937	--	3.49%
	EPFU/LANO	757	--	2.82%
	HF	22	--	0.08%
	LABO	202	--	0.75%
	LF	104	--	0.39%
	MYLU	4	--	0.01%
	Noise	24824		92.45%
Total Recordings		*26850*	24824	--

APPENDIX C

PHOTO LOG

PRE-CONSTRUCTION AVIAN STUDIES
YEAR 1
MAY 2019 THROUGH APRIL 2020

BADGER WIND PROJECT
LOGAN AND MCINTOSH COUNTIES, NORTH DAKOTA

Prepared for

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EXECUTIVE SUMMARY

This report summarizes the results of pre-construction avian studies conducted by Atwell, LLC (Atwell) on behalf of Badger Wind, LLC (Badger Wind) for the proposed Badger Wind Project (the project) in Logan and McIntosh counties, North Dakota. Field studies were designed to document avian and raptor use, raptor nest activity, and Sharp-tailed Grouse (*Tympanuchus phasianellus*) lekking activity in the vicinity of the project.

Avian use studies were conducted in accordance with the United States Fish and Wildlife Service Land-Based Wind Energy Guidelines (USFWS WEG; USFWS 2012), the Eagle Conservation Plan Guidance: Module 1 - Land-based Wind Energy, Version 2 (ECPG; USFWS 2013), and the Revisions to Regulations for Eagle Incidental Take and Take of Eagle Nests (i.e., "final Eagle Rule"; USFWS 2016). The WEG recommend avian studies to document horizontal and vertical avian use, avian use by habitat type, raptor nest presence and activity, and species of concern presence and activity. The ECPG recommends studies to document eagle use, including occurrence, use during spring and fall migration seasons, and nest territory occupancy. The avian studies summarized in this report were designed to collect data in accordance with these guidelines.

Avian studies conducted during the first year of surveys included: nest surveys for Bald Eagles (*Haliaeetus leucocephalus*), Golden Eagles (*Aquila chrysaetos*), and other raptor species; lek surveys for Sharp-tailed Grouse; a full year of monthly eagle use surveys; and diurnal avian activity surveys during the spring and fall migration periods. The studies described in this report were conducted between May 2019 and April 2020.

Key results are summarized below.

Raptor Nests

- During aerial nest surveys, one in-use Bald Eagle nest was found within the project area and no nests were observed within the surrounding 10-mile buffer. This nest in the project area fledged young later in the season. No Golden Eagle nests were found within the project area or 10-mile buffer during the study period.
- Five in-use Ferruginous Hawk (*Buteo regalis*) nests, four Red-tailed Hawk (*Buteo jamaicensis*) nests, one Swainson's Hawk (*Buteo swainsoni*), and two Great Horned Owl nests (*Bubo virginianus*) were found within the project area and a surrounding two-mile buffer.

Sharp-tailed Grouse

- One confirmed Sharp-tailed Grouse lek was observed within the project boundary during aerial surveys in May 2019. In addition, two possible lek locations were detected during

May 2019 ground-based surveys within the project boundary. Cumulatively, six individual Sharp-tailed Grouse detections were recorded during lek surveys. Thirty-eight additional Sharp-tailed Grouse detections were recorded during diurnal avian use surveys in the spring and fall.

Bald Eagle and Golden Eagle Use of the Project Area

- Thirty-Four Bald Eagles were observed over the course of 636 hours of standardized eagle use surveys over the study period. An additional 46 Bald Eagles were detected incidental to standardized surveys. Incidental observations include sightings outside of the standardized sample plot and encounters outside of 60-minute eagle use survey periods.
- Six Golden Eagles were observed over the course of 636 hours of standardized eagle use surveys over the study period. Seven additional Golden Eagles were detected incidentally to standardized use surveys.
- Bald Eagle mean use rates were highest during the spring period, followed by the fall. Only one Bald Eagle was observed during standardized use surveys in the summer and only two were observed in the winter. Golden Eagle mean use rates were highest in the fall and winter.

Use of the Project Area by Species Listed under the Endangered Species Act

- Three Whooping Cranes (*Grus americana*) were observed within the project area from April 15 to 17, 2020. The cranes were first observed during eagle use surveys at a nearby point count station. Return visits found that the cranes foraged during daylight hours in unharvested corn and roosted in riverine wetlands nearby at night. This is the first known observation of Whooping Crane recorded within the project boundary.
- No other federally listed endangered or threatened species were observed within the project boundary during the study period.

General Avian Use of the Project Area

- Many of the most commonly observed species were generalists that are often observed in agricultural areas, including Mourning Doves (*Zenaida macroura*), Rock Pigeons (*Columba livia*), and American Crows (*Corvus brachyrhynchos*). Larger groups of birds were also observed, perhaps as part of seasonal migrations including Franklin's Gull (*Leucophaeus pipixcan*), Lapland Longspurs (*Calcarius lapponicus*), Red-winged Blackbird (*Agelaius phoeniceus*), and Sandhill Cranes (*Grus canadensis*).
    - Small-bodied passerines (particularly Lapland Longspurs) and waterfowl (particularly Snow Geese [*Chen caerulescens*]) together comprised the majority (98%) of avian detections during the spring.

  - Small-bodied passerines (particularly Red-winged Blackbirds), and waterbirds (particularly Franklin's Gull) together comprised the majority (83%) of avian detections during the fall.

- Avian species groups with mean flight heights within the pre-defined 35 – 150-meter rotor-swept zone included large-bodied corvids (e.g., crows and ravens), raptors, waterbirds (e.g., gulls, pelicans, cormorants), and waterfowl.
- Species of conservation priority observed more frequently in grassland habitats during diurnal avian use surveys included Chestnut-collared Longspur (*Calcarius ornatus*), Grasshopper Sparrow (*Ammodramus savannarum*), Bobolink (*Dolichonyx oryzivorus*), and Western Meadowlark (*Sturnella neglecta*).
- All raptor-species use rates were highest during the fall, driven by detections of Broad-winged Hawks (*Buteo platypterus*), Northern Harrier (*Circus hudsonius*), Red-tailed Hawk, and Swainson's Hawk.

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ACRONYMS AND ABBREVIATIONS

AKN	Avian Knowledge Network
Atwell	Atwell, LLC
BGEPA	Bald and Golden Eagle Protection Act
ECPG	United States Fish and Wildlife Service Eagle Conservation Plan Guidance: Module 1 - Land-based Wind Energy Version 2
ESA	Endangered Species Act
km	kilometer(s)
m	meter(s)
MBTA	Migratory Bird Treaty Act
MCP	Minimum Convex Polygon
MW	Megawatt
NDGFD	North Dakota Game and Fish Department
ND SWAP	North Dakota State Wildlife Action Plan
NGPC	Nebraska Game and Parks Commission
NLCD	National Land Cover Database
QA/QC	Quality Assurance/Quality Control
project	Badger Wind Project
RSZ	rotor-swept zone
SCP	Species of Conservation Priority
SD	standard deviation
TES	Threatened and Endangered Species
USFWS	United States Fish and Wildlife Service
WEG	United States Fish and Wildlife Service 2012 Land-Based Wind Energy Guidelines
WTG	Wind Turbine Generator

1 INTRODUCTION

Atwell, LLC (Atwell) was contracted by Badger Wind, LLC (Badger Wind) to conduct avian studies for the proposed Badger Wind Project (the project) in Logan and McIntosh counties, North Dakota (Figure 1). The 250-megawatt (MW) project includes the development of 60 - 120 wind turbine generators (WTGs), associated collection lines, access roads, and a collector substation.

The current project boundary (April 2019) is depicted in Figure 1. The project area is an estimated 121,695 acres, with approximately 60% of its area (73,390 acres) in McIntosh County and approximately 40% (48,315 acres) in Logan County. The general topography is undulating and rises from the west to the east, with approximate elevations between 1,970 and 2,200 feet above mean sea level within the project boundary. The project is predominately within the Missouri Coteau Slope Level IV Ecoregion, with portions of the project area's eastern boundary extending upward into the Missouri Coteau Level IV Ecoregion (Bryce et al. 1996). The Missouri Coteau is an escarpment of glacial till containing numerous hills, small lakes, and poorly drained depressions that are referred to as "potholes" that receive most of their water from snow melt and precipitation (Bryce et al. 1996). The Missouri Coteau Slope descends westward toward the Missouri River from the Coteau and is characterized by a thinner glacial till layer and integrated drainages flowing toward the Missouri River (Clayton 1962).

According to the 2016 U.S. Geological Survey National Land Cover Database (NLCD; Yang et al. 2018), the project area is composed primarily of cultivated crops (56.0%) and herbaceous/grassland (35.1%; Figure 2). Wetlands and open water comprise 2.4% of the project area. Other land cover types found within the project area include developed areas (2.9% of the project area), pasture/hay (2.4%), shrub/scrub (1.1%), woodland forest (0.1%), and barren land (less than 0.1%; Figure 2).

The objectives of the studies summarized in this report were to document avian and raptor use, raptor nest activity, and grouse lekking activity in the vicinity of the project. Survey protocols described herein were designed to adhere to Tier 3 of the United States Fish and Wildlife Service (USFWS) 2012 Land-Based Wind Energy Guidelines (WEG) and Stage 2 assessments described in the USFWS Eagle Conservation Plan Guidance: Module 1 - Land-based Wind Energy Version 2 (ECPG; USFWS 2012; USFWS 2013). These two documents provide wind energy developers and operators guidance for adhering to the Migratory Bird Treaty Act (MBTA) and Bald and Golden Eagle Protection Act (BGEPA), respectively. Additionally, Atwell utilized industry standard approaches for avian use studies as promoted by the National Wind Wildlife Collaborative (Strickland et al. 2011). Table 1 includes a summary of avian studies conducted over the May 2019 to April 2020 study period and their respective survey extents, survey frequencies, and survey durations.

This report adheres to avian taxonomy outlined in the American Ornithological Society's Online Checklist of North & Middle American Birds: 61st Supplement (Chesser et al. 2020).

2 METHODS

2.1 BALD EAGLE AND RAPTOR NEST SURVEY

The eagle and raptor nest surveys were conducted from May 1 to 3, 2019. The eagle nest survey area, depicted with black outline in Figure 3, includes the project area and extends 10 miles from the project boundary, following recommendations in the ECPG and final Eagle Rule (USFWS 2013; USFWS 2016). The smaller non-eagle raptor nest survey area, depicted with purple outline in Figure 3, includes the project area and extends two miles from the project boundary, following recommendations in the WEG (USFWS 2012).

Aerial transect surveys were conducted in a fixed-wing Cessna Skyhawk 172M by an Atwell avian biologist. Transects were flown by North Dakota-based Bismarck Aero at speeds of approximately 70 to 120 knots at altitudes from approximately 400 to 1,000 feet, depending on landscape conditions. North-south survey transects were spaced one mile apart. The plane occasionally deviated from the transect to specifically circle potential nesting habitat patches when they were encountered. The plane then returned to resume the transect once the habitat patch was assessed.

An area extending to 0.5-mile on each side of each transect was scanned for eagle and other raptor nests. Surveys were flown prior to bud-break and leaf extension, resulting in minimal canopy obstruction of nests. Coniferous trees that may obscure nest locations were relatively scarce and were usually associated with homesteads.

In addition to the aerial nest survey, raptor nests that were located incidentally during ground-based eagle use and diurnal avian activity surveys were also recorded and added to the project nest database.

When a raptor nest was encountered, the following data were collected:

- Nesting species;
- Nest location (decimal degrees);
- Nest substrate (deciduous or coniferous);
- Nest status (in-use or alternate);
- Nest condition (good, fair, or poor); and
- Nest contents (number of eggs or young).

Following completion of the surveys, data were reviewed and uploaded into the project database as part of the quality assurance/quality control (QA/QC) program.

2.2 SHARP-TAILED GROUSE LEK SURVEYS

The Sharp-tailed Grouse (*Tympanuchus phasianellus*) lek survey was conducted between May 2 and May 10, 2019. The grouse lek survey area included the project area and extended one mile from the project boundary, following guidance described in the WEG, the North Dakota Game and Fish Department (NDGFD) North Dakota Wildlife Action Plan (ND SWAP; Dyke et al. 2015), and the Nebraska Game and Parks Commission (NGPC) Avian Assessment Guidance for Wind Energy Facilities in Nebraska version 3.5 (NGPC 2018; Figure 4).

Aerial transect surveys were conducted in a fixed-wing Cessna Skyhawk 172M by Atwell avian biologists. Transects were flown by North Dakota-based Bismarck Aero at speeds from approximately 50 to 135 knots at an approximate altitude of 400 feet, depending on landscape conditions and safety concerns. North-south survey transects were flown 0.5 miles apart, with surveyors scanning out to 0.25 mile on each side of the aircraft. Surveys began approximately ten minutes before sunrise and ended approximately two hours after sunrise.

When a potential grouse lek was encountered, the plane deviated from the transect and circled the area where grouse were observed to mark the coordinates of the location, document habitat features, and to count all grouse present. Once the lek was assessed, the aircraft then returned to continue the transect.

An Atwell biologist conducted an informal ground-based lek survey on May 2, 2019, after the morning's scheduled aerial survey was cancelled due to fog. The biologist drove 71st St SE from State Highway 3 to the Village of Burnstad. The biologist stopped every 0.5 mile to visually scan for grouse and to listen for grouse vocalizations over a five-minute survey period at each stop (Strickland et al. 2011; Newell 2016).

All grouse observed incidental to other project-related activities such as eagle nest surveys and eagle use point count surveys were recorded and added to the project's grouse data set.

When a Sharp-tailed Grouse lek was encountered, the following data were collected:

- Lek location (decimal degrees);
- Number of individuals present;
- Observed behaviors;
- Land use; and

Lek locations were additionally referenced with nearby landmarks (e.g., hilltops, potholes or wetlands, trees) to improve location precision and to help relocate the lek if assessed for ground-based lek counts at a later date.

Confirmed leks were defined as two or more birds together, with at least one male displaying. Possible leks were defined as auditory detections of multiple grouse that could not be verified visually after their initial detection on a ground-based survey.

Following completion of the surveys, data were reviewed and uploaded into the project database as part of the QA/QC program.

2.3 EAGLE USE SURVEYS

A long-duration, fixed-point protocol (Strickland et al. 2011) was used to document seasonal activity and behavior of eagles and other raptor species within the project. All eagle detections and other raptor detections within a three-dimensional cylindrical plot (the sample plot) were recorded, following a fixed-radius, point count survey approach (Hutto et al. 1986; Ralph et al. 1993) that is referenced in the ECPG (USFWS 2013). Though fixed-radius plots were used, the distance to each detection was estimated to allow for density estimation (Reynolds et al. 1980). Sample plots measured 2,625 feet (800 meters [m]) in radius by 656 feet (200 m) in height, as described in the final Eagle Rule (USFWS 2016).

Study Period

Eagle use surveys were conducted over one full year to encompass the wintering season, spring and fall migrations, and the breeding season (Strickland et al. 2011). Each sample plot was visited for one hour each month, as described in the final Eagle Rule (USFWS 2016). Seasonal periods were defined as spring (March through May), summer (June through July), fall (August through November), and winter (January through February). The study period began on May 1, 2019 and ended on April 30, 2020.

Survey Methodology

Consistent with the Eagle Rule, a one-hour survey duration was used throughout the study period for all visits (USFWS 2016). Surveys were conducted between dawn and dusk. Surveys were conducted in all weather conditions provided that conditions were safe for the observer and that horizontal visibility was at least 800 m and vertical visibility was at least 200 m. A starting point was randomly selected from the 53-monitoring stations before each of the 12 survey events across the year.

While broadly referred to here as point count surveys, the ECPG recognizes that eagle and raptor use surveys are more accurately described as a ‘point-based recording of activity duration (minutes of flight)’ within the sample plot (USFWS 2013).

The following information was recorded for each eagle or raptor individual that was observed:

- Species or parent taxa group (e.g., Accipiter species);
- Age (adult, immature, juvenile);
- Time of day at first and final observation within the sample plot;
- Behavior;
- Flight direction;
- Habitat;
- Horizontal distance to initial observation and to closest observation;
- Flight height within the sample plot (initial height, minimum height, maximum height);
- For eagles and species as endangered or threatened under the Endangered Species Act (ESA), flight path mapped through the sample plot;
- Duration of flight within the rotor-swept zone's (RSZ) portion of the sample plot (35 to 150 m in height), to the nearest 0.1 minute; and
- Duration of flight within the entire (0 to 200 m in height) sample plot for eagles only (i.e. eagle minutes described in the ECPG [USFWS 2013]).

At the completion of each survey, the observer confirmed that data sheets were complete and legible prior to proceeding to the next point count station. Following completion of the surveys, data were reviewed and uploaded into the project database as part of the QA/QC program.

Selection and Location of Point Count Stations

Fifty-three point count stations were established overall within the study area overall (Figure 5). Point count station coordinates are detailed in Appendix A. Consistent with guidelines in the final Eagle Rule (USFWS 2016) and the Appendix C of the ECPG (USFWS 2013), Atwell established 18 point count stations to achieve 30% spatial coverage of an approximately 28,269-acre minimum convex polygon (MCP). The MCP is depicted by the blue polygon in Figure 5 and was generated from a preliminary turbine array provided by Badger Wind. The MCP encompasses the potentially hazardous area around the turbines and their associated infrastructure.

An additional 35 point count stations were added to provide coverage of the project area given a potential for future expansion and/or modification of the project area. Three of these 35 stations were positioned to the east and outside of the project boundary, in an area that was also under consideration for development at the start of surveys.

The following criteria were used when selecting point count station locations:

- Stations should be located on low-traffic roadways for safety and to minimize noise disturbance during surveys.
- Stations should be located within or adjacent habitat types that are representative of the project area.
- Stations should be spaced so that sample plots do not overlap.
- Stations should provide a 360-degree view of the horizon to the extent feasible.
- Stations should be accessible year-round.

Atwell ground-truthed all 53 point count stations in May 2019. Stations with landowner conflicts, an inadequate viewshed, or anticipated poor observer access during heavy precipitation were adjusted as necessary.

Land cover types were reviewed during ground-truthing to confirm that the survey points were representative of habitats found within the project area. The point count stations were located within represented land cover types as follows: 53.6% cultivated crops, 38.1% herbaceous cover, 3.6% open-space developed areas, 1.9% hay/pastureland, 1.1% emergent herbaceous wetland, and 1.0% shrub scrub. The following land cover types each represented less than 1% of the area covered by survey point count stations: development (low, medium, and high intensities), open water, woody wetland, deciduous forest, and barren land.

Alternate Point Count Station Strategy for Winter Surveys

Point count stations were surveyed for eagle use during the winter (December through February) to the extent feasible. There are 12 point count stations with potential safety or access issues during winter storm events. Point count station 14, 21, 22, 30, 32, 35, 36, 40 and 48, are located on infrequently traveled roads with uncertain plowing frequency. These stations were potentially inaccessible during periods of high snow depths. Point count station 26, 39, and 50 are on frequently traveled roads with minimal roadside clearance. Roadside snowbanks that accumulated during plowing could further limit roadside clearance, rendering these points unsafe during surveys.

Nearby point count stations were pre-selected as to serve alternates for the above point count stations in the event that these stations could not be accessed in inclement weather (Table 2). Alternate points were proximate in location and were located within similar habitats when possible. This strategy allowed surveyors to safely meet standardized survey effort goals for the winter and early spring seasons while maintaining appropriate spatial coverage of the study area.

2.4 DIURNAL AVIAN ACTIVITY POINT COUNT SURVEYS

A short-duration, fixed-point protocol (Strickland et al. 2011) was used to characterize general avian use for all species within the study area, consistent with the WEG (USFWS 2012). Diurnal avian activity surveys were used to estimate mean use and species richness and to determine presence of species of concern and concentrations of avian use within the study area.

Detections of small-bodied birds and large-bodied birds were recorded within a three-dimensional cylindrical plot (the sample plot), following a fixed-radius plot point count survey approach described in Section 2.3. Small-bodied birds included hummingbirds, cuckoos, doves, swifts, woodpeckers, and most passerines. Sample plots for small-bodied birds measured 492 feet (150 m) in radius by 656 feet (200 m) in height. Large-bodied birds included upland game birds, waterfowl, waterbirds (wading birds, cormorants, pelicans, grebes), shorebirds, raptors, nightjars, pigeons, and large corvids (crows [*Corvus brachyrhynchos*] and Common Ravens [*Corvus corax*]). Sample plots for large-bodied birds measured 2,625 feet (800 m) in radius by 656 feet (200 m) in height.

Study Period and Study Area

Diurnal avian activity surveys were completed during the spring (May 2019, and March to April 2020) and fall (August to November 2019) seasons. The same 53 point count station locations established for eagle and raptor use surveys were also used for diurnal avian activity surveys (Figure 5).

Survey Methodology

Diurnal activity surveys followed point count methodology described in Ralph et al. (1993; 1995) and summarized in the WEG (USFWS 2012) and in standard industry recommendations (National Wind Coordinating Committee 1999; Strickland et al. 2011). Though a fixed-radius protocol was used (Hutto et al. 1986; Ralph et al. 1993), distance estimates to each detection were also recorded, allowing for calculation of density estimates (Reynolds et al. 1980).

Diurnal avian activity surveys were 10 minutes in duration. Surveys were conducted after the completion of the eagle and raptor use survey (Section 3.6), so birds had settled after initial disturbance created by the observer's arrival at the point count station.

All birds that were seen or heard during the survey were recorded, up to distances of 150 m for small-bodied birds and 800 m for large-bodied birds. Surveys were conducted throughout the day, their timing contingent on the completion of the preceding eagle and raptor use survey.

The following information was recorded for each auditory and visual detection:

- Species or parent taxa group (e.g., sparrow species);
- Age (adult, immature, and juvenile);
- Time of day at first detection;
- Behavior;
- Flight Direction;
- Habitat;
- Horizontal distance to initial observation and to closest observation;
- Flight height within the sample plot (initial height, minimum height, and maximum height); and
- Flight paths of federally listed threatened and endangered species mapped through the sample plot.

At the completion of each survey, the observer confirmed that data sheets were complete and legible prior to proceeding to the next point count station. Following completion of the surveys, data were reviewed and uploaded into the project database as part of the QA/QC program.

2.5 INCIDENTAL DATA COLLECTION AND LISTED SPECIES

Incidental detections of eagles, federally listed threatened or endangered (TES), and North Dakota species of conservation priority (SCP) as defined by the ND SWAP (Dyke et al. 2015) were recorded during survey activities. Incidental detections include observations recorded while en route to point count stations, non-raptor observations during eagle use surveys, raptor observations outside of the 800 m-radius survey plot, and observations that were recorded at point count stations but outside the survey period.

3 RESULTS

3.1 BALD EAGLE AND RAPTOR NEST SURVEY

3.1.1 Eagle Nests

Atwell detected one in-use Bald Eagle (*Haliaeetus leucocephalus*) nest within the eagle nest survey area during the May 2019 aerial surveys (Figure 3). This nest was located within the project area, in a small cluster of deciduous trees southwest of Beaver Lake in Logan County (46.3490°N, 99.6275°W). An adult Bald Eagle was observed incubating eggs at the time of observation. No other eagle nests were detected within the eagle nest survey area. One individual subadult Bald Eagle was observed soaring within the project area during aerial surveys (Figure 3). Golden Eagles (*Aquila chrysaetos*) were not observed during the aerial survey and no Golden Eagle nests were found during the study period.

3.1.2 Non-Eagle Raptor Nests

Atwell identified nine non-eagle raptor nests within the project area boundary and four non-eagle raptor nests within the surrounding two-mile raptor nest survey buffer. All 13 nests are depicted in Figure 3 and are summarized in Table 3. No federally listed raptor species were recorded as nesting during raptor nest surveys. Several of the 13 non-eagle raptor nests were found during ground-based eagle use and avian use surveys.

Five occupied Ferruginous Hawk (*Buteo regalis*) nests were found during the survey period, including three nests within the project area boundary and two nests within the 2-mile raptor nest survey buffer (Figure 3). All five nest structures were located in deciduous trees.

Four occupied Red-tailed Hawk (*Buteo jamaicensis*) nests were found during the survey period, including three nests within the project area and one nest within the two-mile raptor nest survey buffer. All four nest structures were constructed in deciduous trees.

The remaining four non-eagle raptor nests included: one Swainson's Hawk (*Buteo swainsoni*) nest observed during the nest building stage at an unusually late date inside of the project area boundary; one occupied Great Horned Owl (*Bubo virginianus*) nest within the project area and one occupied Great Horned Owl nest within the 2-mile raptor nest survey buffer; and one unoccupied raptor nest structure built by an unknown raptor species within the project area boundary. This structure was believed to be too small to be a Bald Eagle nest and of dimensions consistent with a hawk nest. The nest was found in poor condition.

3.2 SHARP-TAILED GROUSE LEK SURVEYS

One confirmed lek location, two possible lek locations, and six individual Sharp-tailed Grouse were observed within the grouse survey area during standardized grouse lek surveys (Figure 4). Confirmed and possible leks are shown with 0.5-mile buffers to represent likely nesting areas for females, following home range information provided in the ND SWAP (Dyke et al. 2015).

The confirmed lek was observed during the aerial survey on May 3, 2019, and it was observed again by aircraft on May 10, 2019. The lek was located approximately 7.75 miles southwest of Wishek and just inside of the project area boundary (Figure 4). On both visits, 16 to 18 individuals were observed at the lek. This lek location is managed as herbaceous habitat by the NDGFD (part of the CoverLocks program) according to signage posted on-site.

Of the two possible leks, both were discovered from auditory detections heard during ground-based surveys that were conducted on May 2, 2020 during inclement fog conditions that prevented visual confirmation of the leks on that date. In both cases, an unknown number of individuals were heard in the early morning hours from the biologist's roadside location. Neither potential lek could be confirmed in subsequent visits to the locations.

Of the six individual Sharp-tailed Grouse detected during the lekking season, one grouse was detected during aerial surveys within the project area and the other five grouse were detected incidentally during follow-up ground surveys between May 17 and May 20, 2019. Of these six birds, three were observed within the project area and three were observed outside of the project area but within the grouse survey area (Figure 4).

3.3 EAGLE USE SURVEYS

Eagle use survey results, along with discussion regarding annual and seasonal patterns, spatial distribution (where sample size allowed), directional movements, and flight heights are presented below.

3.3.1 Eagle Use Survey Effort

Table 4 summarizes survey effort by point during the survey period. Eagle use surveys occurred over 636 total hours of standardized survey effort during the study period. Total effort included 159 hours of spring surveys, 106 hours of summer surveys, 212 hours of fall surveys, and 159 hours of winter surveys.

Over the course of the study period, two point count stations (27 and 28) were shifted to new locations (54 and 55) to avoid landowner conflicts. Stations 14, 19, 22, 30, and 40 were not accessible during the winter and early spring so their paired replacement stations were surveyed instead following the alternative point strategy outlined in Section 2.4 above. Alternative points

were also used for stations 35 and 36 during the winter and spring due inaccessibility and to avoid potential landowner conflicts. Point count stations 35 and 36 will eventually be replaced with new point count stations during the second year of eagle use surveys.

3.3.2 Cumulative Detections of Bald Eagles and Golden Eagles

Overall, 34 Bald Eagles were detected over 636 hours across one year of standardized eagle use survey effort (Figure 6). This total only includes Bald Eagles observed during standardized use surveys within the point count stations' sample plots.

An additional 46 incidental detections of Bald Eagles were documented across the project area during the survey period. Incidental detections included eagles observed from point count stations but flying outside of the sample plot boundary or outside of the 60-minute eagle use survey window, including nine Bald Eagles observed only during 10-minute diurnal avian use surveys that were conducted immediately after the 60-minute eagle use surveys were completed. Eagles detected while traveling en route to point count stations were also included as incidental detections (Figure 6).

Six Golden Eagles were detected over 636 hours across one year of standardized eagle use survey effort (Figure 6). This total only included eagles observed during standardized use surveys that were detected within 800 m of the point count station. An additional seven incidental Golden Eagle detections were documented across the project area during the one-year survey period.

3.3.3 Seasonality

Bald Eagles were recorded as standardized detections throughout the year, though most detections occurred during the spring and fall migratory periods. Standardized mean use within the project area was:

- 0.11 Bald Eagle detections/60-minute survey/800 m plot (standard deviation [SD] = 0.37) during the spring survey period;
- 0.01 Bald Eagle detections/60-minute survey/800 m plot (SD = 0.10) during the summer period, 0.06 Bald Eagle detections/60-minute survey/800 m plot (SD = 0.28) during the fall period; and
- 0.01 Bald Eagle detections/60-minute survey/800 m plot (SD = 0.11) during the winter period, (Table 5).

Accounting for the total eagle use survey effort across the project area during the year, the equivalent of one Bald Eagle was detected for every 8.8 hours, 106.0 hours, 16.3 hours, and 79.5

hours of standardized eagle use survey effort during the spring, summer, fall, and winter survey periods, respectively.

Standardized Golden Eagle detections were spread across the spring, fall, and winter seasons, with most detections occurring during the fall season. Golden Eagles were not observed during standardized surveys in the summer. Standardized mean use within the project area was:

- 0.01 Golden Eagle detections/60-minute survey/800 m plot (SD=0.08) during the spring period;
- 0.01 Golden Eagle detections/60-minute survey/800 m plot (SD = 0.12) during the fall period; and
- 0.01 Golden Eagle detections/60-minute survey/800 m plot (SD = 0.11) during the winter period.

Accounting for the total eagle use survey effort across the project area during the year, the equivalent of one Golden Eagle was detected for every 159.0 hours 70.7 hours, and 79.5 hours during the spring, fall, and winter survey periods, respectively.

3.3.4 Spatial Distribution of Detections

Bald Eagle mean use rates were low across the project area (see Table 6 for a summary of use and Figure 5 for point count station locations). Point count stations with highest observed Bald Eagle use tended to be between Wishek and Beaver Lake in Logan County though this pattern was not well defined, and a second year of eagle use surveys will provide additional context on the persistence of this pattern. Point count station 4 was within 800 m of an in-use Bald Eagle nest (Section 3.1.1) and this point count station had the highest estimated Bald Eagle use of the sample set (Table 6). Point count stations 12 and 18 north of Wishek were the only other stations with more than two Bald Eagle detections over the one year of surveys.

There was no apparent spatial pattern to standardized Golden Eagle detections. Thirteen Golden Eagle sightings (six recorded during standardized surveys and seven recorded incidentally to surveys) were distributed across the project area, with six detections in Logan County and seven detections in McIntosh County.

3.3.5 Directional Movements

Bald Eagle movements tended to be toward the north in the spring and toward the south in the fall, suggesting that most of the Bald Eagles observed during these seasons were migrating through the project area.

Eighteen Bald Eagle detections occurred during the spring season, 10 of which were headed in a northerly direction (i.e., north, northeast, northwest, north-northeast, or north-northwest). Only three spring observations were moving in a southerly direction (i.e., south, southeast, southwest, south-southeast, or south-southwest). Five spring observations did not show any directional movement (i.e., either perched, circling, or mixed flight directions). One of the three southbound spring observations was associated with the known nest within the project area.

Thirteen Bald Eagle detections occurred during the fall season, seven of which were headed in a southerly direction. Only two fall observations were for eagles moving in a northerly direction, two eagle observations were seen flying westward, and another two eagle observations did not show any directional movement. Two Bald Eagles were detected flying south in early to mid-December, suggesting that Bald Eagle fall migrations may continue through late fall.

In contrast to Bald Eagles, Golden Eagles observed during standardized eagle use surveys did not generally follow expected seasonal directional movements (e.g., northbound in the spring and southbound in the fall). This pattern suggests that most of the Golden Eagles seen during the study period were not actively migrating at the time of observation, perhaps using the project area in postnatal dispersal movements or as migratory stopover habitat while observed from point count stations.

3.3.6 Flight Heights

Table 7 summarizes the mean distributions of minimum and maximum flight heights for raptor species detected during standardized eagle use surveys. Mean minimum and maximum flight heights within the project area were highest during the spring survey period for Bald Eagles, Golden Eagles, and the raptor group in general. Mean raptor flight heights steadily decreased through the seasons from the spring to the following winter. A time within RSZ summary for Bald and Golden Eagles is presented in Table 8.

Bald Eagle mean minimum and maximum flight heights were within the RSZ during the spring, and Bald Eagle mean maximum flight heights were within the RSZ during the fall and winter. Sample sizes were low during some seasons, with only one Bald Eagle observed during standardized surveys in the summer and only two Bald Eagles observed in the winter. Bald Eagles were observed within the RSZ for 30.3 minutes over 636 hours of standardized survey effort across the study period. Similar to a seasonal pattern of observation described in Section 3.3.3, rates of Bald Eagle time within the RSZ were highest in the spring (0.11 minutes/survey hour) and fall (0.05).

Golden Eagle sample size was also small, and three of the six Golden Eagles were observed during standardized surveys at heights within the RSZ. Golden Eagles were observed within the RSZ for 10.6 minutes over 636 hours of standardized survey effort across the study period. Golden Eagle

rates of observation within the RSZ were also highest in the spring (0.04 minutes/survey hour) and fall (0.02 minutes/survey hour).

3.3.7 Eagle-Minutes Summary

Eagle-minutes represent accrued minutes of eagle observations for flying eagles within the 800 m-radius by 200 m-high sample plot. Perched eagles or eagles observed outside of the sample plot are not assigned eagle-minutes (USFWS 2013). Eagle-minutes are summarized by season in Table 8.

Similar to patterns described in Sections 3.3.3 and 3.3.6 above, Bald Eagle seasonal eagle-minute rates were highest in the spring (0.26 Bald Eagle-minutes per hour of standardized eagle use observation) and fall (0.16 Bald Eagle-minutes per survey hour). Bald Eagle-minute rates were lowest in the winter (0.03 Bald Eagle-minutes per survey hour) and summer (0.01 Bald-Eagle minutes per survey hour). Cumulatively, 81 total Bald Eagle-minutes were recorded over 636 hours of standardized survey effort across the study period.

Observed Golden Eagle-minute rates were highest in the fall (0.056 Golden Eagle minutes per survey hour) and spring (0.04 Golden Eagle minutes per survey hour). Golden Eagle minute rates were lowest in the winter (0.02 Golden Eagle minutes per survey hour) and the summer, when they were not observed. Cumulatively, 21 Golden Eagle-minutes were recorded over 636 hours of standardized survey effort.

3.3.8 Use of the Project Area by Other Raptor Species

Overall, mean raptor use was highest during the fall survey period (3.37 raptors/60-minute survey/800 m plot; Table 5). Detections of Red-tailed Hawks, Swainson's Hawks, and Northern Harriers (*Circus hudsonius*) collectively accounted for 70.3% of raptor detections during the fall season. Broad-winged Hawks (*Buteo platypterus*) made up an additional 12.3% of raptor detections in the fall. All but one of the 88 Broad-winged Hawks that were reported in the fall were observed over the course of one September survey at point count station 25.

Mean use rates were similar during the summer and spring survey periods (summer: 2.39 raptors/60-minute survey/800 m plot; spring: 2.01 raptors/60-minute survey/800 m plot). Similar to the fall season, Red-tailed Hawks, Swainson's Hawks, and Northern Harriers comprised the bulk of raptor detections in both the summer (78.2%) and the spring (76.4%).

Winter mean use was very low compared to the other three seasons (0.069 raptors/60-minute survey/800 m plot). A total of 11 raptors representing five species were observed over 159 hours of standardized eagle use surveys over the full winter season. Three of the five species detected in the winter were not observed during standardized eagle use surveys during any other season,

including Northern Goshawk (*Accipiter gentilis*), Great Horned Owl, and Snowy Owl (*Bubo scandiacus*). Snowy Owls were the most common raptor detections (45.5%).

Fourteen raptor species were observed during standardized surveys in the fall, the highest raptor diversity noted in any season over the first year of surveys. Twelve raptor species were detected during the spring, seven species in the summer, and five in the winter.

A review of the entire raptor group across all point count stations shows that raptors generally did not exhibit strong inter-seasonal patterns of spatial use within the project area that might suggest local concentrations of use (Table 9 and Figure 5 for point count station locations). However, contrary to Bald Eagle observations described above, point count stations with the highest raptor use rates tended to be in the southern and central portions of the project area. Point count station 25, located west of Wishek in McIntosh County, had the highest mean use overall (8.92 raptors/60-minute survey/800 m plot). This result was driven by a large group of migrating Broad-winged Hawks detected at this station on September 19, 2019.

Mean minimum and maximum flight heights were within the RSZ during the spring for several raptor species (Table 7) including Ferruginous Hawk, Northern Harrier, Red-tailed Hawk, Rough-legged Hawk (*Buteo lagopus*), Swainson's Hawk, and Turkey Vulture (*Cathartes aura*). Summer and fall mean minimum and maximum flight heights were within or near the RSZ for Ferruginous Hawk, Red-tailed Hawk, Swainson's Hawk, and Turkey Vulture.

3.3.9 Federally Listed Threatened and Endangered Species

Three adult Whooping Cranes (*Grus americana*) were detected within the project area during standardized surveys on April 15, 2020. The cranes were initially observed at 46.304° N, 99.640° W, within 250 m of point count station 16, flying north at heights ranging from 2 to 7 m above the ground (i.e., below RSZ). This is the first known occurrence of this federally listed endangered species within the project area.

The Whooping Cranes were observed foraging in corn throughout the day, approximately four miles northwest of Wishek, North Dakota. Of note, due to poor harvesting conditions during the fall of 2019, the Whooping Cranes were foraging in unharvested stands of corn. The Atwell biologist noted in April 2020 that there were other areas of unharvested corn within the project area, perhaps dispersing Whooping Crane stopover use farther from the migration corridor's centerline than expected.

The nocturnal roosting location was not obtained on April 15. The Whooping Cranes were again present on April 16 and 17, 2020 and they roosted 0.7 miles (1.1 kilometer [km]) from their foraging location on those days. The roosting location is at the confluence of two riverine wetlands with seasonally flooded water regime classifications within the project area.

This was the only sighting of a federally listed threatened or endangered species within the project area during the study period.

3.4 DIURNAL AVIAN ACTIVITY POINT COUNT SURVEYS

The following sections summarize the results of the diurnal avian activity surveys, including mean use and mean flight height statistics.

3.4.1 General Avian Use

Standardized mean use data for all 110 species observed during 10-minute diurnal avian activity surveys in the spring and fall are presented in Appendix B. A list of all species observed within the project area over the course of eagle use and diurnal avian activity surveys (including incidentally observed species) is included in Appendix C.

Passerine, non-passerine, upland gamebird, raptor, wader, waterbird, and waterfowl statistics, discussed in more detail below, are summarized by species group in Table 10 and by individual species in Appendix B. Mean use statistics are summarized for all detections within the 800 m-radius by 200 m-high sample plot for large-bodied species and within the sample plot for small-bodied species as described in Section 2.5.

In addition, several large-bodied species of multiple species groups were frequently detected outside the sample plot at above 200 m in altitude. To provide additional information on use of the project area by these species, mean use statistics are also summarized for all detections within 800 m of the point regardless of flight height. In Table 10 and Appendix B, this is noted in a second line of data with an italicized “all” suffix after the species group or species name.

3.4.2 Species Group Use of the Project Area during Spring and Fall Migration

Large-bodied Corvids

Large-bodied corvids include crows and ravens and were recorded out to 800 m during diurnal avian activity surveys. Mean use rates within the project area were lower in the spring (0.05 detections/10-minute survey/800 m plot) than in the fall (0.11 detections/10-minute survey/800 m plot). This species group represented less than 0.1% of all spring detections and 0.4% of all fall detections in the project area during diurnal avian activity surveys. Nearly all large-bodied corvid detections (all spring detections and 96% of fall detections) were American Crows. One Common Raven was detected in the fall.

Large-bodied Non-Passerines

Large-bodied non-passerines include nightjars and Rock Pigeons (*Columba livia*) and were recorded out to 800 m during diurnal avian activity surveys. Large-bodied non-passerine mean use within the project area was slightly higher in the spring (0.56 detections/10-minute survey/800 m plot) than the fall (0.44 detections/10-minute survey/800 m plot). Large-bodied non-passerines represented 0.4% of spring detections and 2% of fall detections during diurnal avian activity surveys. Nearly all large non-passerine detections (all spring large-bodied non-passerines detections and 99% of fall large-bodied non-passerine detections) were Rock Pigeons. One Common Nighthawk (*Chordeiles minor*) was detected in the fall.

Non-Passerines (Small)

Small-bodied non-passerines include doves (excluding Rock Pigeon), cuckoos, swifts, hummingbirds, kingfishers, and woodpeckers were recorded out to 150 m during diurnal avian activity surveys. Small-bodied non-passerine mean use within the project area was three times higher in the fall (0.32 detections/10-minute survey/150 m plot) than in the spring (0.10 detections/10-minute survey/150 m plot). Much of this seasonal difference was attributable to higher numbers of Mourning Doves (*Zenaida macroura*) detected during the fall season.

Small-bodied non-passerines represented less than 0.1% of all spring detections and just over 1% of all fall detections during diurnal avian activity surveys. Mourning Doves were the most common small-bodied non-passerine detected and accounted for 81% of the observations of this species group in the spring and 94% of the observations of birds within this group in the fall.

Passerines (including Small-bodied Corvids)

Passerine species (perching birds) and small-bodied corvids (e.g., Blue Jay [*Cyanocitta cristata*]) were recorded out to 150 m and accounted for a large portion of all avian detections both in the spring (34% of all detections) and fall (44% of all detections). Passerine mean use of the project area was much higher in the spring, with mean use rates of 45.89 detections/10-minute survey/150 m plot in the spring and 11.77 detections/10-minute survey/150 m plot in the fall. Lapland Longspur (*Calcarius lapponicus*) accounted for much of the seasonal difference in passerine use; 6,245 Lapland Longspurs were detected during spring surveys, which equates to 86% of all spring passerine/small-bodied corvid detections. Only 498 Lapland Longspurs were detected during avian use surveys in the fall.

Fifty-one passerine and small-bodied corvid species were recorded during standardized diurnal avian activity surveys. Lapland Longspurs and Red-winged Blackbirds (*Agelaius phoeniceus*) were detected in large flocks on multiple occasions in cropland habitats, or in cropland/grassland margins. Red-winged Blackbirds are common breeders in cropland, grassland, and wetland

habitats within the project boundary and are abundant during migration in the spring and fall. Lapland Longspurs are also abundant in cropland habitats during spring and fall migration and may continue into the winter season contingent on seasonal weather conditions. Taken together, these two species represented 82% of 9,781 cumulative passerine detections recorded over the spring and fall seasons.

In the spring, migrating Lapland Longspurs accounted for the highest spring mean use rate any species (39.28 detections/10-minute survey/150 m plot) and made up 86% of all passerine detections. In the fall, flocks of staging and migrating Red-winged Blackbirds produced the highest fall mean use of any species (4.99 detections/10-minute survey/150 m plot) and made up 43% of all fall passerine detections. Migrating Lapland Longspurs were also numerous in the fall, accounting for an additional 20% of the fall passerine detections.

Counts of more than 500 Lapland Longspurs were recorded on two spring surveys (510 birds at point count station 32 on March 18, 2020 and 590 birds at point count station 17 on March 19, 2020) and counts between 300 and 500 Lapland Longspurs occurred at nine point count stations during the spring.

Encounters with large flocks of longspurs or blackbirds were not attributable to unique habitats and/or physiography present at stations with highest recorded mean use rates for these species, and the Atwell biologist noted that it was apparent that these longspur and blackbird flocks could have appeared at any location in the project area during migration. Spring Lapland Longspur counts within the project area generally peaked in early to mid-March, with a second, smaller peak in early to mid-April. This trend matches similar regional patterns reported for Logan and McIntosh counties (AKN 2020).

Several North Dakota SCP were detected during diurnal avian use surveys including:

- Chestnut-collared Longspur ([*Calcarius ornatus*], SCP Level I, 22 spring detections and 11 fall detections);
- Grasshopper Sparrow ([*Ammodramus savannarum*], SCP Level I, 4 spring detections and 1 fall detection);
- Bobolink ([*Dolichonyx oryzivorus*], SCP Level II, 19 spring detections and 4 fall detections); and
- Western Meadowlark ([*Sturnella neglecta*], SCP Level II, 66 spring detections and 22 fall detections).

Each of these species was found in generally low numbers with more detections during the spring season than in the fall season. This seasonal difference can likely be attributed to higher rates of detectability for vocalizing, territorial birds in the spring. Level I SCP (Chestnut-collared Longspur and Grasshopper Sparrow) detections tended to be in northern and eastern portions of the project area that are higher in elevation and are dominated by herbaceous, grassland cover. Highest Bobolink numbers were recorded southwest of Wishek, in fragmented grasslands near point count stations 32 and 34. Western Meadowlarks detections were more widespread across the project area but generally followed the spatial pattern observed for Chestnut-collared Longspurs.

Raptors

Raptors include eagles, falcons, harriers, hawks, owls, and vultures and were recorded out to 800 m during diurnal avian activity surveys. Additional raptor results recorded during eagle use surveys are summarized in Section 3.3.6. Mean raptor use recorded during diurnal avian use surveys was lower within the survey area during the spring survey period compared to the fall survey period. This pattern mirrored seasonal differences in raptor use found during eagle use surveys (Table 5).

Similar to results from eagle use surveys, raptor mean use recorded during diurnal avian use surveys was primarily driven by detections of Red-tailed Hawks, Swainson's Hawks, and Northern Harriers. In particular, Swainson's Hawks accounted for approximately 46% of all raptor detections during fall avian use surveys.

The ND SWAP lists several raptor species as SCP (Dyke et al. 2015) and several of these raptor species were observed during diurnal avian use surveys. Level I SCP observed during avian use surveys included: Ferruginous Hawk (3 spring detections and 1 fall detection) and Swainson's Hawk (8 spring detections and 62 fall detections). Level II SCP observed during avian use surveys included: American Kestrel (3 spring detections and 3 fall detections), Bald Eagle (7 spring detections and 4 fall detections), Golden Eagle (1 spring detection), and Northern Harrier (16 spring detections and 21 fall detections).

Shorebirds

Shorebirds include avocets, plovers, curlews, dowitchers, godwits, knots, phalaropes, sandpipers, snipes, stilts, turnstones, and woodcocks and were recorded out to 800 m during diurnal avian activity surveys. Shorebird mean use rates within the project area was similar in the spring (0.54 detections/10-minute survey/800 m plot) and fall (0.58 detections/10-minute survey/800 m plot). Shorebird detections represented 0.41% of all spring detections and 2.18% of all fall detections during diurnal avian activity surveys.

A large proportion of shorebirds observed in the fall were unidentifiable to species, belying higher shorebird species richness reported in the spring. A total of seven shorebird species were detected during the study period. Species that likely nest within the project area, including Killdeer and Upland Sandpiper (*Bartramia longicauda*), represented a majority of shorebird detections. Killdeer accounted for the greatest proportion of shorebirds in both seasons (65% in spring and 49% in fall).

Shorebirds were encountered in low numbers and frequencies throughout the project area and across several habitats. There was some indication that shorebirds may be found in higher densities in higher elevation grassland/pothole habitats along the project area's northeastern boundary, particularly near point count stations 22, 51, and 52. Killdeer accounted for the most significant proportion of higher shorebird concentrations in this portion of the study area.

The ND SWAP lists several shorebird species as SCP (Dyke et al. 2015). Several of these species were observed during diurnal avian use surveys, including:

- Marbled Godwit ([*Limosa fedoa*], SCP Level I, 5 spring detections);
- Wilson's Phalarope ([*Phalaropus tricolor*], SCP Level I, 6 spring detections); and
- Upland Sandpiper (SCP Level II, 11 spring detections).

Upland Gamebirds

Upland gamebirds include bobwhite, grouse, partridge, prairie-chickens, and turkey and were recorded out to 800 m during diurnal avian activity surveys. Upland gamebird mean use within the project area was higher in the spring (0.26 detections/10-minute survey/800 m plot) than the fall (0.10 detections/10-minute survey/800 m plot) during diurnal avian activity surveys.

Upland gamebirds represented 0.20% of all spring detections and 0.38% of all fall detections during diurnal avian activity surveys. Only two upland gamebird species were detected, Ring-necked Pheasant (*Phasianus colchicus*) and Sharp-tailed Grouse, a ND SWAP Level II SCP (Dyke et al. 2015). Ring-necked Pheasants were detected more frequently in the fall, with 15 fall detections and 10 spring detections. Sharp-tailed Grouse were detected more frequently in the spring, with 32 spring detections and six fall detections. These species are non-migratory and are present year-round within the project area; seasonal differences are attributable to seasonal differences in detectability stemming from grouse behavior and vocalization frequency.

Waders

Waders include cranes, bitterns, egrets and herons and were recorded out to 800 m during diurnal avian activity surveys. In addition to the previously mentioned Whooping Crane observations in the fall of 2019, only Sandhill Cranes (*Grus canadensis*) were observed in the spring and only Great Blue Herons (*Ardea herodias*) were observed in the fall.

A large proportion of Sandhill Cranes (including one group of 270 individuals) were observed flying over 200 m in altitude, above the sample plot and also above the RSZ. When observations greater than 200 m in height are excluded from analysis, wader spring mean use was 0.52 detections/10-minute survey/800 m plot and waders comprised 0.39% of all standardized spring avian observations. However, when Sandhill Cranes detected at heights over 200 m are included in analysis, spring mean increased to 2.42 detections/10-minute survey/800 m plot with waders comprising 1.77% of all standardized spring avian observations during diurnal avian activity surveys. Only three Great Blue Herons were detected during standardized avian use surveys in the fall.

Waterbirds

The waterbirds group includes cormorants, grebes, gulls, and loons. Waterbirds represented less than 1% of all spring detections and 38% of all fall detections during avian use surveys. Overall, waterbird mean use was 0.83 detections/10-minute survey/800 m plot in the spring and 10.13 detections/10-minute survey/800 m plot in the fall.

Most of this difference in observed seasonal use of the project area can be attributed to patterns in Franklin's Gull (*Leucophaeus pipixcan*) use. Only two Franklin's Gulls were observed during spring avian use surveys, a mean use rate of 0.01 detections/10-minute survey/800 m plot. In contrast, 2,023 Franklin's Gulls were observed during fall avian use surveys, a mean use rate of 9.54 detections/10-minute survey/800 m plot. Franklin's Gulls accounted for 94% of all fall waterbird detections during avian use surveys.

Nearly all Franklin's Gull detections were observed at just four surveys in the fall:

- August 27, 2019 - 500 individuals were seen at point count station 36 south of Wishek;
- September 6, 2019 - 300 individuals were seen at point count station 12 north of Wishek;
- August 28, 2020 - 200 individuals were seen at point count station 55 northwest of Wishek; and
- September 26, 2019 - 1,000 individuals were seen at point count station 2 near Beaver Lake.

Franklin's Gulls were generally observed in flight as they moved through the project area, and all gulls observed during the September 26, 2019 observation were in flight. On occasion, large flocks were found opportunistically foraging in agricultural habitats following harvesting and haying activities (e.g., the August 27, 2019 observation of 500 individuals), an expected observation for gulls moving in large numbers over agricultural cropland habitats. There are no known Franklin's Gull nesting colony sites within the project area and fall detections appear to represent post-breeding movements from locations beyond the project area.

The ND SWAP lists several waterbird species as SCP (Dyke et al. 2015). Waterbird SCP observed during diurnal avian use surveys included:

- Black Tern ([*Chlidonias niger*], SCP Level I, 1 fall detection); Franklin's Gull (SCP Level I, 2 spring detections and 2,023 fall detections);
- Horned Grebe ([*Podiceps auratus*], SCP Level I, 2 spring detections); and
- American White Pelican ([*Pelecanus erythrorhynchos*], SCP Level II, 21 fall detections).

Waterfowl

Waterfowl refers to the taxonomic order Anseriformes, including geese and ducks. Waterfowl mean use rates were significantly higher in the spring (84.18 detections/60-minute survey/800 m plot) than in the fall (2.31 detections/10-minute survey/800 m plot) and were the primary reason for higher overall avian use recorded in the spring than in the fall. There were 13,385 waterfowl detections during the spring season, 63% of all spring detections during avian use surveys. Only 489 waterfowl detections were recorded in the fall.

Migrating Snow Geese (*Chen caerulescens*), Greater White-fronted Geese (*Anser albifrons*), and Canada Geese (*Branta canadensis*) together accounted for 12,799 of 13,385 (96%) of spring waterfowl detections and 60% of all detections during avian use surveys. Groups of over 100 Snow Geese were regularly observed in flight and one flock of approximately 3,000 Snow Geese was observed flying northeastward on March 24, 2020 at point count station 40. This flock alone accounted for 14% of all of the spring detections combined. The spring mean use rates for the most commonly observed geese species included: 68.50 detections/60-minute survey/800 m plot for Snow Goose, 8.08 detections/10-minute survey/800 m plot for Canada Goose, and 3.91 detection/10-minute survey/800 m plot for Greater White-fronted Goose.

As noted for large observed flocks of passerines described above, there were no discernible habitat or physiographic characteristics that appeared to attract large groups of Snow Geese to these particular stations. Large flocks of geese were generally in flight when observed at point count stations across the project area.

Prairie pothole habitats are concentrated on the northeastern edge of the project area, particularly within the one-mile buffer surrounding the project area northeast of Wishek. Point count stations 51, 52, 53 within the one-mile buffer and point count station 22 within the project area boundary had waterfowl species richness values of 10 species or above.

The above statistics were calculated only from individuals observed within the sample plot. Waterfowl were frequently observed at altitudes over 200 m, and mean use statistics are also summarized for all detections regardless of flight height for Greater White-fronted Goose, Mallard (*Anas platyrhynchos*), Northern Pintail (*Anas acuta*), Ross's Goose (*Chen rossii*), and Snow Goose in Appendix B. Large proportions of detections of Greater White-fronted Geese, Mallards, and Snow Geese were observed above 200 m in altitude in the fall, and waterfowl mean use rates double in the fall to 5.77 detection/10-minute survey/800 m plot if detections over 200 m in altitude are included in mean use calculations.

3.4.3 Flight Heights by Species Group during Spring and Fall Migration

Table 11 details mean flight height statistics for species groups detected during diurnal avian use surveys in the spring and fall. Mean minimum and maximum flight heights are summarized for the spring survey period, the fall survey period, and for spring and fall observations combined. Flight heights are summarized by flock and not by individual; lone birds were counted as a flock of size of one.

Mean minimum and maximum flight heights were similar in the spring and fall for all birds combined, with mean minimum heights between 25 to 30 m and mean maximum heights around 35 m. The most notable seasonal differences were observed in waders and waterfowl. Mean flight heights were around 450 m for waders in the spring and under 20 m in the fall, attributable to high-flying migrating Sandhill Cranes observed only during the spring period and low-flying Great Blue Herons observed in the fall (see Waders subsection in Section 3.4.2 above). Waterfowl flight heights tended to be higher during the fall season (mean heights approximately 210 m) than in the spring (mean heights around 50 m).

Species groups with mean flight heights within or near the RSZ included raptors, shorebirds, waterbirds, and waterfowl.

4 CONCLUSIONS

During this pre-construction avian use study, a total of 62 species were recorded within the project area (Appendix C). Over the course of 2019 and 2020 standardized field studies, data were recorded for over 29,404 individual bird observations. Six hundred and thirty-six hours of standardized eagle use survey effort and 61.8 hours of standardized diurnal avian use surveys were completed for this avian use study.

One Bald Eagle nest was found within the project area during the aerial nest survey. No other Bald Eagle nests were found within 10 miles of the project boundary, and no Golden Eagle nests were found during the nest survey.

One confirmed Sharp-tailed Grouse lek was found within the project area during aerial lek surveys. Two possible lek locations were identified within the project area during ground-based surveys in fog. Lekking grouse were heard but not seen due to visibility conditions, and no grouse were observed at either location during follow-up visits.

Bald Eagle mean use rates were highest in the spring and fall, suggesting that most of the eagle use observed within the project area was comprised of migrating individuals heading northward in the spring and southward in the fall. Golden Eagles were rarely encountered during standardized use surveys, with highest mean use rates in the fall and winter.

Passerines and waterfowl together accounted for over 95% of bird detections recorded during spring diurnal avian use surveys. Large groups of Lapland Longspurs and Snow Geese in particular influenced this pattern. Passerines and waterbirds accounted for over 80% of bird detections during fall avian use surveys, driven by large groups of Red-winged Blackbirds and Franklin's Gulls. Significant numbers of Sandhill Cranes (spring) and waterfowl (fall) were observed flying at high altitudes well above the 200 m-high sample plot and the RSZ.

Three Whooping Cranes were observed within the project area over three-day span in April of 2020. Whooping Cranes are listed under the ESA as an endangered species. Though this is the first known observation within the project area boundary, the project area is within the Whooping Crane migration corridor and may be used by migrating cranes in the spring and fall (Pearse et al. 2018). The three individuals were observed foraging in unharvested corn during daylight hours and were observed flying to a roosting location in a nearby riverine wetland at dusk.

5 REFERENCES

AKN [Avian Knowledge Network]. 2020. Avian Knowledge Network. www.avianknowledge.net.

Bryce SA, Omernik JM, Pater DA, Ulmer M, Schaar J, Freeouf J, Johnson P, Kuck P, Azevedo SH. 1996. Ecoregions of North Dakota and South Dakota. Reston, Virginia: U.S. Geological Survey.

Chesser RT, Billerman SM, Burns KJ, Cicero C, Dunn JL, Kratter AW, Lovette IJ, Mason NA, Rasmussen PC, Remsen Jr. JV, et al. 2020. Sixty-first supplement to the American Ornithological Society's check-list of North American birds. The Auk: Ornithological Advances. 137(3). doi:https://doi.org/10.1093/auk/ukaa030. https://academic.oup.com/auk/article/137/3/ukaa030/5865308.

Clayton L. 1962. Glacial Geology of Logan and McIntosh Counties North Dakota. Grand Forks, North Dakota: North Dakota Geological Survey Report No.: Bulletin 37. https://www.dmr.nd.gov/ndgs/documents/outofprint/Bulletins/Bulletin%2037.pdf.

Dyke S, Johnson S, Isakson P. 2015. North Dakota State Wildlife Action Plan 2015. Bismarck, ND: North Dakota Game and Fish Department. http://gf.nd.gov/gnf/conservation/swap-2015/docs/swap-2015.pdf.

Hutto RL, Pletschet SM, Hendricks P. 1986. A fixed-radius point count method for nonbreeding and breeding season use. The Auk. 103:593–602. doi:10.1093/auk/103.3.593.

National Wind Coordinating Committee. 1999. Studying Wind Energy/Bird Interactions: A Guidance Document (Metrics and Methods for Determining or Monitoring Potential Impacts on Birds at Existing and Proposed Wind Energy Sites). National Wind Coordinating Committee.

Newell J. 2016. Survey and inventory protocols in Montana: upland game birds. file:///C:/Users/cmccreedy/Downloads/S&I_Protocols%20_for_Upland_Birds_final.pdf.

NGPC [Nebraska Game and Parks Commission]. 2018. Wind energy and Nebraska's wildlife: avian assessment guidance for wind energy facilities, draft 3.5. July. Lincoln (NE). http://outdoornebraska.gov/wp-content/uploads/2018/09/Avian-risk.pdf.

Pearse AT, Rabbe M, Bidwell MT, Juliusson LM, Craig-Moore L, Brandt DA, Harrell W. 2018. Map of whooping crane migration corridor. February 16. https://doi.org/10.5066/F7FT8K74.

Ralph CJ, Martin TE, Geupel GR, DeSante DF, Pyle P. 1993. Handbook of field methods for monitoring landbirds. Albany (CA): Pacific Southwest Research Station. https://www.birdpop.org/docs/pubs/Ralph_et_al_1993_Handbook_of_Field_Methods_for_Monitoring_Landbirds.pdf.

Ralph CJ, Sauer JR, Droege S. 1995. Monitoring bird populations by point counts. Albany (CA): Pacific Southwest Research Station (General Technical Report).

Reynolds RT, Scott JM, Nussbaum RA. 1980. A variable circular-plot method for estimating bird numbers. Condor.:309–313.

Strickland D, Arnett E, Erickson W, Johnson D, Johnson G, Morrison M, Shaffer J, Warren-Kicks W. 2011. Comprehensive Guide to Studying Wind Energy/Wildlife Interactions. National Wind Coordinating Collaborative. https://www.nationalwind.org/wp-content/uploads/assets/publications/Comprehensive_Guide_to_Studying_Wind_Energy_Wildlife_Interactions_2011_Updated.pdf.

USFWS [U.S. Fish and Wildlife Service]. 2012. U.S. Fish and Wildlife Service Land-Based Wind Energy Guidelines. U.S. Fish and Wildlife Service. http://www.fws.gov/ecological-services/es-library/pdfs/WEG_final.pdf.

USFWS [U.S. Fish and Wildlife Service]. 2013. Eagle conservation plan guidance: module 1 - land-based wind energy, version 2. April. Washington (DC): Division of Migratory Bird Management. https://www.fws.gov/migratorybirds/pdf/management/eagleconservationplanguidance.pdf.

USFWS [U.S. Fish and Wildlife Service]. 2016. Eagle Permits; Revisions to Regulations for Eagle Incidental Take and Take of Eagle Nests. https://www.federalregister.gov/documents/2016/12/16/2016-29908/eagle-permits-revisions-to-regulations-for-eagle-incidental-take-and-take-of-eagle-nests.

Yang L, Jin S, Danielson P, Homer C, Gass L, Bender SM, Case A, Costello C, Dewitz J, Fry J, et al. 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.

FIGURES

Badger Wind

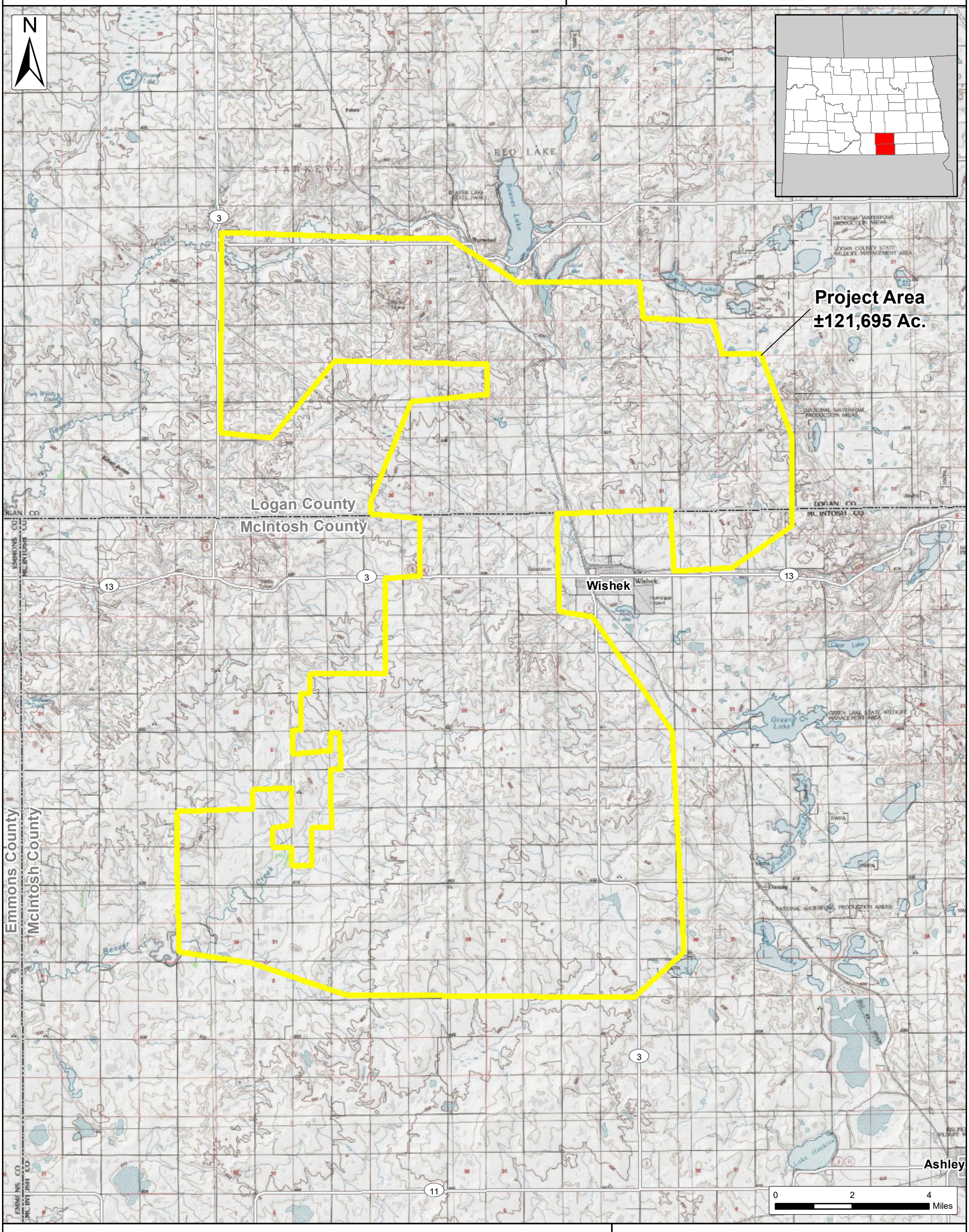
Figure 1. Site Location

Logan County & McIntosh County, North Dakota

Client:
Ørsted Onshore North America

Issue Date:
11/18/2020

Atwell, LLC Project:
19000785



Project Area
04/15/2019 (±121,695 Ac.)

City/Village

Counties

SOURCE: USGS TOPO QUADS

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Badger Wind

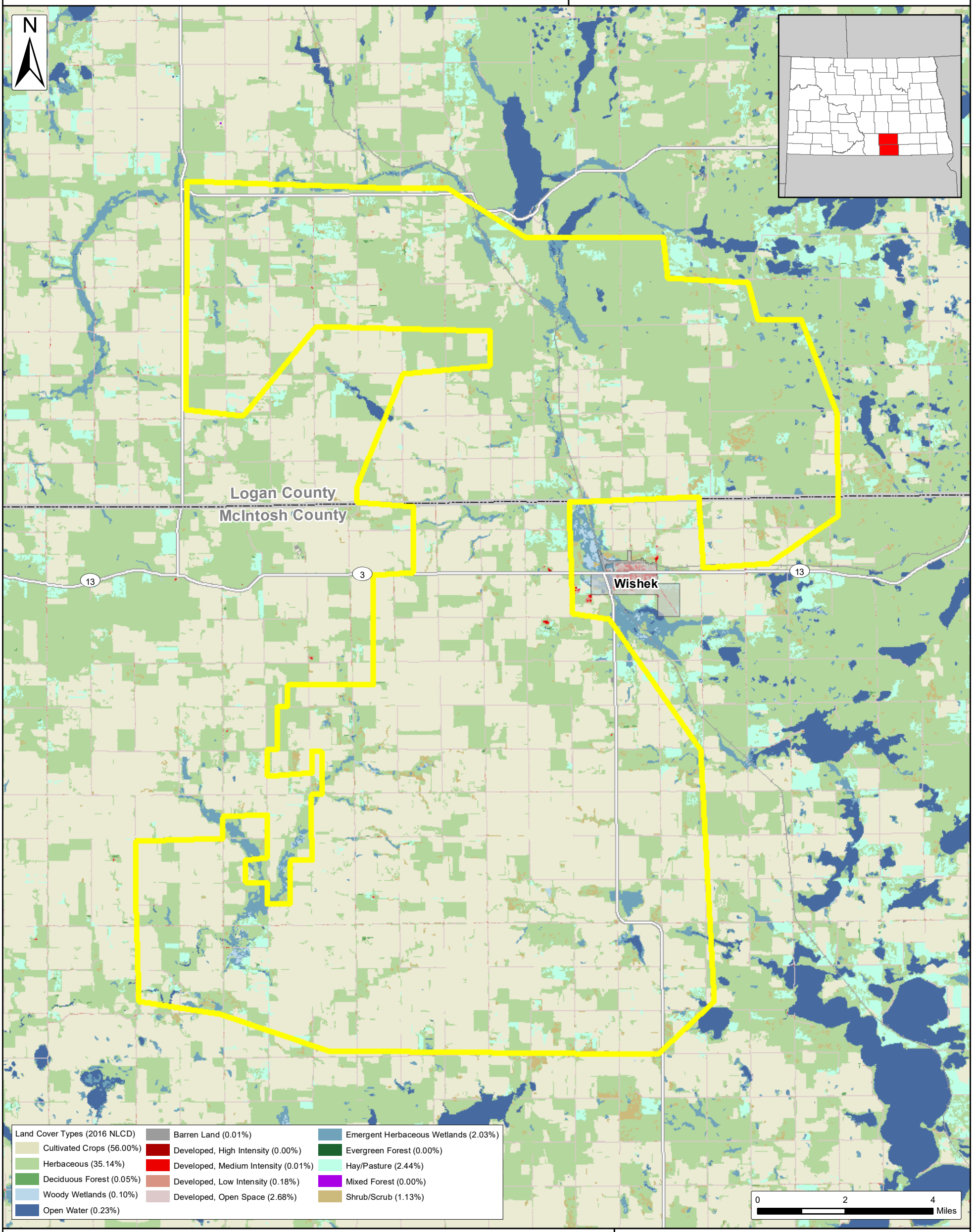
Figure 2. Land Cover Types within the Project Area

Logan County & McIntosh County, North Dakota

Client:
Ørsted Onshore North America

Issue Date:
11/18/2020

Atwell, LLC Project:
19000785



Project Area
04/15/2019 (±121,695 Ac.)

City/Village

Counties

SOURCE: NATIONAL LAND COVER DATABASE 2016 (USGS)

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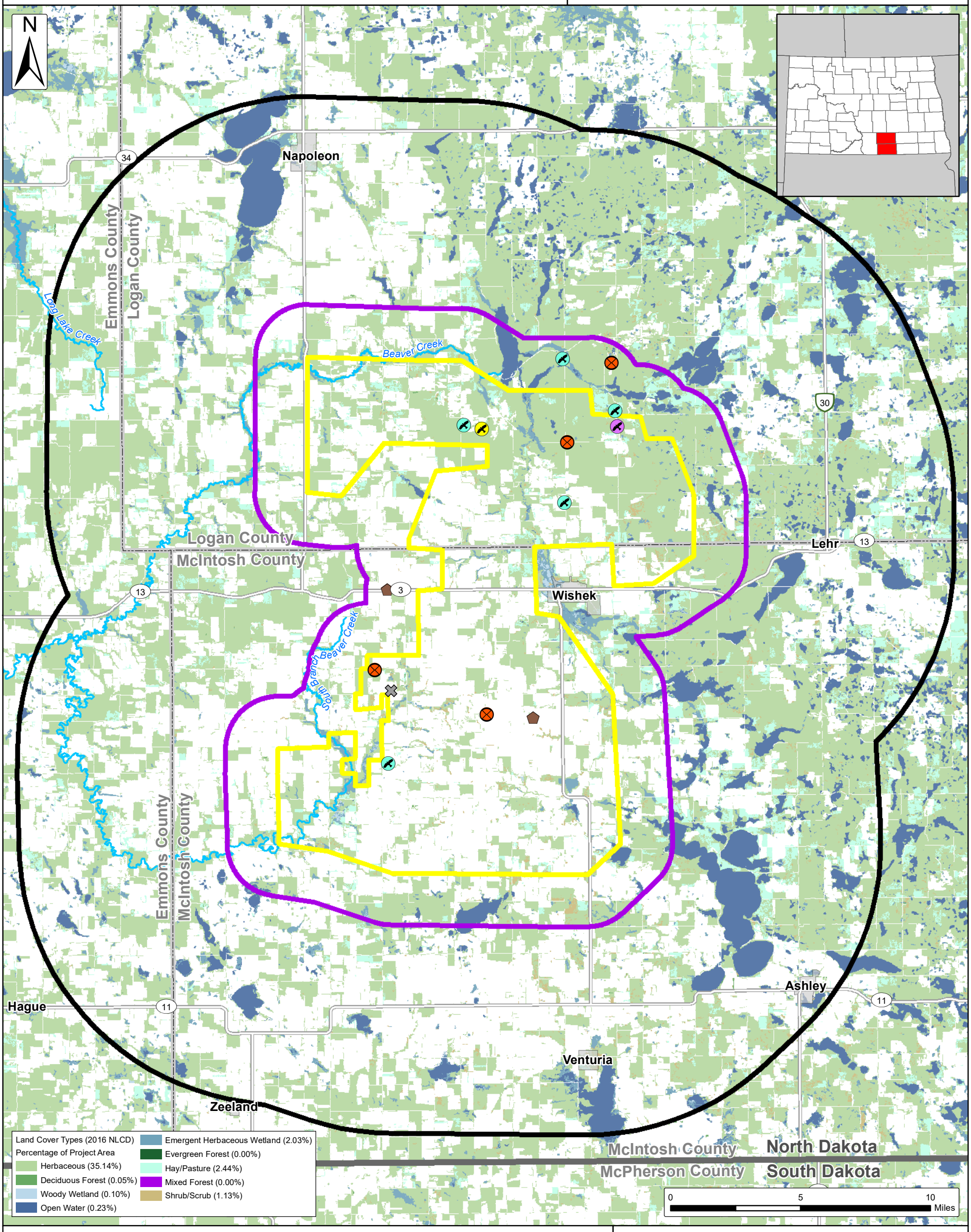
Figure 3. Eagle and Raptor Nests

Logan and McIntosh Counties, North Dakota

Client:
Ørsted Onshore North America

Issue Date:
8/17/2020

Atwell, LLC Project:
19000785



Raptor Nests Identified during 2020 Surveys

- Bald Eagle, In-Use
- Ferruginous Hawk, In-Use
- Great Horned Owl, In-Use
- Red-tailed Hawk, In-Use
- Swainson's Hawk, Nest Building
- Unknown, Not Occupied

- Major Watercourse (National Hydrography Dataset)
- Project Area 04/15/2019 (~121,695 acres)
- Raptor Nest Survey Area (2-Mile Buffer)
- Eagle Nest Survey Area (10-Mile Buffer)
- City/Village
- County
- State Boundary

SOURCE: USGS NATIONAL LAND COVER DATABASE (NLCD) 2016

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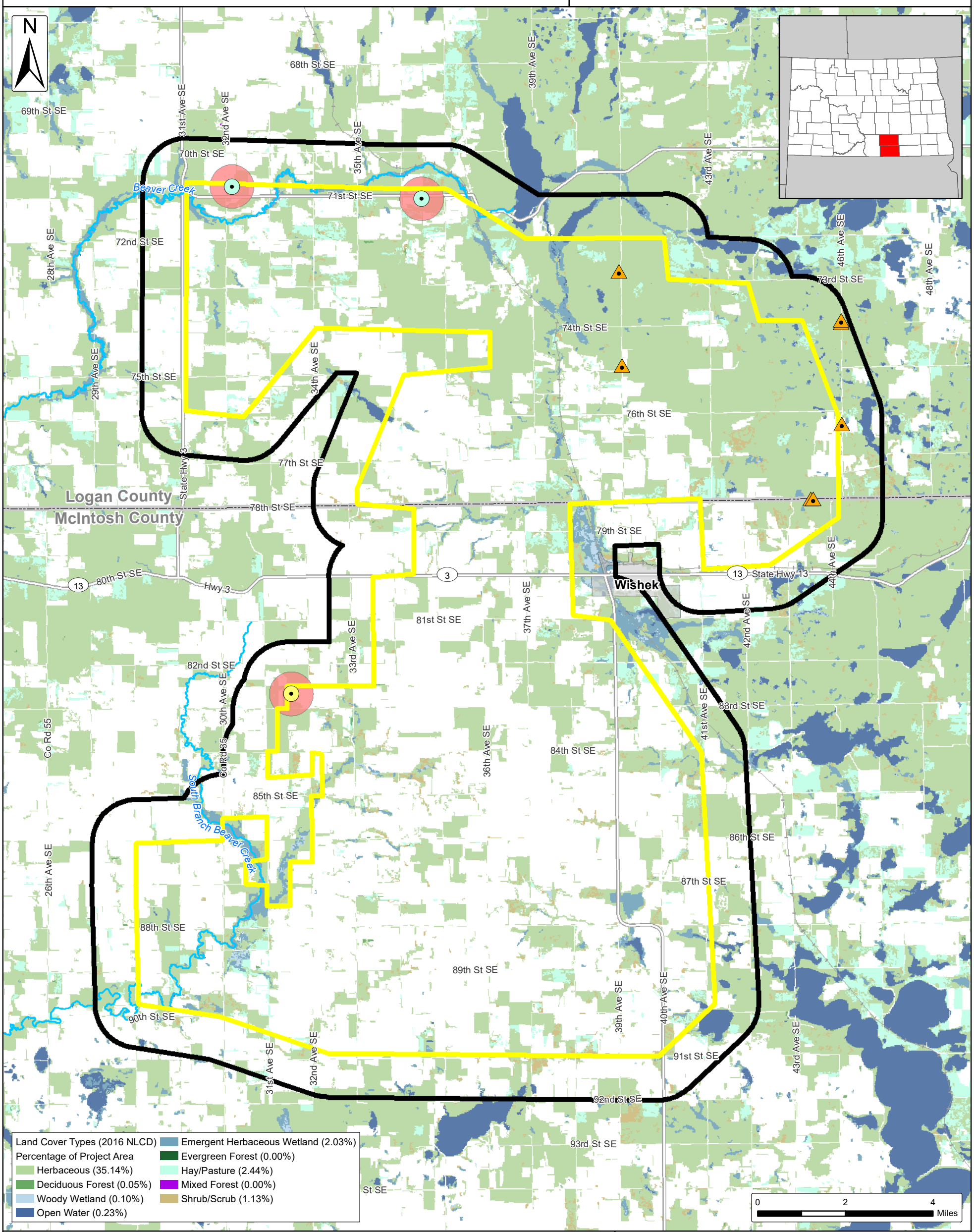
Figure 4. Sharp-Tailed Grouse Lek Survey

Logan and McIntosh Counties, North Dakota

Client:
Ørsted Onshore North America

Issue Date:
8/17/2020

Atwell, LLC Project:
19000785



Grouse and Leks Identified during 2019 Surveys
- Lone Individual
- Confirmed Lek
- Possible Lek

- Grouse Lek Study Point 0.5-Mile Buffer
- Project Area 04/15/2019 (~121,695 acres)
- Grouse Survey Area (1-Mile Buffer)

- Major Watercourse (National Hydrography Dataset)
- City/Village
- County

SOURCE: USGS NATIONAL LAND COVER DATABASE (NLCD) 2016

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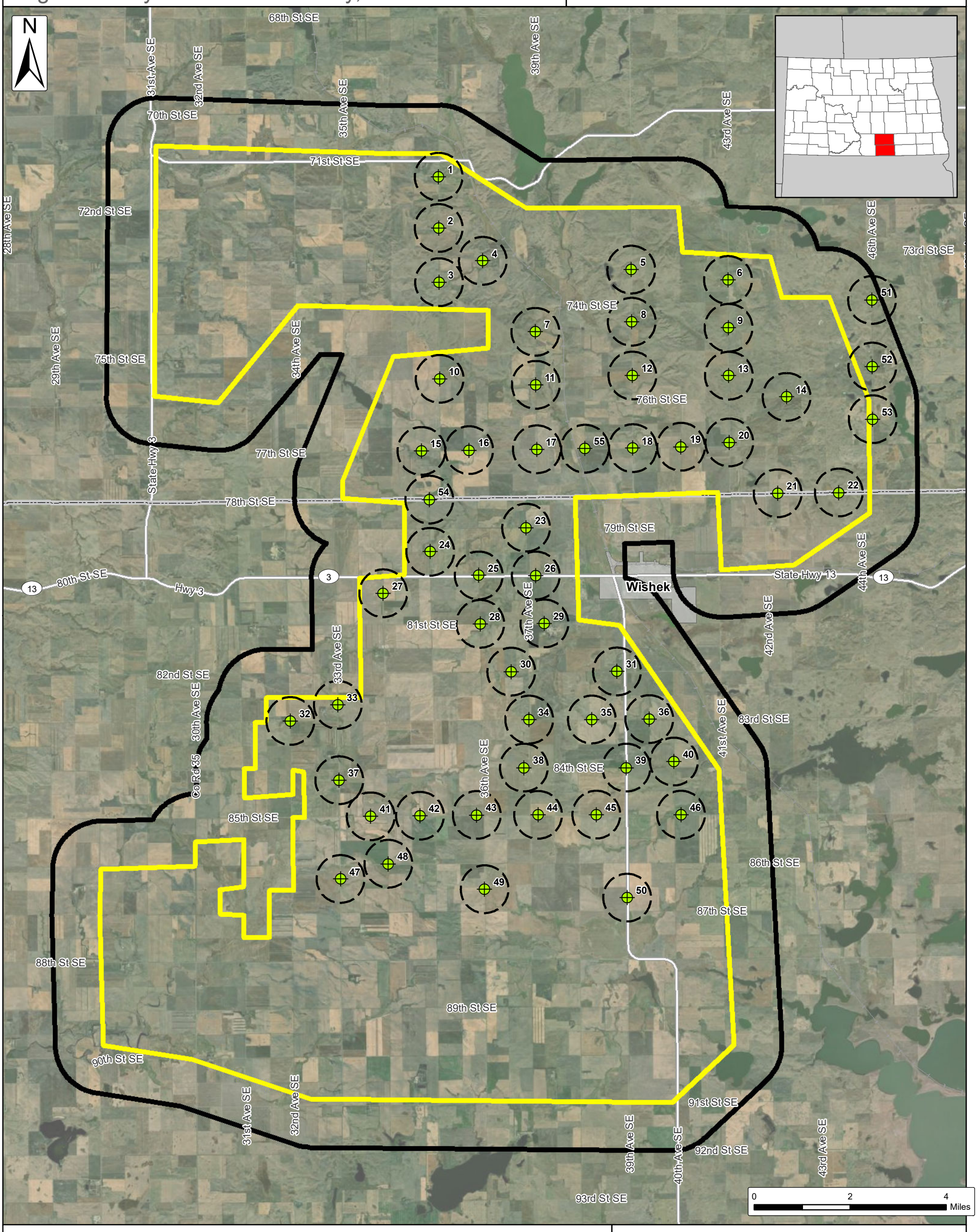
Figure 5. Avian and Eagle Use Point Count Stations

Logan County & McIntosh County, North Dakota

Client:
Ørsted Onshore North America

Issue Date:
8/18/2020

Atwell, LLC Project:
19000785



Point Count Station

800 m-radius Avian Sample Plot

Project Area
04/15/2019 (±121,695 Ac.)

1 Mile Buffer

City/Village

Counties

SOURCE: ESRI BASEMAPS

ATWELL

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Badger Wind

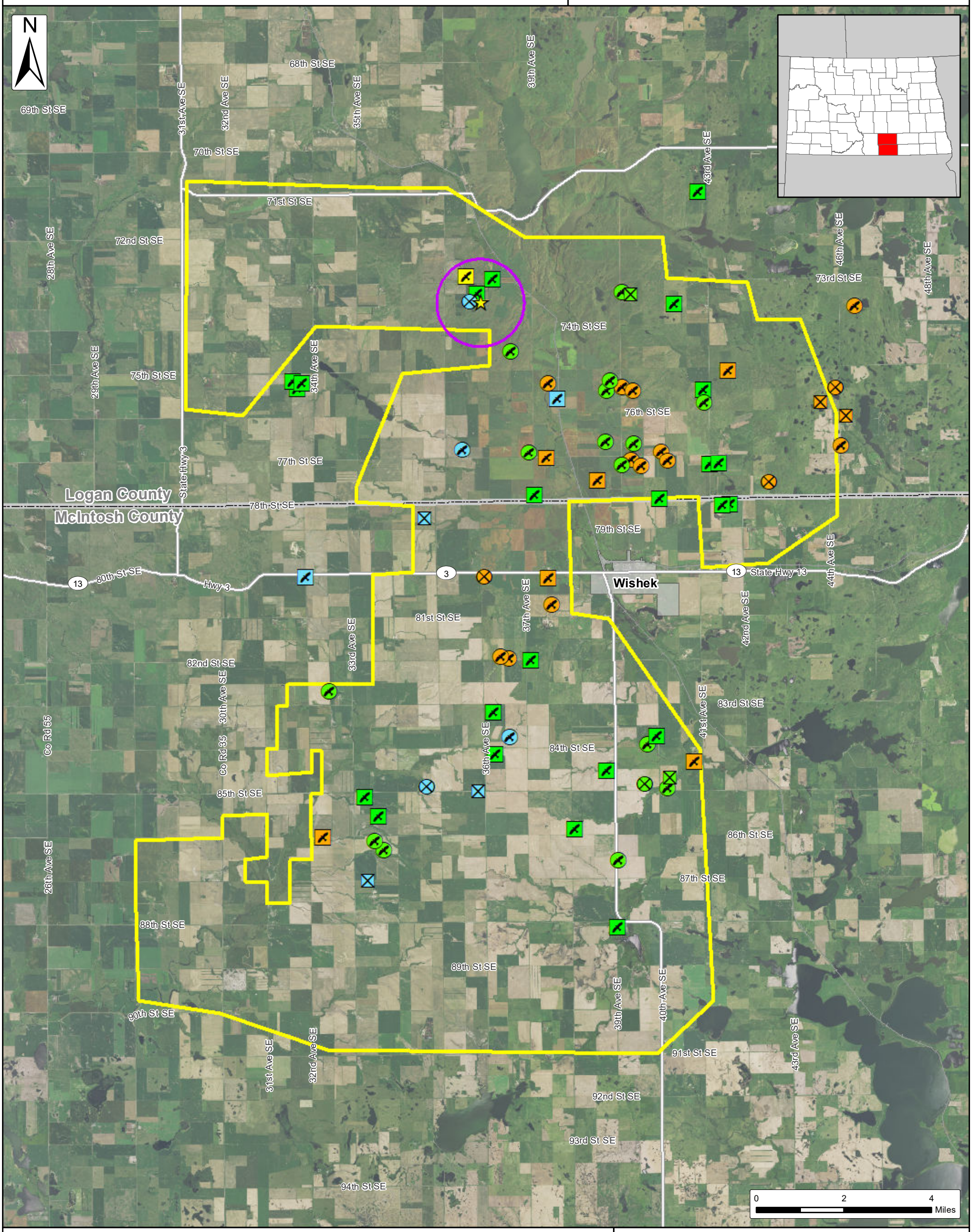
Figure 6. Bald Eagle and Golden Eagle Observations

Logan and McIntosh Counties, North Dakota

Client:
Ørsted Onshore North America

Issue Date:
11/18/2020

Atwell, LLC Project:
19000785



In-Use Bald Eagle Nest

Nest-Associated Observations (1-mile buffer)*

Species

- Bald Eagle - Standardized
- Bald Eagle - Incidental
- Golden Eagle - Standardized
- Golden Eagle - Incidental

Season

- Fall
- Spring
- Summer
- Winter

Project Area
04/15/2019 (~121,695 acres)

City/Village

County

*Six standardized and six incidental eagle observations associated with the in-use Bald Eagle nest were recorded within this buffer during spring, summer, and fall surveys.

Source: USDA NAIP 2019 Imagery

ATWELL

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TABLES

Table 1. Survey Periods for Pre-Construction Avian Studies – Year 1

Survey	Frequency	May 2019	Jun 2019	Jul 2019	Aug 2019	Sep 2019	Oct 2019	Nov 2019	Dec 2019	Jan 2020	Feb 2020	Mar 2020	Apr 2020
Eagle and Raptor Nest Surveys	Single Survey Event	■											
Sharp-tailed Grouse Lek Surveys	Single Survey Event	■											
Eagle Use Surveys	Monthly	■	■	■	■	■	■	■	■	■	■	■	■
Diurnal Avian Activity Surveys	Monthly	■			■	■	■	■				■	■

Shaded boxes represent months in which the surveys occurred.

BW Exhibit 28

Table 2. List of Alternate Winter Point Count Stations

Original Point Count Station	Alternate Point Count Station
14	13
19	17
21	18
22	5
26	20
27[a]	23
30	11
32	33
35	49
36	37
39	46
40	47
48	42
50	44

[a] Point dropped in August 2019 due to landowner concerns, alternate point count station did not need to be used.

Table 3. Eagle Nests and Nests of Other Raptor Species

Survey Type	Date	Species	Status	Latitude	Longitude	Project Area of Nest Survey Buffer
Aerial	5/2/2019	Bald Eagle	In-Use	46.349	-99.628	Project Area
Aerial	5/2/2019	Ferruginous Hawk	In-Use	46.163	-99.706	Project Area
Ground	5/16/2019	Ferruginous Hawk	In-Use	46.351	-99.642	Project Area
Ground	5/19/2019	Ferruginous Hawk	In-Use	46.307	-99.562	Project Area
Ground	5/16/2019	Ferruginous Hawk	In-Use	46.387	-99.562	2-mile
Ground	5/19/2019	Ferruginous Hawk	In-Use	46.358	-99.520	2-mile
Ground	7/25/2019	Swainson's Hawk	Nest Building	46.349	-99.519	Project Area
Ground	5/19/2019	Red-tailed Hawk	In-Use	46.190	-99.626	Project Area
Ground	7/25/2019	Red-tailed Hawk	In-Use	46.341	-99.559	Project Area
Ground	7/29/2019	Red-tailed Hawk	In-Use	46.215	-99.716	Project Area
Ground	5/16/2019	Red-tailed Hawk	In-Use	46.385	-99.523	2-mile
Ground	5/21/2019	Great Horned Owl	In-Use	46.188	-99.589	Project Area
Aerial	5/2/2019	Great Horned Owl	In-Use	46.260	-99.705	2-mile
Aerial	5/2/2019	Unknown	Not Occupied	46.204	-99.703	Project Area

Table 4. Total Standardized Survey Effort by Point Count Station

	60 Minute Eagle Use Survey Standardized Effort (hours)[a]					10 Minute Diurnal Avian Activity Survey Standardized Effort (hours)[a]		
Point Count Station	Spring	Summer	Fall	Winter	Total Hours	Spring	Fall	Total Hours
1	3	2	4	3	12	0.50	0.67	1.17
2	3	2	4	3	12	0.50	0.67	1.17
3	3	2	4	3	12	0.50	0.67	1.17
4	3	2	4	3	12	0.50	0.67	1.17
5[a]	4	2	4	5	15	0.67	0.67	1.33
6	3	2	4	3	12	0.50	0.67	1.17
7	3	2	4	3	12	0.50	0.67	1.17
8	3	2	4	3	12	0.50	0.67	1.17
9	3	2	4	3	12	0.50	0.67	1.17
10	3	2	4	3	12	0.50	0.67	1.17
11[a]	3	2	4	5	14	0.50	0.67	1.17
12	3	2	4	3	12	0.50	0.67	1.17
13[a]	4	2	5	6	17	0.67	0.83	1.50
14[a]	2	2	3	0	7	0.33	0.50	0.83
15	3	2	4	3	12	0.50	0.67	1.17
16	3	2	4	3	12	0.50	0.67	1.17
17[a]	4	2	4	6	16	0.67	0.67	1.33
18	3	2	4	3	12	0.50	0.67	1.17
19[a]	2	2	4	0	8	0.33	0.67	1.00
20	3	2	4	3	12	0.50	0.67	1.17
21	3	2	4	3	12	0.50	0.67	1.17
22[a]	2	2	4	1	9	0.33	0.67	1.00
23	3	2	4	3	12	0.50	0.67	1.17
24	3	2	4	3	12	0.50	0.67	1.17

BW Exhibit 28

Table 4. Total Standardized Survey Effort by Point Count Station

	60 Minute Eagle Use Survey Standardized Effort (hours)[a]					10 Minute Diurnal Avian Activity Survey Standardized Effort (hours)[a]		
Point Count Station	Spring	Summer	Fall	Winter	Total Hours	Spring	Fall	Total Hours
25	3	2	4	3	12	0.50	0.67	1.17
26	3	2	4	3	12	0.50	0.67	1.17
27[b]	1	2	0	0	3	0.17	0.00	0.17
28[b]	1	2	0	0	3	0.17	0.00	0.17
29	3	2	4	3	12	0.50	0.67	1.17
30[a]	3	2	4	2	11	0.50	0.67	1.17
31	3	2	4	3	12	0.50	0.67	1.17
32	3	2	4	3	12	0.50	0.67	1.17
33	3	2	4	3	12	0.50	0.67	1.17
34	3	2	4	3	12	0.50	0.67	1.17
35[c]	1	2	4	1	8	0.17	0.67	0.83
36[c]	1	2	4	0	7	0.17	0.67	0.83
37[c]	5	2	4	6	17	0.83	0.67	1.50
38	3	2	4	3	12	0.50	0.67	1.17
39	3	2	4	3	12	0.50	0.67	1.17
40[a]	3	2	4	2	11	0.50	0.67	1.17
41	3	2	4	3	12	0.50	0.67	1.17
42	3	2	4	3	12	0.50	0.67	1.17
43	3	2	4	3	12	0.50	0.67	1.17
44	3	2	4	3	12	0.50	0.67	1.17
45	3	2	4	3	12	0.50	0.67	1.17
46	3	2	4	3	12	0.50	0.67	1.17
47[a]	3	2	4	4	13	0.50	0.67	1.17
48	3	2	4	3	12	0.50	0.67	1.17

Table 4. Total Standardized Survey Effort by Point Count Station

	60 Minute Eagle Use Survey Standardized Effort (hours)[a]					10 Minute Diurnal Avian Activity Survey Standardized Effort (hours)[a]		
Point Count Station	Spring	Summer	Fall	Winter	Total Hours	Spring	Fall	Total Hours
49[a]	5	2	4	4	15	0.83	0.67	1.50
50	3	2	4	3	12	0.50	0.67	1.17
51	3	2	4	3	12	0.50	0.67	1.17
52	3	2	4	3	12	0.50	0.67	1.17
53	3	2	4	3	12	0.50	0.67	1.17
54[d]	2	0	4	3	9	0.33	0.67	1.00
55[d]	2	0	4	3	9	0.33	0.67	1.00
Grand Total	**159**	**106**	**212**	**159**	**636**	**26.50**	**35.33**	**61.83**

[a] Due to the seasonal inaccessibility of some point count stations between November 2019 and March 2020, a winter alternate point count survey strategy was employed (see Section 2.4). Refer to Table 2 for a list point count stations with their paired alternate stations.

[b] Point count station dropped in August 2019 due to landowner concerns.

[c] Due to landowner concerns, the winter alternate point count station was surveyed in April 2020 (see Table 2).

[d] Point count station added in August 2019 as a replacement for dropped point count station.

Table 5. Eagle Use Surveys - Seasonal Raptor Mean Use

	Spring					Summer					Fall					Winter				
Common Name	**Total Std. Detections[a]**	**% Comp.[b]**	**Mean Use (birds/60 min. survey)[c]**	**SD[d]**	**Occur. Freq.[e]**	**Total Std. Detections[a]**	**% Comp.[b]**	**Mean Use (birds/60 min. survey)[c]**	**SD[d]**	**Occur. Freq.[e]**	**Total Std. Detections[a]**	**% Comp.[b]**	**Mean Use (birds/60 min. survey)[c]**	**SD[d]**	**Occur. Freq.[e]**	**Total Std. Detections[a]**	**% Comp.[b]**	**Mean Use (birds/60 min. survey)[c]**	**SD[d]**	**Occur. Freq.[e]**
American Kestrel[II]	11	0.034	0.069	0.452	0.038	1	0.004	0.009	0.097	0.009	17	0.024	0.080	0.335	0.066	0	-	-	-	-
Bald Eagle[II]	18	0.056	0.113	0.373	0.094	1	0.004	0.009	0.097	0.009	13	0.018	0.061	0.277	0.052	2	0.182	0.013	0.112	0.013
Broad-winged Hawk	0	-	-	-	-	0	-	-	-	-	88	0.123	0.415	5.975	0.009	0	-	-	-	-
Cooper's Hawk	3	0.009	0.019	0.136	0.019	0	-	-	-	-	1	0.001	0.005	0.069	0.005	0	-	-	-	-
Ferruginous Hawk[I]	14	0.044	0.088	0.306	0.082	14	0.055	0.132	0.392	0.113	23	0.032	0.108	0.749	0.042	0	-	-	-	-
Golden Eagle[II]	1	0.003	0.006	0.079	0.006	0	-	-	-	-	3	0.004	0.014	0.118	0.014	2	0.182	0.013	0.112	0.013
Great Horned Owl	0	-	-	-	-	0	-	-	-	-	0	-	-	-	-	1	0.091	0.006	0.079	0.006
Merlin	3	0.009	0.019	0.136	0.019	0	-	-	-	-	4	0.006	0.019	0.168	0.014	0	-	-	-	-
Northern Goshawk	0	-	-	-	-	0	-	-	-	-	0	-	-	-	-	1	0.091	0.006	0.079	0.006
Northern Harrier[II]	85	0.266	0.535	1.048	0.321	42	0.166	0.396	0.973	0.236	141	0.197	0.665	1.330	0.325	0	-	-	-	-
Prairie Falcon[II]	0	-	-	-	-	0	-	-	-	-	5	0.007	0.024	0.152	0.024	0	-	-	-	-
Red-tailed Hawk	112	0.351	0.704	1.565	0.302	81	0.320	0.764	1.246	0.377	190	0.266	0.896	1.714	0.340	0	-	-	-	-
Rough-legged Hawk	8	0.025	0.050	0.219	0.050	0	-	-	-	-	4	0.006	0.019	0.168	0.014	0	-	-	-	-
Sharp-shinned Hawk	3	0.009	0.019	0.136	0.019	0	-	-	-	-	4	0.006	0.019	0.136	0.019	0	-	-	-	-
Snowy Owl	0	-	-	-	-	0	-	-	-	-	0	-	-	-	-	5	0.455	0.031	0.175	0.031
Swainson's Hawk[I]	47	0.147	0.296	1.077	0.132	75	0.296	0.708	1.387	0.311	172	0.241	0.811	2.227	0.217	0	-	-	-	-
Turkey Vulture	9	0.028	0.057	0.258	0.050	33	0.130	0.311	0.832	0.170	29	0.041	0.137	0.657	0.075	0	-	-	-	-
Unknown Accipiter	0	-	-	-	-	0	-	-	-	-	1	0.001	0.005	0.069	0.005	0	-	-	-	-
Unknown Buteo	4	0.013	0.025	0.157	0.025	5	0.020	0.047	0.254	0.038	13	0.018	0.061	0.352	0.038	0	-	-	-	-
Unknown Falcon	0	-	-	-	-	1	0.004	0.009	0.097	0.009	0	-	-	-	-	0	-	-	-	-
Unknown Raptor	1	0.003	0.006	0.079	0.006	0	-	-	-	-	7	0.010	0.033	0.204	0.028	0	-	-	-	-
Whooping Crane[FE, III]	3	1.000	0.019	0.238	0.006	0	-	-	-	-	0	-	-	-	-	0	-	-	-	-
ALL RAPTORS	**319**	**1.000**	**2.006**	**2.920**	**0.616**	**253**	**1.000**	**2.387**	**2.012**	**0.811**	**715**	**1.000**	**3.373**	**0.505**	**0.660**	**11**	**1.000**	**0.069**	**0.255**	**0.069**
ALL TES	**3**	**1.000**	**0.019**	**0.238**	**0.006**	**0**	**-**	**-**	**-**	**-**	**0**	**-**	**-**	**-**	**-**	**0**	**-**	**-**	**-**	**-**

[a] Total Std. Detections is the total number of standardized individuals detected within the 800 m–radius by 200 m-high survey cylinder during standardized use surveys

[b] % Comp. (i.e., percent composition) is the proportion of raptors or federally threatened and endangered species (TES) that a particular species comprises using total standardized detections.

[c] Mean Use is the total standardized detections divided by the total number of 60-minute point count surveys conducted within the season.

[d] SD is the standard deviation of Mean Use

[e] Occur. Freq. (i.e., Occurrence Frequency) is the proportion of point count surveys at which a particular species was detected during the season

- North Dakota State Wildlife Action Plan (Dyke et al. 2015) Species of Conservation Priortiy (SCP) are denoted with a superscript I, II, or III following the species name to indicate that it is Level 1, Level 2, or Level 3 SCP, respectively. Federally endangered species are denoted with a superscript FE.

Table 6. Eagle Use Surveys - Seasonal Bald Eagle Mean Use by Point Count Station

Point Count Station	Spring		Summer		Fall		Winter		Full Year	
	Total Std. Detections[a]	Mean Use (eagles/60 min. survey/800-m survey plot)[b]	Total Std. Detections[a]	Mean Use (eagles/60 min. survey/800-m survey plot)[b]	Total Std. Detections[a]	Mean Use (eagles/60 min. survey/800-m survey plot)[b]	Total Std. Detections[a]	Mean Use (eagles/60 min. survey/800-m survey plot)[b]	Total Std. Detections[a]	Mean Use (eagles/60 min. survey/800-m survey plot)[b]
1	0	-	0	-	0	-	0	-	0	-
2	0	-	0	-	0	-	0	-	0	-
3	0	-	0	-	0	-	0	-	0	-
4	4	1.333	1	0.500	1	0.250	0	-	6	0.500
5	1	0.200	0	-	0	-	0	-	1	0.067
6	0	-	0	-	0	-	0	-	0	-
7	1	0.333	0	-	0	-	0	-	1	0.083
8	0	-	0	-	0	-	0	-	0	-
9	0	-	0	-	0	-	0	-	0	-
10	0	-	0	-	0	-	0	-	0	-
11	0	-	0	-	1	0.250	0	-	1	0.071
12	2	0.667	0	-	2	0.500	0	-	4	0.333
13	1	0.250	0	-	0	-	0	-	1	0.059
14	0	-	0	-	0	-	0	-	0	-
15	0	-	0	-	0	-	0	-	0	-
16	0	-	0	-	0	-	1	0.333	1	0.083
17	1	0.250	0	-	0	-	0	-	1	0.063
18	3	1.000	0	-	2	0.500	0	-	5	0.417
19	0	-	0	-	2	0.500	0	-	2	0.250
20	0	-	0	-	0	-	0	-	0	-
21	0	-	0	-	0	-	0	-	0	-

BW Exhibit 28

Table 6. Eagle Use Surveys - Seasonal Bald Eagle Mean Use by Point Count Station

Point Count Station	Spring		Summer		Fall		Winter		Full Year	
	Total Std. Detections[a]	Mean Use (eagles/60 min. survey/800-m survey plot)[b]	Total Std. Detections[a]	Mean Use (eagles/60 min. survey/800-m survey plot)[b]	Total Std. Detections[a]	Mean Use (eagles/60 min. survey/800-m survey plot)[b]	Total Std. Detections[a]	Mean Use (eagles/60 min. survey/800-m survey plot)[b]	Total Std. Detections[a]	Mean Use (eagles/60 min. survey/800-m survey plot)[b]
22	0	-	0	-	0	-	0	-	0	-
23	0	-	0	-	0	-	0	-	0	-
24	0	-	0	-	0	-	0	-	0	-
25	0	-	0	-	0	-	0	-	0	-
26	0	-	0	-	0	-	0	-	0	-
27	0	-	0	-	0	-	0	-	0	-
28	0	-	0	-	0	-	0	-	0	-
29	0	-	0	-	1	0.250	0	-	1	0.083
30	0	-	0	-	2	0.500	0	-	2	0.182
31	0	-	0	-	0	-	0	-	0	-
32	0	-	0	-	0	-	0	-	0	-
33	1	0.333	0	-	0	-	0	-	1	0.083
34	0	-	0	-	0	-	0	-	0	-
35	0	-	0	-	0	-	0	-	0	-
36	0	-	0	-	0	-	0	-	0	-
37	0	-	0	-	0	-	0	-	0	-
38	0	-	0	-	0	-	1	0.333	1	0.083
39	0	-	0	-	0	-	0	-	0	-
40	1	0.333	0	-	0	-	0	-	1	0.091
41	0	-	0	-	0	-	0	-	0	-
42	0	-	0	-	0	-	0	-	0	-

Table 6. Eagle Use Surveys - Seasonal Bald Eagle Mean Use by Point Count Station

Point Count Station	Spring		Summer		Fall		Winter		Full Year	
	Total Std. Detections[a]	Mean Use (eagles/60 min. survey/800-m survey plot)[b]	Total Std. Detections[a]	Mean Use (eagles/60 min. survey/800-m survey plot)[b]	Total Std. Detections[a]	Mean Use (eagles/60 min. survey/800-m survey plot)[b]	Total Std. Detections[a]	Mean Use (eagles/60 min. survey/800-m survey plot)[b]	Total Std. Detections[a]	Mean Use (eagles/60 min. survey/800-m survey plot)[b]
43	0	-	0	-	0	-	0	-	0	-
44	0	-	0	-	0	-	0	-	0	-
45	0	-	0	-	0	-	0	-	0	-
46	1	0.333	0	-	0	-	0	-	1	0.083
47	0	-	0	-	0	-	0	-	0	-
48	1	0.333	0	-	0	-	0	-	1	0.083
49	0	-	0	-	0	-	0	-	0	-
50	1	0.333	0	-	0	-	0	-	1	0.083
51	0	-	0	-	1	0.250	0	-	1	0.083
52	0	-	0	-	0	-	0	-	0	-
53	0	-	0	-	1	0.250	0	-	1	0.083
54	0	-	0	-	0	-	0	-	0	-
55	0	-	0	-	0	-	0	-	0	-

[a] Total Std. Detections is the total number of standardized individuals detected within the 800 m–radius survey cylinder during standardized use surveys

[b] Mean Use is the total standardized detections divided by the total number of 60-minute point count surveys conducted within the season.

Table 7. Eagle Use Surveys - Seasonal and Annual Raptor Mean Flight Heights

Species	Flight Height[a]	Spring					Summer					Fall					Winter					Year				
		Sample Size[b]	Mean Flight Height (m)	SD[c]	Upper 95% CI Bound[d]	Lower 95% CI Bound[d]	Sample Size[b]	Mean Flight Height (m)	SD[c]	Upper 95% CI Bound[d]	Lower 95% CI Bound[d]	Sample Size[b]	Mean Flight Height (m)	SD[c]	Upper 95% CI Bound[d]	Lower 95% CI Bound[d]	Sample Size[b]	Mean Flight Height (m)	SD[c]	Upper 95% CI Bound[d]	Lower 95% CI Bound[d]	Sample Size[b]	Mean Flight Height (m)	SD[c]	Upper 95% CI Bound[d]	Lower 95% CI Bound[d]
American Kestrel[II]	Min	11	7.91	11.26	15.48	0.34	1	1.00	N/A	N/A	N/A	13	12.38	13.53	20.56	4.21	-	-	-	-	-	25.00	9.96	12.36	15.06	4.86
American Kestrel[II]	Max	11	14.45	9.42	20.78	8.13	1	2.00	N/A	N/A	N/A	13	29.46	21.14	42.23	16.69	-	-	-	-	-	25.00	21.76	18.25	29.29	14.23
Bald Eagle[II]	Min	17	64.59	69.22	100.18	29.00	1	25.00	N/A	N/A	N/A	12	30.83	24.20	46.21	15.46	2	23.00	31.11	302.54	-256.54	32.00	48.09	55.08	67.95	28.23
Bald Eagle[II]	Max	17	99.41	77.88	139.45	59.37	1	30.00	N/A	N/A	N/A	12	56.25	48.53	87.08	25.42	2	37.50	31.82	323.39	-248.39	32.00	77.19	67.92	101.67	52.70
Broad-winged Hawk	Min	-	-	-	-	-	-	-	-	-	-	7	122.86	115.14	229.34	16.37	-	-	-	-	-	7	122.86	115.14	229.34	16.37
Broad-winged Hawk	Max	-	-	-	-	-	-	-	-	-	-	7	235.71	137.58	362.96	108.47	-	-	-	-	-	7	235.71	137.58	362.96	108.47
Cooper's Hawk	Min	3	25.33	21.22	78.05	-27.38	-	-	-	-	-	1	2.00	N/A	N/A	N/A	-	-	-	-	-	4	19.50	20.89	52.74	-13.74
Cooper's Hawk	Max	3	75.00	78.58	270.21	-120.21	-	-	-	-	-	1	3.00	N/A	N/A	N/A	-	-	-	-	-	4	57.00	73.57	174.07	-60.07
Ferruginous Hawk[I]	Min	14	95.14	90.52	147.41	42.88	13	27.54	30.17	45.77	9.31	20	36.05	32.52	51.27	20.83	-	-	-	-	-	47	51.30	61.93	69.48	33.11
Ferruginous Hawk[I]	Max	14	150.00	100.06	207.77	92.23	13	62.00	52.80	93.91	30.09	20	76.65	56.96	103.31	49.99	-	-	-	-	-	47	94.45	79.19	117.70	71.20
Golden Eagle[II]	Min	1	80.00	N/A	N/A	N/A	-	-	-	-	-	3	50.33	62.05	204.48	-103.81	2	13.50	9.19	96.09	-69.09	6	43.00	47.02	92.35	-6.35
Golden Eagle[II]	Max	1	150.00	N/A	N/A	N/A	-	-	-	-	-	3	71.67	70.06	245.70	-102.37	2	25.00	0.00	25.00	25.00	6	69.17	63.67	135.99	2.35
Merlin	Min	3	6.00	7.81	25.40	-13.40	-	-	-	-	-	3	13.67	10.97	40.92	-13.58	-	-	-	-	-	6	9.83	9.50	19.80	-0.13
Merlin	Max	3	8.67	9.81	33.05	-15.72	-	-	-	-	-	3	40.33	52.54	170.85	-90.18	-	-	-	-	-	6	24.50	37.99	64.37	-15.37
Northern Goshawk	Min	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	25.00	N/A	N/A	N/A	1	25.00	N/A	N/A	N/A
Northern Goshawk	Max	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	30.00	N/A	N/A	N/A	1	30.00	N/A	N/A	N/A
Northern Harrier[II]	Min	92	37.89	87.81	56.08	19.71	38	4.50	16.23	9.84	-0.84	140	4.69	14.45	7.11	2.28	-	-	-	-	-	270	15.98	54.79	22.54	9.41
Northern Harrier[II]	Max	29	49.32	89.56	67.86	30.77	38	11.76	23.05	19.34	4.19	140	12.71	33.40	18.30	7.13	-	-	-	-	-	270	25.05	60.57	32.31	17.79
Prairie Falcon[II]	Min	-	-	-	-	-	-	-	-	-	-	5	10.60	16.89	31.57	-10.37	-	-	-	-	-	5	10.60	16.89	31.57	-10.37
Prairie Falcon[II]	Max	-	-	-	-	-	-	-	-	-	-	5	20.80	22.55	48.80	-7.20	-	-	-	-	-	5	20.80	22.55	48.80	-7.20
Red-tailed Hawk	Min	119	73.18	105.97	92.41	53.94	66	35.85	42.83	46.38	25.32	161	22.72	32.64	27.80	17.64	-	-	-	-	-	346	42.58	72.08	50.20	34.96
Red-tailed Hawk	Max	119	100.23	111.23	120.42	80.04	66	86.71	79.28	106.20	67.22	161	45.36	49.01	52.99	37.73	-	-	-	-	-	346	72.12	84.72	81.08	63.16
Rough-legged Hawk	Min	9	83.56	108.68	167.09	0.02	-	-	-	-	-	4	25.00	11.55	43.37	6.63	-	-	-	-	-	13	65.54	93.27	121.90	9.18
Rough-legged Hawk	Max	9	114.44	117.57	204.81	24.08	-	-	-	-	-	4	51.25	17.50	79.10	23.40	-	-	-	-	-	13	95.00	101.06	156.07	33.93
Sharp-shinned Hawk	Min	3	17.00	17.09	59.45	-25.45	-	-	-	-	-	4	20.00	33.50	73.30	-33.30	-	-	-	-	-	7	18.71	25.71	42.49	-5.06
Sharp-shinned Hawk	Max	3	27.00	30.12	101.81	-47.81	-	-	-	-	-	4	23.50	32.15	74.66	-27.66	-	-	-	-	-	7	25.00	28.68	51.53	-1.53
Snowy Owl	Min	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	4.50	4.95	48.97	-39.97	2	4.50	4.95	48.97	-39.97
Snowy Owl	Max	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	11.00	1.41	23.71	-1.71	2	11.00	1.41	23.71	-1.71
Swainson's Hawk[I]	Min	42	59.43	54.68	76.47	42.39	75	47.89	71.27	64.29	31.50	140	41.57	56.92	51.08	32.06	-	-	-	-	-	257	46.33	61.22	53.85	38.81
Swainson's Hawk[I]	Max	42	107.74	81.91	133.26	82.21	75	120.64	113.32	146.71	94.57	140	94.43	85.87	108.78	80.08	-	-	-	-	-	257	104.25	94.47	115.86	92.65
Turkey Vulture	Min	9	93.11	158.80	215.17	-28.95	26	32.65	52.46	53.84	11.46	29	29.97	45.22	47.17	12.77	-	-	-	-	-	64	39.94	75.33	58.75	21.12
Turkey Vulture	Max	9	101.11	154.47	219.85	-17.63	26	81.35	78.63	113.11	49.59	29	52.21	49.00	70.85	33.57	-	-	-	-	-	64	70.92	82.99	91.65	50.19
Unknown Accipiter	Min	-	-	-	-	-	-	-	-	-	-	1	15.00	N/A	N/A	N/A	-	-	-	-	-	1	15.00	N/A	N/A	N/A
Unknown Accipiter	Max	-	-	-	-	-	-	-	-	-	-	1	20.00	N/A	N/A	N/A	-	-	-	-	-	1	20.00	N/A	N/A	N/A
Unknown Buteo	Min	1	20.00	N/A	N/A	N/A	3	38.33	29.30	111.11	-34.45	2	35.50	48.79	473.86	-402.86	-	-	-	-	-	6	34.33	29.51	65.30	3.37
Unknown Buteo	Max	1	30.00	N/A	N/A	N/A	3	38.33	29.30	111.11	-34.45	2	87.50	88.39	881.64	-706.64	-	-	-	-	-	6	53.33	51.15	107.02	-0.35

Table 7. Eagle Use Surveys - Seasonal and Annual Raptor Mean Flight Heights

Species	Flight Height[a]	Spring					Summer					Fall					Winter					Year				
		Sample Size[b]	Mean Flight Height (m)	SD[c]	Upper 95% CI Bound[d]	Lower 95% CI Bound[d]	Sample Size[b]	Mean Flight Height (m)	SD[c]	Upper 95% CI Bound[d]	Lower 95% CI Bound[d]	Sample Size[b]	Mean Flight Height (m)	SD[c]	Upper 95% CI Bound[d]	Lower 95% CI Bound[d]	Sample Size[b]	Mean Flight Height (m)	SD[c]	Upper 95% CI Bound[d]	Lower 95% CI Bound[d]	Sample Size[b]	Mean Flight Height (m)	SD[c]	Upper 95% CI Bound[d]	Lower 95% CI Bound[d]
Unknown Falcon	Min	-	-	-	-	-	1	15.00	N/A	N/A	N/A	-	-	-	-	-	-	-	-	-	-	1	15.00	N/A	N/A	N/A
Unknown Falcon	Max	-	-	-	-	-	1	35.00	N/A	N/A	N/A	-	-	-	-	-	-	-	-	-	-	1	35.00	N/A	N/A	N/A
Unknown Raptor	Min	2	200.50	282.14	2735.39	-2334.39	-	-	-	-	-	4	5.75	6.40	15.93	-4.43	-	-	-	-	-	6	70.67	161.43	240.07	-98.74
Unknown Raptor	Max	2	201.00	281.43	2729.54	-2327.53	-	-	-	-	-	4	9.00	5.83	18.28	-0.28	-	-	-	-	-	6	73.00	160.28	241.21	-95.21
ALL RAPTORS	**Min**	**326**	**59.64**	**94.44**	**69.93**	**49.35**	**224**	**33.45**	**53.41**	**40.48**	**26.41**	**549**	**24.87**	**42.85**	**28.46**	**21.27**	**7**	**15.29**	**15.97**	**30.05**	**0.52**	**1106**	**36.79**	**65.88**	**40.68**	**32.91**
ALL RAPTORS	**Max**	**326**	**85.25**	**102.94**	**96.47**	**74.04**	**224**	**81.79**	**92.10**	**93.92**	**69.66**	**549**	**52.88**	**69.15**	**58.68**	**47.08**	**7**	**25.29**	**17.05**	**41.05**	**9.52**	**1106**	**68.10**	**86.33**	**73.20**	**63.01**

[a] This column indicates if a particular row is providing results for the minimum (Min) or maximum (Max) flight height statistic.

[b] Sample size refers to the number of flocks (i.e., not individuals) that were detected in flight within 800 m of the point count station during standardized eagle use (60-minute) surveys. Birds that were heard-only or perched-only were not included in the flight height analysis. All detections are included in flight height analyses, independent of whether the detection occurred above or below 200 m in height

[c] SD is the standard deviation of Mean Minimum or Maximum Flight Height. N/A indicates that standard deviation could not be calculated as the sample size is one.

[d] This column indicates either the upper or lower bound of the 95% confidence interval. N/A indicates that the confidence interval could not be calculated as the sample size is one.

- North Dakota State Wildlife Action Plan (Dyke et al. 2015) Species of Conservation Priortiy (SCP) are denoted with a superscript I, II, or III following the species name to indicate that it is Level 1, Level 2, or Level 3 SCP, respectively.

Table 8. Eagle-Minutes and Time within Rotor Swept Zone Summaries for Bald Eagles and Golden Eagles

	Spring	Summer	Fall	Winter	Annual Total
Survey Effort (hours)	159	106	212	159	636
	EAGLE-MINUTES SUMMARY				
BAEA Eagle-Minutes[a]	42	1	33	5	81
BAEA Eagle-Minutes per Survey Hour	0.264	0.009	0.156	0.031	0.127
GOEA Eagle-Minutes	6	0	12	3	21
GOEA Eagle-Minutes per Survey Hour	0.038	0.000	0.057	0.019	0.033
	MINUTES WITHIN ROTOR SWEPT ZONE (RSZ) SUMMARY				
BAEA minutes within RSZ[b]	17.8	0	10.5	2	30.3
BAEA minutes within RSZ per Survey Hour	0.112	0.000	0.050	0.013	0.048
GOEA time within RSZ	6	0	4.6	0	10.6
GOEA minutes within RSZ per Survey Hour	0.038	0.000	0.022	0.000	0.017

[a] Minutes within the standardized 800 m-radius by 200 m-high sample plot as described by the ECPG and final Eagle Rule. Each individual observation is rounded to the next highest integer; and eagle observed for 1.3 minutes in flight within the sample plot is assigned two eagle minutes. Perched eagles and eagles outside of the sample plot are not assigned eagle minutes.

[b] Minutes within the rotor swept zone (RSZ) is used as a metric of flight behavior that could expose a passing bird to collision with operating turbine blades. RSZ represents a predetermined range of above-ground heights within a hypothetical turbine blade sweep of 35 - 150 m within the 800 m-radius sample plot. Measured to the 0.1 minute.

- BAEA represents Bald Eagle and GOEA represents Golden Eagle

Table 9. Eagle Use Surveys - Seasonal Raptor Mean Use by Point Count Station

Point Count Station	Spring		Summer		Fall		Winter		Full Year	
	Total Std. Detections[a]	Mean Use (raptors/60 min. survey/800-m survey plot)[b]	Total Std. Detections[a]	Mean Use (raptors/60 min. survey/800-m survey plot)[b]	Total Std. Detections[a]	Mean Use (raptors/60 min. survey/800-m survey plot)[b]	Total Std. Detections[a]	Mean Use (raptors/60 min. survey/800-m survey plot)[b]	Total Std. Detections[a]	Mean Use (raptors/60 min. survey/800-m survey plot)[b]
1	1	0.333	7	3.500	6	1.500	0	-	14	1.167
2	5	1.667	12	6.000	2	0.500	0	-	19	1.583
3	2	0.667	5	2.500	1	0.250	0	-	8	0.667
4	6	2.000	6	3.000	17	4.250	1	0.333	30	2.500
5	4	1.000	1	0.500	29	7.250	0	-	34	2.267
6	5	1.667	0	-	16	4.000	0	-	21	1.750
7	7	2.333	6	3.000	14	3.500	1	0.333	28	2.333
8	0	-	9	4.500	12	3.000	0	-	21	1.750
9	6	2.000	4	2.000	9	2.250	0	-	19	1.583
10	3	1.000	0	-	4	1.000	0	-	7	0.583
11	7	2.333	2	1.000	9	2.250	0	-	18	1.286
12	6	2.000	2	1.000	10	2.500	0	-	18	1.500
13	2	0.500	1	0.500	9	1.800	1	0.167	13	0.765
14	8	4.000	12	6.000	5	1.667	0	-	25	3.571
15	5	1.667	4	2.000	7	1.750	0	-	16	1.333
16	2	0.667	1	0.500	6	1.500	1	0.333	10	0.833
17	5	1.250	6	3.000	9	2.250	0	-	20	1.250
18	7	2.333	8	4.000	21	5.250	0	-	36	3.000
19	2	1.000	5	2.500	9	2.250	0	-	16	2.000
20	9	3.000	9	4.500	12	3.000	0	-	30	2.500
21	3	1.000	4	2.000	6	1.500	0	-	13	1.083

Table 9. Eagle Use Surveys - Seasonal Raptor Mean Use by Point Count Station

Point Count Station	Spring		Summer		Fall		Winter		Full Year	
	Total Std. Detections[a]	Mean Use (raptors/60 min. survey/800-m survey plot)[b]	Total Std. Detections[a]	Mean Use (raptors/60 min. survey/800-m survey plot)[b]	Total Std. Detections[a]	Mean Use (raptors/60 min. survey/800-m survey plot)[b]	Total Std. Detections[a]	Mean Use (raptors/60 min. survey/800-m survey plot)[b]	Total Std. Detections[a]	Mean Use (raptors/60 min. survey/800-m survey plot)[b]
22	2	1.000	6	3.000	15	3.750	0	-	23	2.556
23	4	1.333	5	2.500	8	2.000	0	-	17	1.417
24	5	1.667	5	2.500	9	2.250	0	-	19	1.583
25	2	0.667	6	3.000	99	24.750	0	-	107	8.917
26	7	2.333	8	4.000	26	6.500	0	-	41	3.417
27	3	3.000	6	3.000	0	-	0	-	9	3.000
28	2	2.000	10	5.000	0	-	0	-	12	4.000
29	16	5.333	2	1.000	14	3.500	0	-	32	2.667
30	1	0.333	5	2.500	18	4.500	0	-	24	2.182
31	5	1.667	8	4.000	27	6.750	0	-	40	3.333
32	15	5.000	7	3.500	15	3.750	0	-	37	3.083
33	12	4.000	6	3.000	24	6.000	0	-	42	3.500
34	3	1.000	4	2.000	6	1.500	0	-	13	1.083
35	2	2.000	6	3.000	14	3.500	0	-	22	2.750
36	2	2.000	4	2.000	14	3.500	0	-	20	2.857
37	28	5.600	1	0.500	16	4.000	1	0.167	46	2.706
38	1	0.333	3	1.500	4	1.000	2	0.667	10	0.833
39	6	2.000	8	4.000	10	2.500	0	-	24	2.000
40	9	3.000	11	5.500	7	1.750	0	-	27	2.455
41	5	1.667	3	1.500	20	5.000	1	0.333	29	2.417
42	2	0.667	3	1.500	24	6.000	1	0.333	30	2.500

Table 9. Eagle Use Surveys - Seasonal Raptor Mean Use by Point Count Station

Point Count Station	Spring		Summer		Fall		Winter		Full Year	
	Total Std. Detections[a]	Mean Use (raptors/60 min. survey/800-m survey plot)[b]	Total Std. Detections[a]	Mean Use (raptors/60 min. survey/800-m survey plot)[b]	Total Std. Detections[a]	Mean Use (raptors/60 min. survey/800-m survey plot)[b]	Total Std. Detections[a]	Mean Use (raptors/60 min. survey/800-m survey plot)[b]	Total Std. Detections[a]	Mean Use (raptors/60 min. survey/800-m survey plot)[b]
43	1	0.333	5	2.500	8	2.000	1	0.333	15	1.250
44	2	0.667	7	3.500	3	0.750	0	-	12	1.000
45	1	0.333	1	0.500	7	1.750	0	-	9	0.750
46	16	5.333	4	2.000	16	4.000	0	-	36	3.000
47	6	2.000	1	0.500	1	0.250	0	-	8	0.615
48	22	7.333	5	2.500	13	3.250	0	-	40	3.333
49	7	1.400	3	1.500	3	0.750	0	-	13	0.867
50	18	6.000	1	0.500	8	2.000	0	-	27	2.250
51	10	3.333	1	0.500	14	3.500	0	-	25	2.083
52	1	0.333	0	-	10	2.500	0	-	11	0.917
53	1	0.333	4	2.000	14	3.500	1	0.333	20	1.667
54	1	0.500	0	-	15	3.750	0	-	16	1.778
55	6	3.000	0	-	20	5.000	0	-	26	2.889

[a] Total Std. Detections is the total number of standardized individuals detected within the 800 m–radius survey cylinder during standardized use surveys

[b] Mean Use is the total standardized detections divided by the total number of 60-minute point count surveys conducted within the season.

Table 10. Diurnal Avian Use Surveys - Seasonal Mean Use by Species Group

	Spring					Fall				
Species Group	Total Std. Detections[a]	% Comp.[b]	Mean Use (birds/10 min. survey/survey plot)[c]	SD[d]	Occur. Freq.[e]	Total Std. Detections[a]	% Comp.[b]	Mean Use (birds/10 min. survey/survey plot)[c]	SD[d]	Occur. Freq.[e]
Large-bodied Corvids	8	0.038	0.050	0.433	0.019	23	0.412	0.108	1.512	0.009
Non-passerine (large)	89	0.420	0.560	2.401	0.075	94	1.682	0.443	2.604	0.047
Non-passerine (small)	16	0.075	0.101	0.424	0.063	68	1.217	0.321	1.140	0.146
Passerine	7296	34.418	45.887	98.798	0.918	2485	44.462	11.722	35.965	0.613
Raptor	66	0.311	0.415	0.705	0.314	136	2.433	0.642	1.668	0.349
Raptor_*all*	77	0.354	0.484	0.967	0.321	136	2.151	0.642	1.668	0.349
Shorebird	86	0.406	0.541	1.205	0.264	122	2.183	0.575	3.002	0.104
Unknown Species Group	2	0.009	0.013	0.159	0.006	0	-	-	-	-
Upland Gamebirds	42	0.198	0.264	1.225	0.082	21	0.376	0.099	0.664	0.038
Wader	83	0.392	0.522	3.174	0.031	3	0.054	0.014	0.153	0.009
Wader_*all*	385	1.768	2.421	22.674	0.038	3	0.047	0.014	0.153	0.009
Waterbird	125	0.590	0.786	1.564	0.296	2148	38.433	10.132	80.401	0.080
Waterbird_*all*	132	0.606	0.830	1.623	0.302	2148	33.966	10.132	80.401	0.080
Waterfowl	13385	63.143	84.182	472.342	0.478	489	8.749	2.307	14.195	0.108
Waterfowl_*all*	13646	62.657	85.824	472.602	0.484	1224	19.355	5.774	34.518	0.127
ALL BIRDS	**21198**	**100.000**	**133.321**	**483.877**	**0.975**	**5589**	**100.000**	**26.363**	**89.049**	**0.759**
ALL BIRDS_*all*	**21779**	**100.000**	**136.975**	**484.123**	**0.975**	**6324**	**100.000**	**29.830**	**93.995**	**0.769**

[a] Total Std. Detections is the total number of standardized individuals detected within the 200-m high sample plot during standardized use surveys. Survey cylinder radius extended out to 800 m for large-bodied species and 150 m for small-bodied species. Mean use also is summarized for all heights for species groups with detections over 200 m in altitude and out to the same radial distances for large and small-bodied species, noted with the suffix "_*all* " after the group name

[b] % Comp. (i.e., percent composition) is the percent of all birds that a particular species group comprises during the season

[c] Mean Use is the total standardized detections divided by the total number of 10-minute point count surveys conducted within the season

[d] SD is the standard deviation of Mean Use

[e] Occur. Freq. (i.e., Occurrence Frequency) is the proportion of point count surveys at which a particular species group was detected during the season

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Table 11. Diurnal Avian Use Surveys - Seasonal and Annual Mean Flight Heights

Species	Flight Height[a]	Spring					Fall					Year				
		Sample Size[b]	Mean Flight Height (m)	SD[c]	Upper 95% CI Bound[d]	Lower 95% CI Bound[d]	Sample Size[b]	Mean Flight Height (m)	SD[c]	Upper 95% CI Bound[d]	Lower 95% CI Bound[d]	Sample Size[b]	Mean Flight Height (m)	SD[c]	Upper 95% CI Bound[d]	Lower 95% CI Bound[d]
Large-bodied Corvid	Min	3	35.00	27.84	104.16	-34.16	2	15.50	20.51	199.74	-168.74	5	27.20	24.63	57.78	-3.38
Large-bodied Corvid	Max	3	40.00	20.00	89.68	-9.68	2	36.00	48.08	468.01	-396.01	5	38.40	27.98	73.14	3.66
Non-passerine (large)	Min	16	8.25	6.81	11.88	4.62	15	11.73	10.68	17.65	5.82	31	9.94	8.92	13.21	6.66
Non-passerine (large)	Max	16	13.94	6.84	17.58	10.29	15	21.33	10.93	27.39	15.28	31	17.52	9.66	21.06	13.97
Non-passerine (small)	Min	10	4.80	3.46	7.27	2.33	36	6.00	6.94	8.35	3.65	46	5.74	6.33	7.62	3.86
Non-passerine (small)	Max	10	5.90	4.15	8.87	2.93	36	7.42	6.72	9.69	5.14	46	7.09	6.24	8.94	5.23
Passerine	Min	571	9.73	15.05	10.97	8.49	285	10.57	14.59	12.27	8.87	856	10.01	14.90	11.01	9.01
Passerine	Max	571	14.87	16.75	16.25	13.50	285	15.76	15.05	17.52	14.01	856	15.17	16.20	16.26	14.08
Raptor	Min	67	68.69	105.82	94.50	42.87	89	28.39	45.83	38.05	18.74	156	45.70	79.76	58.31	33.08
Raptor	Max	67	86.18	106.26	112.10	60.26	89	56.55	65.51	70.35	42.75	156	69.28	86.38	82.94	55.61
Shorebird	Min	32	22.38	33.20	34.34	10.41	15	6.20	6.59	9.85	2.55	47	17.21	28.53	25.59	8.84
Shorebird	Max	32	30.16	35.49	42.95	17.36	15	11.93	7.98	16.35	7.52	47	24.34	30.69	33.35	15.33
Upland Game	Min	3	10.67	16.74	52.26	-30.93	2	4.00	4.24	42.12	-34.12	5	8.00	12.57	23.61	-7.61
Upland Game	Max	3	12.00	15.59	50.72	-26.72	2	8.50	9.19	91.09	-74.09	5	10.60	12.10	25.62	-4.42
Wader	Min	10	453.50	555.74	851.05	55.95	2	8.50	9.19	91.09	-74.09	12	379.33	531.70	717.16	41.51
Wader	Max	10	456.00	553.60	852.02	59.98	2	15.00	0.00	15.00	15.00	12	382.50	529.35	718.84	46.16
Waterbird	Min	70	37.64	124.58	67.35	7.94	14	45.71	72.79	87.74	3.69	84	38.99	117.22	64.43	13.55
Waterbird	Max	70	43.87	123.62	73.35	14.39	14	81.86	66.11	120.03	43.69	84	50.20	116.59	75.50	24.90
Waterfowl	Min	212	45.55	51.87	52.57	38.53	28	210.71	347.67	345.53	75.90	240	64.82	137.31	82.28	47.36
Waterfowl	Max	212	58.59	73.90	68.60	48.59	28	217.14	344.21	350.61	83.67	240	77.09	144.25	95.43	58.75
Unknown Species Group	Min	1	1.00	N/A	N/A	N/A	-	-	-	-	-	1	1.00	N/A	N/A	N/A
Unknown Species Group	Max	1	1.00	N/A	N/A	N/A	-	-	-	-	-	1	1.00	N/A	N/A	N/A
ALL BIRDS	**Min**	**995**	**28.16**	**86.99**	**33.57**	**22.75**	**488**	**25.86**	**97.57**	**34.54**	**17.18**	**1483**	**27.40**	**90.58**	**32.02**	**22.79**
ALL BIRDS	**Max**	**995**	**35.90**	**91.01**	**41.57**	**30.24**	**488**	**36.14**	**99.80**	**45.02**	**27.26**	**1483**	**35.98**	**93.96**	**40.77**	**31.20**

[a] This column indicates if a particular row is providing results for the minimum (Min) or maximum (Max) flight height statistic

[b] Sample size refers to the number of flocks (i.e., not individuals) that were detected in flight within either the 800 m (large-bodied species) or 150 m (small-bodied species) of the point count station during standardized diurnal avian activity (10-minute) surveys. Birds that were heard-only or perched-only were not included in the flight height analysis. All observations are included in flight height analyses regardless of whether the flock was observed at above or below 200 m in height

[c] SD is the standard deviation of Mean Minimum or Maximum Flight Height. N/A indicates that standard deviation could not be calculated as the sample size is one

[d] This column indicates either the upper or lower bound of the 95% confidence interval. N/A indicates that the confidence interval could not be calculated as the sample size is one

APPENDICES

APPENDIX A

POINT COUNT STATION LOCATIONS

Appendix A. Point Count Station Locations

Point Count Station	Latitude	Longitude	Northing	Easting
1	46.380	-99.644	261305.231	2184491.587
2	46.365	-99.644	255663.371	2184500.034
3	46.348	-99.645	249700.860	2184534.672
4	46.354	-99.625	252051.518	2189349.957
5	46.351	-99.561	251087.624	2205682.309
6	46.348	-99.519	249948.627	2216331.143
7	46.333	-99.603	244239.141	2195133.639
8	46.336	-99.561	245351.453	2205738.269
9	46.333	-99.519	244690.246	2216389.261
10	46.319	-99.645	239070.552	2184604.957
11	46.317	-99.603	238411.779	2195187.563
12	46.319	-99.561	239433.078	2205806.507
13	46.319	-99.519	239420.642	2216424.772
14	46.312	-99.494	237079.382	2222780.975
15	46.297	-99.653	231138.422	2182598.229
16	46.297	-99.632	231228.571	2187850.204
17	46.297	-99.603	231323.198	2195298.857
18	46.297	-99.561	231450.248	2205856.453
19	46.298	-99.540	231601.896	2211160.716
20	46.299	-99.519	232076.075	2216478.600
21	46.283	-99.498	226475.597	2221795.379
22	46.283	-99.472	226566.186	2228522.830
23	46.274	-99.608	222702.669	2194112.594
24	46.267	-99.650	220043.702	2183565.178
25	46.260	-99.629	217443.492	2188900.519
26	46.259	-99.604	217433.926	2195181.774

Appendix A. Point Count Station Locations

Point Count Station	Latitude	Longitude	Northing	Easting
27	46.255	-99.670	215484.301	2178390.337
28	46.245	-99.628	212124.312	2189065.797
29	46.245	-99.600	212163.820	2196127.519
30	46.230	-99.615	206859.738	2192482.864
31	46.230	-99.569	206881.143	2204115.203
32	46.216	-99.711	201429.290	2168174.231
33	46.221	-99.691	203207.443	2173396.403
34	46.216	-99.607	201586.568	2194456.229
35	46.216	-99.580	201593.156	2201349.958
36	46.216	-99.555	201638.974	2207668.566
37	46.198	-99.690	194915.858	2173560.354
38	46.201	-99.610	196302.655	2193870.520
39	46.201	-99.565	196302.391	2205152.243
40	46.203	-99.545	196966.997	2210376.094
41	46.187	-99.677	190943.717	2177015.515
42	46.187	-99.655	191008.528	2182433.156
43	46.187	-99.631	191095.012	2188688.725
44	46.187	-99.604	191108.779	2195431.450
45	46.187	-99.579	191131.876	2201842.281
46	46.187	-99.542	191126.651	2211161.443
47	46.168	-99.690	184056.480	2173695.106
48	46.173	-99.669	185727.063	2178958.016
49	46.165	-99.628	182924.292	2189552.036
50	46.162	-99.566	181995.895	2205231.229
51	46.341	-99.456	247745.875	2232180.915
52	46.321	-99.456	240419.147	2232207.544

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Appendix A. Point Count Station Locations

Point Count Station	Latitude	Longitude	Northing	Easting
53	46.305	-99.456	234631.774	2232254.113
54	46.283	-99.650		
55	46.297	-99.582		

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APPENDIX B

SEASONAL SPECIES GROUP MEAN USE STATISTICS

BW Exhibit 28

Appendix B-1. Seasonal Large-bodied Corvids, Large-bodied Non-Passerines, and Upland Gamebirds Use Statistics Recorded during Diurnal Avian Use Surveys

	Spring					Fall				
Common Name	Total Std. Detections[a]	% Comp.[b]	Mean Use (birds/10 min. survey/survey plot)[c]	SD[d]	Occur. Freq.[e]	Total Std. Detections[a]	% Comp.[b]	Mean Use (birds/10 min. survey/survey plot)[c]	SD[d]	Occur. Freq.[e]
	LARGE-BODIED CORVIDS									
American Crow	8	100.000	0.050	0.433	0.019	22	95.652	0.104	1.511	0.005
Common Raven	0	-	-	-	-	1	4.348	0.005	0.069	0.005
	LARGE-BODIED NON-PASSERINES									
Common Nighthawk	0	-	-	-	-	1	1.064	0.005	0.069	0.005
Rock Pigeon	89	100.000	0.560	2.401	0.075	93	98.936	0.439	2.604	0.042
	UPLAND GAMEBIRDS									
Ring-necked Pheasant	10	23.810	0.063	0.291	0.050	15	71.429	0.071	0.567	0.028
Sharp-tailed Grouse[II]	32	76.190	0.201	1.084	0.044	6	28.571	0.028	0.350	0.009
ALL LARGE-BODIED CORVIDS	**8**	**100.000**	**0.050**	**0.433**	**0.019**	**23**	**100.000**	**0.108**	**1.512**	**0.009**
ALL LARGE-BODIED NON-PASSERINES	**89**	**100.000**	**0.560**	**2.401**	**0.075**	**94**	**100.000**	**0.443**	**2.604**	**0.047**
ALL UPLAND GAMEBIRDS	**42**	**100.000**	**0.264**	**1.225**	**0.082**	**21**	**100.000**	**0.099**	**0.664**	**0.038**

[a] Total Std. Detections is the total number of standardized individuals detected within the 800 m–radius survey cylinder during standardized use surveys

[b] % Comp. (i.e., percent composition) is the percent of a particular species group that a particular species comprises using total standardized detections.

[c] Mean Use is the total standardized detections divided by the total number of 60-minute point count surveys conducted within the season.

[d] SD is the standard deviation of Mean Use

[e] Occur. Freq. (i.e., Occurrence Frequency) is the proportion of point count surveys at which a particular species was detected during the season

- North Dakota State Wildlife Action Plan (Dyke et al. 2015) Species of Conservation Priortiy (SCP) are denoted with a superscript I or II following the species name to indicate that it is Level I or Level II SCP, respectively.

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Appendix B-2. Seasonal Small-Bodied Non-Passerine and Passerine Use Statistics within the Project Area (Diurnal Avian Activity Surveys)

Common Name	Spring					Fall				
	Total Std. Detections[a]	% Comp.[b]	Mean Use (birds/10 min. survey/survey plot)[c]	SD[d]	Occur. Freq.[e]	Total Std. Detections[a]	% Comp.[b]	Mean Use (birds/10 min. survey/survey plot)[c]	SD[d]	Occur. Freq.[e]
	SMALL NON-PASSERINES									
Hairy Woodpecker	0	-	-	-	-	1	1.471	0.005	0.069	0.005
Downy Woodpecker	1	6.250	0.006	0.079	0.006	0	-	-	-	-
Mourning Dove	13	81.250	0.082	0.389	0.050	64	94.118	0.302	1.107	0.137
Northern Flicker	2	12.500	0.013	0.112	0.013	3	4.412	0.014	0.153	0.009
	PASSERINES									
American Goldfinch	12	0.164	0.075	0.399	0.050	71	2.857	0.335	1.238	0.123
American Pipit	0	-	-	-	-	44	1.771	0.208	2.154	0.024
American Robin	24	0.329	0.151	1.313	0.038	19	0.765	0.090	0.539	0.028
American Tree Sparrow	11	0.151	0.069	0.586	0.025	0	-	-	-	-
Bank Swallow	1	0.014	0.006	0.079	0.006	13	0.523	0.061	0.703	0.014
Barn Swallow	12	0.164	0.075	0.382	0.050	90	3.622	0.425	1.976	0.090
Brown-headed Cowbird	93	1.275	0.585	1.532	0.233	6	0.241	0.028	0.237	0.019
Blue Jay	1	0.014	0.006	0.079	0.006	3	0.121	0.014	0.206	0.005
Bobolink[II]	19	0.260	0.119	0.520	0.069	4	0.161	0.019	0.136	0.019
Brewer's Blackbird	25	0.343	0.157	1.128	0.044	30	1.207	0.142	0.848	0.033
Brown Thrasher	0	-	-	-	-	3	0.121	0.014	0.206	0.005
Chestnut-collared Longspur[I]	22	0.302	0.138	0.497	0.088	11	0.443	0.052	0.326	0.033
Clay-colored Sparrow	12	0.164	0.075	0.365	0.050	11	0.443	0.052	0.326	0.038
Cedar Waxwing	0	-	-	-	-	6	0.241	0.028	0.412	0.005
Chipping Sparrow	0	-	-	-	-	1	0.040	0.005	0.069	0.005
Cliff Swallow	15	0.206	0.094	0.461	0.057	3	0.121	0.014	0.206	0.005
Common Grackle	96	1.316	0.604	2.447	0.170	34	1.368	0.160	1.072	0.047

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Appendix B-2. Seasonal Small-Bodied Non-Passerine and Passerine Use Statistics within the Project Area (Diurnal Avian Activity Surveys)

	Spring					Fall				
Common Name	Total Std. Detections[a]	% Comp.[b]	Mean Use (birds/10 min. survey/survey plot)[c]	SD[d]	Occur. Freq.[e]	Total Std. Detections[a]	% Comp.[b]	Mean Use (birds/10 min. survey/survey plot)[c]	SD[d]	Occur. Freq.[e]
Dark-eyed Junco	7	0.096	0.044	0.411	0.019	0	-	-	-	-
Eastern Bluebird	2	0.027	0.013	0.159	0.006	0	-	-	-	-
Eastern Kingbird	8	0.110	0.050	0.271	0.038	13	0.523	0.061	0.378	0.038
European Starling	33	0.452	0.208	1.080	0.057	166	6.680	0.783	7.072	0.038
Gray Catbird	2	0.027	0.013	0.159	0.006	1	0.040	0.005	0.069	0.005
Grasshopper Sparrow[l]	4	0.055	0.025	0.157	0.025	1	0.040	0.005	0.069	0.005
Harris's Sparrow	1	0.014	0.006	0.079	0.006	0	-	-	-	-
Horned Lark	206	2.823	1.296	1.989	0.516	123	4.950	0.580	2.014	0.160
House Sparrow	55	0.754	0.346	1.587	0.082	67	2.696	0.316	2.106	0.047
House Wren	1	0.014	0.006	0.079	0.006	2	0.080	0.009	0.097	0.009
Lapland Longspur	6245	85.595	39.277	99.106	0.346	498	20.040	2.349	12.525	0.108
Least Flycatcher	1	0.014	0.006	0.079	0.006	0	-	-	-	-
Lincoln's Sparrow	0	-	-	-	-	1	0.040	0.005	0.069	0.005
Marsh Wren	0	-	-	-	-	2	0.080	0.009	0.097	0.009
Northern Shrike	1	0.014	0.006	0.079	0.006	0	-	-	-	-
Orchard Oriole	3	0.041	0.019	0.136	0.019	3	0.121	0.014	0.206	0.005
Pine Siskin	0	-	-	-	-	20	0.805	0.094	0.608	0.033
Purple Martin	0	-	-	-	-	1	0.040	0.005	0.069	0.005
Red-winged Blackbird	225	3.084	1.415	4.414	0.277	1058	42.575	4.991	32.638	0.142
Say's Phoebe	2	0.027	0.013	0.112	0.013	0	-	-	-	-
Savannah Sparrow	9	0.123	0.057	0.258	0.050	18	0.724	0.085	0.416	0.047
Sedge Wren	0	-	-	-	-	6	0.241	0.028	0.166	0.028
Snow Bunting	4	0.055	0.025	0.250	0.013	3	0.121	0.014	0.206	0.005

Appendix B-2. Seasonal Small-Bodied Non-Passerine and Passerine Use Statistics within the Project Area (Diurnal Avian Activity Surveys)

	Spring					Fall				
Common Name	**Total Std. Detections[a]**	**% Comp.[b]**	**Mean Use (birds/10 min. survey/survey plot)[c]**	**SD[d]**	**Occur. Freq.[e]**	**Total Std. Detections[a]**	**% Comp.[b]**	**Mean Use (birds/10 min. survey/survey plot)[c]**	**SD[d]**	**Occur. Freq.[e]**
Song Sparrow	6	0.082	0.038	0.222	0.031	9	0.362	0.042	0.245	0.033
Swainson's Thrush	7	0.096	0.044	0.555	0.006	0	-	-	-	-
Tree Swallow	2	0.027	0.013	0.112	0.013	0	-	-	-	-
Unknown Blackbird	5	0.069	0.031	0.397	0.006	1	0.040	0.005	0.069	0.005
Unknown Finch	0	-	-	-	-	3	0.121	0.014	0.206	0.005
Unknown Passerine	6	0.082	0.038	0.273	0.025	18	0.724	0.085	0.553	0.042
Unknown Sparrow	8	0.110	0.050	0.271	0.038	15	0.604	0.071	0.322	0.052
Unknwon Swallow	0	-	-	-	-	5	0.201	0.024	0.343	0.005
Unknown Warbler	3	0.041	0.019	0.238	0.006	1	0.040	0.005	0.069	0.005
Vesper Sparrow	11	0.151	0.069	0.278	0.063	12	0.483	0.057	0.287	0.042
White-crowned Sparrow	1	0.014	0.006	0.079	0.006	0	-	-	-	-
Western Kingbird	10	0.137	0.063	0.368	0.044	11	0.443	0.052	0.340	0.033
Western Meadowlark[II]	66	0.905	0.415	0.888	0.258	22	0.885	0.104	0.411	0.071
White-throated Sparrow	0	-	-	-	-	2	0.080	0.009	0.137	0.005
Yellow Warbler	2	0.027	0.013	0.112	0.013	6	0.241	0.028	0.256	0.014
Yellow-headed Blackbird	17	0.233	0.107	0.472	0.063	39	1.569	0.184	1.387	0.042
Yellow-rumped Warbler	0	-	-	-	-	9	0.362	0.042	0.428	0.019
ALL SMALL-BODIED NON-PASSERINES	**16**	**100.000**	**0.101**	**0.424**	**0.063**	**68**	**100.000**	**0.321**	**1.140**	**0.146**
ALL PASSERINES	**7296**	**100.000**	**45.887**	**98.798**	**0.918**	**2485**	**100.000**	**11.722**	**35.965**	**0.613**

[a] Total Std. Detections is the total number of standardized individuals detected within the 800 m–radius survey cylinder during standardized use surveys

[b] % Comp. (i.e., percent composition) is the percent of a particular species group that a particular species comprises using total standardized detections.

[c] Mean Use is the total standardized detections divided by the total number of 60-minute point count surveys conducted within the season.

Appendix B-2. Seasonal Small-Bodied Non-Passerine and Passerine Use Statistics within the Project Area (Diurnal Avian Activity Surveys)

	Spring					Fall				
Common Name	Total Std. Detections[a]	% Comp.[b]	Mean Use (birds/10 min. survey/survey plot)[c]	SD[d]	Occur. Freq.[e]	Total Std. Detections[a]	% Comp.[b]	Mean Use (birds/10 min. survey/survey plot)[c]	SD[d]	Occur. Freq.[e]

[d] SD is the standard deviation of Mean Use

[e] Occur. Freq. (i.e., Occurrence Frequency) is the proportion of point count surveys at which a particular species was detected during the season

- North Dakota State Wildlife Action Plan (Dyke et al. 2015) Species of Conservation Priortiy (SCP) are denoted with a superscript I or II following the species name to indicate that it is Level I or Level II SCP, respectively.

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Appendix B-3. Seasonal Raptor Use Statistics within the Project Area (Diurnal Avian Activity Surveys)

	Spring					Fall				
Common Name	**Total Std. Detections[a]**	**% Comp.[b]**	**Mean Use (birds/10 min. survey/survey plot)[c]**	**SD[d]**	**Occur. Freq.[e]**	**Total Std. Detections[a]**	**% Comp.[b]**	**Mean Use (birds/10 min. survey/survey plot)[c]**	**SD[d]**	**Occur. Freq.[e]**
American Kestrel[II]	3	4.545	0.019	0.136	0.019	3	2.206	0.014	0.118	0.014
Bald Eagle[II]	7	10.606	0.044	0.283	0.025	4	2.941	0.019	0.136	0.019
Bald Eagle[II]_*all*[f]	8	10.390	0.050	0.293	0.031	4	2.941	0.019	0.136	0.019
Ferruginous Hawk[I]	3	4.545	0.019	0.136	0.019	1	0.735	0.005	0.069	0.005
Golden Eagle[II]	1	1.515	0.006	0.079	0.006	0	-	-	-	-
Great Horned Owl	1	1.515	0.006	0.079	0.006	0	-	-	-	-
Merlin	0	-	-	-	-	1	0.735	0.005	0.069	0.005
Northern Goshawk	0	-	-	-	-	1	0.735	0.005	0.069	0.005
Northern Harrier[II]	16	24.242	0.101	0.393	0.075	21	15.441	0.099	0.315	0.094
Northern Harrier[II]_*all*[f]	17	22.078	0.107	0.399	0.082	21	15.441	0.099	0.315	0.094
Red-tailed Hawk	21	31.818	0.132	0.375	0.119	28	20.588	0.132	0.426	0.104
Red-tailed Hawk_*all*[f]	26	33.766	0.164	0.476	0.126	28	20.588	0.132	0.426	0.104
Rough-legged Hawk	1	1.515	0.006	0.079	0.006	0	-	-	-	-
Sharp-shinned Hawk	1	1.515	0.006	0.079	0.006	1	0.735	0.005	0.069	0.005
Sharp-shinned Hawk_*all*[f]	3	3.896	0.019	0.136	0.019	1	0.735	0.005	0.069	0.005
Swainson's Hawk[I]	8	12.121	0.050	0.219	0.050	62	45.588	0.292	1.545	0.137
Swainson's Hawk[I]_*all*[f]	9	11.688	0.057	0.232	0.057	62	45.588	0.292	1.545	0.137
Turkey Vulture	1	1.515	0.006	0.079	0.006	6	4.412	0.028	0.166	0.028
Turkey Vulture_*all*[f]	2	2.597	0.013	0.112	0.013	6	4.412	0.028	0.166	0.028
Unknown Accipiter	0	-	-	-	-	1	0.735	0.005	0.069	0.005
Unknown Buteo	1	1.515	0.006	0.079	0.006	7	5.147	0.033	0.204	0.028
Unknown Raptor	2	3.030	0.013	0.112	0.013	0	-	-	-	-
ALL RAPTORS	**66**	**100.000**	**0.415**	**0.705**	**0.314**	136	100.000	0.642	1.668	0.349
ALL RAPTORS_*all heights*[f]	**77**	**100.000**	**0.484**	**0.967**	**0.321**	136	100.000	0.642	1.668	0.349

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Appendix B-3. Seasonal Raptor Use Statistics within the Project Area (Diurnal Avian Activity Surveys)

	Spring					Fall				
Common Name	Total Std. Detections[a]	% Comp.[b]	Mean Use (birds/10 min. survey/survey plot)[c]	SD[d]	Occur. Freq.[e]	Total Std. Detections[a]	% Comp.[b]	Mean Use (birds/10 min. survey/survey plot)[c]	SD[d]	Occur. Freq.[e]

[a] Total Std. Detections is the total number of standardized individuals detected within the 800 m–radius survey cylinder during standardized use surveys

[b] % Comp. (i.e., percent composition) is the percent of raptors that a particular species comprises using total standardized detections.

[c] Mean Use is the total standardized detections divided by the total number of 60-minute point count surveys conducted within the season.

[d] SD is the standard deviation of Mean Use

[e] Occur. Freq. (i.e., Occurrence Frequency) is the proportion of point count surveys at which a particular species was detected during the season

[f] Species or group names followed by "*_all*" indicate that presented data includes individuals greater than 200 m in height.

- North Dakota State Wildlife Action Plan (Dyke et al. 2015) Species of Conservation Priortiy (SCP) are denoted with a superscript I or II following the species name to indicate that it is Level I or Level II SCP, respectively.

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Appendix B-4. Seasonal Shorebirds, Waders, and Waterbirds Use Statistics within the Project Area (Diurnal Avian Activity Surveys)

	Spring					Fall				
Common Name	Total Std. Detections[a]	% Comp.[b]	Mean Use (birds/10 min. survey/survey plot)[c]	SD[d]	Occur. Freq.[e]	Total Std. Detections[a]	% Comp.[b]	Mean Use (birds/10 min. survey/survey plot)[c]	SD[d]	Occur. Freq.[e]
	SHOREBIRDS									
Greater Yellowlegs	0	-	-	-	-	3	2.459	0.014	0.118	0.014
Killdeer	56	65.116	0.352	0.713	0.233	60	49.180	0.283	1.622	0.090
Marbled Godwit[I]	5	5.814	0.031	0.237	0.019	0	-	-	-	-
Red-necked Phalarope	3	3.488	0.019	0.238	0.006	0	-	-	-	-
Upland Sandpiper[II]	11	12.791	0.069	0.392	0.044	0	-	-	-	-
Wilson's Phalarope[I]	6	6.977	0.038	0.476	0.006	0	-	-	-	-
Wilson's Snipe	5	5.814	0.031	0.175	0.031	0	-	-	-	-
Unknown Shorebird	0	-	-	-	-	59	48.361	0.278	2.475	0.019
	WADERS									
Great Blue Heron	0	-	-	-	-	3	100.000	0.014	0.153	0.009
Sandhill Crane	83	100.000	0.522	3.174	0.031	0	-	-	-	-
Sandhill Crane_*all*[f]	385	100.000	2.421	22.674	0.038	0	-	-	-	-
	WATERBIRDS									
American Coot	5	4.000	0.031	0.326	0.013	16	0.745	0.075	0.500	0.033
American White Pelican[II]	0	-	-	-	-	21	0.978	0.099	1.442	0.005
American White Pelican[II]_*all*[f]	7	0.053	0.044	0.395	0.013	21	0.978	0.099	1.442	0.005
Black Tern[I]	0	-	-	-	-	1	0.047	0.005	0.069	0.005
California Gull	20	16.000	0.126	0.933	0.038	1	0.047	0.005	0.069	0.005
Double-crested Cormorant	0	-	-	-	-	81	3.771	0.382	4.592	0.009
Franklin's Gull[I]	2	1.600	0.013	0.159	0.006	2023	94.181	9.542	80.316	0.033
Horned Grebe[I]	2	1.600	0.013	0.159	0.006	0	-	-	-	-
Pied-billed Grebe	1	0.800	0.006	0.079	0.006	2	0.093	0.009	0.097	0.009
Ring-billed Gull	90	72.000	0.566	1.256	0.226	0	-	-	-	-

Appendix B-4. Seasonal Shorebirds, Waders, and Waterbirds Use Statistics within the Project Area (Diurnal Avian Activity Surveys)

	Spring					Fall				
Common Name	Total Std. Detections[a]	% Comp.[b]	Mean Use (birds/10 min. survey/survey plot)[c]	SD[d]	Occur. Freq.[e]	Total Std. Detections[a]	% Comp.[b]	Mean Use (birds/10 min. survey/survey plot)[c]	SD[d]	Occur. Freq.[e]
Sora	1	0.800	0.006	0.079	0.006	3	0.140	0.014	0.118	0.014
Unknown Gull	2	1.600	0.013	0.159	0.006	0	-	-	-	-
Unknown Waterbird species	2	1.600	0.013	0.159	0.006	0	-	-	-	-
ALL SHOREBIRDS	**86**	**100.000**	**0.541**	**1.205**	**0.264**	**122**	**100.000**	**0.575**	**3.002**	**0.104**
ALL WADERS	**83**	**100.000**	**0.522**	**3.174**	**0.031**	**3**	**100.000**	**0.014**	**0.153**	**0.009**
ALL WADERS_*all heights*[f]	**385**	**100.000**	**2.421**	**22.674**	**0.038**	**3**	**100.000**	**0.014**	**0.153**	**0.009**
ALL WATERBIRDS	**125**	**100.000**	**0.786**	**1.564**	**0.296**	**2148**	**100.000**	**10.132**	**80.401**	**0.080**
ALL WATERBIRDS_*all heights*[f]	**132**	**100.000**	**0.830**	**1.623**	**0.302**	**2148**	**100.000**	**10.132**	**80.401**	**0.080**

[a] Total Std. Detections is the total number of standardized individuals detected within the 800 m–radius survey cylinder during standardized use surveys

[b] % Comp. (i.e., percent composition) is the percent of a particular species group that a particular species comprises using total standardized detections.

[c] Mean Use is the total standardized detections divided by the total number of 60-minute point count surveys conducted within the season.

[d] SD is the standard deviation of Mean Use

[e] Occur. Freq. (i.e., Occurrence Frequency) is the proportion of point count surveys at which a particular species was detected during the season

[f] Species or group names followed by "_200" indicate that presented data includes individuals greater than 200 m in height.

- North Dakota State Wildlife Action Plan (Dyke et al. 2015) Species of Conservation Priortiy (SCP) are denoted with a superscript I or II following the species name to indicate that it is Level I or Level II SCP, respectively.

Appendix B-5. Seasonal Waterfowl Use Statistics within the Project Area (Diurnal Avian Activity Surveys)

	Spring					Fall				
Common Name	Total Std. Detections[a]	% Comp.[b]	Mean Use (birds/10 min. survey/survey plot)[c]	SD[d]	Occur. Freq.[e]	Total Std. Detections[a]	% Comp.[b]	Mean Use (birds/10 min. survey/survey plot)[c]	SD[d]	Occur. Freq.[e]
American Wigeon	6	0.045	0.038	0.295	0.019	0	-	-	-	-
Blue-winged Teal	27	0.202	0.170	0.756	0.063	18	3.681	0.085	0.618	0.024
Cackling Goose	198	1.479	1.245	8.044	0.044	0	-	-	-	-
Canada Goose	1285	9.600	8.082	78.736	0.164	95	19.427	0.448	3.566	0.042
Canvasback[II]	4	0.030	0.025	0.317	0.006	0	-	-	-	-
Common Merganser	2	0.015	0.013	0.159	0.006	0	-	-	-	-
Gadwall	10	0.075	0.063	0.401	0.031	13	2.658	0.061	0.647	0.014
Greater White-fronted Goose	621	4.640	3.906	31.318	0.063	40	8.180	0.189	2.747	0.005
Greater White-fronted Goose_*all*[f]	671	4.917	4.220	31.529	0.069	150	12.255	0.708	8.027	0.009
Green-winged Teal	0	-	-	-	-	4	0.818	0.019	0.217	0.009
Lesser Scaup[II]	5	0.037	0.031	0.285	0.013	0	-	-	-	-
Mallard	147	1.098	0.925	3.275	0.239	77	15.746	0.363	4.815	0.019
Mallard_*all*[f]	154	1.129	0.969	3.310	0.245	117	9.559	0.552	5.531	0.024
Northern Pintail[II]	105	0.784	0.660	3.260	0.157	0	-	-	-	-
Northern Pintail[II]_*all*[f]	109	0.799	0.686	3.271	0.164	0	-	-	-	-
Northern Shoveler	12	0.090	0.075	0.485	0.031	4	0.818	0.019	0.217	0.009
Redhead	5	0.037	0.031	0.397	0.006	0	-	-	-	-
Ross's Goose	40	0.299	0.252	1.096	0.088	1	0.204	0.005	0.069	0.005
Ross's Goose_*all*[f]	40	0.293	0.252	1.096	0.088	6	0.490	0.028	0.350	0.009
Ruddy Duck	4	0.030	0.025	0.317	0.006	0	-	-	-	-
Snow Goose	10893	81.382	68.509	377.666	0.126	180	36.810	0.849	12.362	0.005
Snow Goose_*all*[f]	11093	81.291	69.767	378.071	0.126	760	62.092	3.585	32.776	0.014
Unknown Duck	21	0.157	0.132	0.772	0.050	57	11.656	0.269	2.336	0.019

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Appendix B-5. Seasonal Waterfowl Use Statistics within the Project Area (Diurnal Avian Activity Surveys)

	Spring					Fall				
Common Name	Total Std. Detections[a]	% Comp.[b]	Mean Use (birds/10 min. survey/survey plot)[c]	SD[d]	Occur. Freq.[e]	Total Std. Detections[a]	% Comp.[b]	Mean Use (birds/10 min. survey/survey plot)[c]	SD[d]	Occur. Freq.[e]
ALL WATERFOWL	**13385**	**100.000**	**84.182**	**472.342**	**0.478**	**489**	**100.000**	**2.307**	**14.195**	**0.108**
ALL WATERFOWL_*all heights*[f]	**13646**	**100.000**	**85.824**	**472.602**	**0.484**	**1224**	**100.000**	**5.774**	**34.518**	**0.127**

[a] Total Std. Detections is the total number of standardized individuals detected within the 800 m–radius survey cylinder during standardized use surveys

[b] % Comp. (i.e., percent composition) is the percent of waterfowl that a particular species comprises using total standardized detections.

[c] Mean Use is the total standardized detections divided by the total number of 60-minute point count surveys conducted within the season.

[d] SD is the standard deviation of Mean Use

[e] Occur. Freq. (i.e., Occurrence Frequency) is the proportion of point count surveys at which a particular species was detected during the season

[f] Species or group names followed by "_*all* " indicate that presented data also includes individuals flying at greater than 200 m in height.

- North Dakota State Wildlife Action Plan (Dyke et al. 2015) Species of Conservation Priortiy (SCP) are denoted with a superscript I or II following the species name to indicate that it is Level I or Level II SCP, respectively.

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APPENDIX C

SPECIES OBSERVED DURING EAGLE USE AND DIURNAL AVIAN USE SURVEYS

Appendix C. Species Observed during Eagle Use and Diurnal Avian Use Surveys

Common Name	Scientific Name	Season[a]				Conservation Listing Status	
		Spring	Summer	Fall	Winter	State Status[b]	Federal Status[c]
Alder/Willow Flycatcher	*Empidonax alnorum/traillii*	-	Incidental	-	N/A	-	-
American Avocet	*Recurvirostra americana*	-	Incidental	Incidental	N/A	SCP II	-
American Bittern	*Botaurus lentiginosus*	-	Incidental	Incidental	N/A	SCP I	-
American Coot	*Fulica americana*	X	Incidental	X	N/A	-	-
American Crow	*Corvus brachyrhynchos*	X	N/A	X	N/A	-	-
American Goldfinch	*Spinus tristis*	X	Incidental	X	N/A	-	-
American Kestrel	*Falco sparverius*	X	X	X	-	SCP II	-
American Pipit	*Anthus rubescens*	Incidental	N/A	X	N/A	-	-
American Redstart	*Setophaga ruticilla*	Incidental	N/A	-	N/A	-	-
American Robin	*Turdus migratorius*	X	Incidental	X	N/A	-	-
American Tree Sparrow	*Spizelloides arborea*	X	N/A	-	N/A	-	-
American White Pelican	*Pelecanus erythrorhynchos*	-	Incidental	X	N/A	SCP II	-
American Wigeon	*Mareca americana*	X	Incidental	-	N/A	-	-
Baird's Sandpiper	*Calidris bairdii*	-	Incidental	-	N/A	-	-
Baird's Sparrow	*Centronyx bairdii*	Incidental	N/A	-	N/A	SCP I	-
Bald Eagle	*Haliaeetus leucocephalus*	X	X	X	X	SCP II	BGEPA
Baltimore Oriole	*Icterus galbula*	Incidental	Incidental	-	N/A	-	-
Bank Swallow	*Riparia riparia*	X	Incidental	X	N/A	-	-
Barn Swallow	*Hirundo rustica*	X	Incidental	X	N/A	-	-
Black Tern	*Chlidonias niger*	Incidental	Incidental	X	N/A	SCP I	-
Black-and-White Warbler	*Mniotilta varia*	Incidental	N/A	-	N/A	-	-
Black-bellied Plover	*Pluvialis squatarola*	Incidental	N/A	-	N/A	-	-
Black-crowned Night-Heron*	*Nycticorax nycticorax*	-	Incidental	-	N/A	-	-
Blackpoll Warbler	*Setophaga striata*	Incidental	N/A	-	N/A	-	-

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Appendix C. Species Observed during Eagle Use and Diurnal Avian Use Surveys

Common Name	Scientific Name	Season[a]				Conservation Listing Status	
		Spring	Summer	Fall	Winter	State Status[b]	Federal Status[c]
Blue Jay	*Cyanocitta cristata*	X	N/A	X	Incidental	-	-
Blue-winged Teal	*Spatula discors*	X	Incidental	X	N/A	-	-
Bobolink	*Dolichonyx oryzivorus*	X	Incidental	X	N/A	SCP II	-
Brewer's Blackbird	*Euphagus cyanocephalus*	X	Incidental	X	N/A	-	-
Broad-winged Hawk	*Buteo platypterus*	-	-	X	-	-	-
Brown Thrasher	*Toxostoma rufum*	-	Incidental	X	N/A	-	-
Brown-headed Cowbird	*Molothrus ater*	X	Incidental	X	N/A	-	-
Bufflehead	*Bucephala albeola*	Incidental	N/A	-	N/A	-	-
Burrowing Owl*	*Athene cunicularia*	-	N/A	Incidental	N/A	SCP II	-
Cackling Goose	*Branta hutchinsii*	X	N/A	-	N/A	-	-
California Gull	*Larus californicus*	X	Incidental	X	N/A	-	-
Canada Goose	*Branta canadensis*	X	Incidental	X	N/A	-	-
Canvasback	*Aythya valisineria*	-	Incidental	-	N/A	SCP II	-
Cattle Egret	*Bubulcus ibis*	Incidental	N/A	-	N/A	-	-
Cedar Waxwing	*Bombycilla cedrorum*	-	N/A	X	N/A	-	-
Chestnut-collared Longspur	*Calcarius ornatus*	X	Incidental	X	N/A	SCP I	-
Chipping Sparrow	*Spizella passerina*	-	Incidental	X	N/A	-	-
Clay-colored Sparrow	*Spizella pallida*	X	Incidental	X	N/A	-	-
Cliff Swallow	*Petrochelidon pyrrhonota*	X	Incidental	X	N/A	-	-
Common Goldeneye	*Bucephala clangula*	Incidental	N/A	-	N/A	-	-
Common Grackle	*Quiscalus quiscula*	X	Incidental	X	N/A	-	-
Common Merganser	*Mergus merganser*	Incidental	N/A	-	N/A	-	-
Common Nighthawk	*Chordeiles minor*	-	N/A	X	N/A	-	-
Common Raven	*Corvus corax*	-	N/A	X	N/A	-	-

Appendix C. Species Observed during Eagle Use and Diurnal Avian Use Surveys

Common Name	Scientific Name	Season[a]				Conservation Listing Status	
		Spring	Summer	Fall	Winter	State Status[b]	Federal Status[c]
Common Yellowthroat	*Geothlypis trichas*	-	Incidental	-	N/A	-	-
Cooper's Hawk	*Accipiter cooperii*	-	-	X	-	-	-
Dark-eyed Junco	*Junco hyemalis*	X	N/A	-	N/A	-	-
Dickcissel	*Spiza americana*	-	Incidental	-	N/A	SCP II	-
Double-crested Cormorant	*Phalacrocorax auritus*	-	Incidental	X	N/A	-	-
Downy Woodpecker*	*Dryobates pubescens*	-	Incidental	-	N/A	-	-
Eastern Bluebird	*Sialia sialis*	X	Incidental	-	N/A	-	-
Eastern Kingbird	*Tyrannus tyrannus*	X	Incidental	X	N/A	-	-
Eurasian Collared-Dove*	*Streptopelia decaocto*	-	N/A	-	Incidental	-	
European Starling	*Sturnus vulgaris*	X	Incidental	X	N/A	-	-
Ferruginous Hawk	*Buteo regalis*	X	X	X	-	SCP I	-
Forster's Tern	*Sterna forsteri*	Incidental	Incidental	-	N/A	-	-
Franklin's Gull	*Leucophaeus pipixcan*	X	Incidental	X	N/A	SCP I	-
Gadwall	*Mareca strepera*	X	Incidental	X	N/A	-	-
Golden Eagle	*Aquila chrysaetos*	X	-	X	X	SCP II	BGEPA
Grasshopper Sparrow	*Ammodramus savannarum*	X	Incidental	X	N/A	SCP I	-
Gray Catbird	*Dumetella carolinensis*	X	N/A	X	N/A	-	-
Gray Partridge	*Perdix perdix*	Incidental	Incidental	Incidental	N/A	-	-
Gray-cheeked Thrush	*Catharus minimus*	Incidental	N/A	-	N/A	-	-
Great Blue Heron	*Ardea herodias*	-	N/A	X	N/A	-	-
Great Egret	*Ardea alba*	Incidental	Incidental	-	N/A	-	-
Great Horned Owl	*Bubo virginianus*	X	-	-	X	-	-
Greater White-fronted Goose	*Anser albifrons*	X	N/A	X	N/A	-	-
Greater Yellowlegs	*Tringa melanoleuca*	-	N/A	X	N/A	-	-

Appendix C. Species Observed during Eagle Use and Diurnal Avian Use Surveys

Common Name	Scientific Name	Season[a]				Conservation Listing Status	
		Spring	Summer	Fall	Winter	State Status[b]	Federal Status[c]
Green-winged Teal	*Anas crecca*	-	Incidental	X	N/A	-	-
Hairy Woodpecker	*Dryobates villosus*	-	N/A	X	Incidental	-	-
Harris's Sparrow	*Zonotrichia querula*	X	N/A	-	N/A	-	-
Horned Grebe	*Podiceps auritus*	X	Incidental	-	N/A	SCP I	-
Horned Lark	*Eremophila alpestris*	X	Incidental	X	Incidental	-	-
House Finch	*Haemorhous mexicanus*	-	Incidental	-	N/A	-	-
House Sparrow	*Passer domesticus*	X	Incidental	X	N/A	-	-
House Wren	*Troglodytes aedon*	X	Incidental	X	N/A	-	-
Killdeer	*Charadrius vociferus*	X	Incidental	X	N/A	-	-
Lapland Longspur	*Calcarius lapponicus*	X	N/A	X	Incidental	-	-
Lark Sparrow	*Chondestes grammacus*	Incidental	N/A	-	N/A	-	-
Least Flycatcher	*Empidonax minimus*	X	Incidental	-	N/A	-	-
Least Sandpiper	*Calidris minutilla*	-	Incidental	-	N/A	-	-
Lesser Scaup	*Aythya affinis*	X	Incidental	-	N/A	SCP II	-
Lesser Yellowlegs	*Tringa flavipes*	Incidental	Incidental	-	N/A	-	-
Lincoln's Sparrow	*Melospiza lincolnii*	-	N/A	X	N/A	-	-
Mallard	*Anas platyrhynchos*	X	Incidental	X	N/A	-	-
Marbled Godwit	*Limosa fedoa*	X	Incidental	-	N/A	SCP I	-
Marsh Wren	*Cistothorus palustris*	-	Incidental	X	N/A	-	-
Merlin	*Falco columbarius*	X	-	X	-	-	-
Mourning Dove	*Zenaida macroura*	X	Incidental	X	N/A	-	-
Nelson's Sparrow	*Ammospiza nelsoni*	-	Incidental	-	N/A	SCP I	-
Northern Flicker	*Colaptes auratus*	X	Incidental	X	N/A	-	-
Northern Goshawk	*Accipiter gentilis*	-	-	X	X	-	-

Appendix C. Species Observed during Eagle Use and Diurnal Avian Use Surveys

Common Name	Scientific Name	Season[a]				Conservation Listing Status	
		Spring	Summer	Fall	Winter	State Status[b]	Federal Status[c]
Northern Harrier	*Circus hudsonius*	X	X	X	-	SCP II	-
Northern Pintail	*Anas acuta*	X	Incidental	-	N/A	SCP II	-
Northern Shoveler	*Spatula clypeata*	X	Incidental	X	N/A	-	-
Northern Shrike	*Lanius borealis*	X	N/A	-	N/A	-	-
Northern Waterthrush	*Parkesia noveboracensis*	Incidental	N/A	-	N/A	-	-
Orchard Oriole	*Icterus spurius*	X	Incidental	X	N/A	-	-
Palm Warbler	*Setophaga palmarum*	-	N/A	Incidental	N/A	-	-
Pectoral Sandpiper*	*Calidris melanotos*	-	Incidental	-	N/A	-	-
Peregrine Falcon	*Falco peregrinus*	Incidental	-	-	-	SCP III	-
Pied-billed Grebe	*Podilymbus podiceps*	X	Incidental	X	N/A	-	-
Pine Siskin	*Spinus pinus*	-	N/A	X	N/A	-	-
Prairie Falcon	*Falco mexicanus*	-	-	X	-	SCP II	-
Purple Martin	*Progne subis*	-	N/A	X	N/A	-	-
Red Crossbill*	*Loxia curvirostra*	-	N/A	Incidental	N/A	-	-
Redhead	*Aythya americana*	X	N/A	-	N/A	-	-
Red-headed Woodpecker	*Melanerpes erythrocephalus*	-	Incidental	Incidental	N/A	SCP I	-
Red-necked Phalarope	*Phalaropus lobatus*	X	N/A	-	N/A	-	-
Red-tailed Hawk	*Buteo jamaicensis*	X	X	X	-	-	-
Red-winged Blackbird	*Agelaius phoeniceus*	X	Incidental	X	N/A	-	-
Ring-billed Gull	*Larus delawarensis*	X	N/A	-	N/A	-	-
Ring-necked Pheasant	*Phasianus colchicus*	X	Incidental	X	Incidental	-	-
Rock Pigeon	*Columba livia*	X	Incidental	X	Incidental	-	-
Rose-breasted Grosbeak	*Pheucticus ludovicianus*	Incidental	N/A	-	N/A	-	-
Ross's Goose	*Anser rossii*	X	N/A	X	N/A	-	-

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Appendix C. Species Observed during Eagle Use and Diurnal Avian Use Surveys

Common Name	Scientific Name	Season[a]				Conservation Listing Status	
		Spring	Summer	Fall	Winter	State Status[b]	Federal Status[c]
Rough-legged Hawk	*Buteo lagopus*	X	-	X	-	-	-
Ruddy Duck	*Oxyura jamaicensis*	X	N/A	-	N/A	-	-
Sandhill Crane	*Antigone canadensis*	Incidental	N/A	Incidental	N/A	-	-
Savannah Sparrow	*Passerculus sandwichensis*	X	Incidental	X	N/A	-	-
Say's Phoebe	*Sayornis saya*	X	N/A	-	N/A	-	-
Sedge Wren	*Cistothorus platensis*	-	Incidental	X	N/A	-	-
Semipalmated Sandpiper	*Calidris pusilla*	-	Incidental	-	N/A	-	-
Sharp-shinned Hawk	*Accipiter striatus*	-	-	X	-	-	-
Sharp-tailed Grouse	*Tympanuchus phasianellus*	X	Incidental	X	Incidental	SCP II	-
Snow Bunting	*Plectrophenax nivalis*	X	N/A	X	Incidental	-	-
Snow Goose	*Anser caerulescens*	X	N/A	X	N/A	-	-
Snowy Owl	*Bubo scandiacus*	-	-	-	X	-	-
Solitary Sandpiper	*Tringa solitaria*	-	Incidental	-	N/A	-	-
Song Sparrow	*Melospiza melodia*	X	Incidental	X	N/A	-	-
Sora	*Porzana carolina*	X	Incidental	X	N/A	-	-
Spotted Sandpiper*	*Actitis macularius*	-	Incidental	-	N/A	-	-
Sprague's Pipit	*Anthus spragueii*	-	Incidental	Incidental	N/A	SCP I	-
Swainson's Hawk	*Buteo swainsoni*	X	X	X	-	SCP I	-
Swainson's Thrush	*Catharus ustulatus*	X	N/A	-	N/A	-	-
Swamp Sparrow	*Melospiza georgiana*	-	Incidental	-	N/A	-	-
Tree Swallow	*Tachycineta bicolor*	X	Incidental	-	N/A	-	-
Tundra Swan	*Cygnus columbianus*	-	N/A	Incidental	N/A	-	-
Turkey Vulture	*Cathartes aura*	X	X	X	-	-	-
Upland Sandpiper	*Bartramia longicauda*	X	Incidental	-	N/A	SCP II	-

Appendix C. Species Observed during Eagle Use and Diurnal Avian Use Surveys

Common Name	Scientific Name	Season[a]				Conservation Listing Status	
		Spring	Summer	Fall	Winter	State Status[b]	Federal Status[c]
Veery	*Catharus fuscescens*	Incidental	N/A	-	N/A	-	-
Vesper Sparrow	*Pooecetes gramineus*	X	Incidental	X	N/A	-	-
Warbling Vireo	*Vireo gilvus*	-	Incidental	-	N/A	-	-
Western Kingbird	*Tyrannus verticalis*	X	Incidental	X	N/A	-	-
Western Meadowlark	*Sturnella neglecta*	X	Incidental	X	N/A	SCP II	-
White-breasted Nuthatch*	*Sitta carolinensis*	-	N/A	Incidental	N/A	-	-
White-crowned Sparrow	*Zonotrichia leucophrys*	X	N/A	-	N/A	-	-
White-faced Ibis	*Plegadis chihi*	-	Incidental	-	N/A	-	-
White-throated Sparrow	*Zonotrichia albicollis*	-	N/A	X	N/A	-	-
Whooping Crane	*Grus americana*	X	N/A	-	N/A	SCP III	FE
Willet	*Tringa semipalmata*	Incidental	Incidental	Incidental	N/A	SCP II	-
Willow Flycatcher	*Empidonax traillii*	-	Incidental	-	N/A	-	-
Wilson's Phalarope	*Phalaropus tricolor*	X	Incidental	-	N/A	SCP I	-
Wilson's Snipe	*Gallinago delicata*	X	Incidental	-	N/A	-	-
Wood Duck*	*Aix sponsa*	-	Incidental	-	N/A	-	-
Yellow Warbler	*Setophaga petechia*	X	Incidental	X	N/A	-	-
Yellow-headed Blackbird	*Xanthocephalus xanthocephalus*	X	Incidental	X	N/A	-	-
Yellow-rumped Warbler	*Setophaga coronata*	-	Incidental	X	N/A	-	-

[a] An "X" within a particular seasonal column indicates that species has been detected at least once within the project area over the course of standardized field studies. Non-raptor species generally receive an "N/A" in summer and winter as standardized surveys were only conducted for raptors during these seasons. However, species marked with "Incidental" indicate that the species was observed incidentally within the project area during the season.

[b] State conservation listing status indicates North Dakota State Wildlife Action Plan (Dyke et al. 2015) Species of Conservation Priority (SCP) Level I, II, or III. Species marked with an asterisk (*) indicate that it was detected within the project incidentally only.

c Federal Status Codes: FE = Federally Endangered; BGEPA = Bald and Golden Eagle Protection Act

WHOOPING CRANE STOPOVER HABITAT ASSESSMENT

BADGER WIND PROJECT
LOGAN AND MCINTOSH COUNTIES, NORTH DAKOTA
REVISED

Prepared for

Badger Wind, LLC
401 N. Michigan Avenue
Suite 501
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Atwell Project No. 19000785

Submitted by Atwell, LLC

September 2021

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ACRONYMS AND ABBREVIATIONS

Atwell	Atwell, LLC
AWP	Aransas-Wood Buffalo Whooping Crane Subpopulation
amsl	above mean sea levelBadger Wind Badger Wind, LLC
GIS	geographic information system
HAPET	Habitat and Population Evaluation Team
km	kilometer(s)
m	meter(s)
NDGF	North Dakota Game and Fish Department
NLCD	National Land Cover Database
NWI	National Wetland Inventory
Ørsted	Ørsted Onshore North America, LLC
PUDL	Potential Undisturbed Layer
QA/QC	Quality Assurance / Quality Control
TWI	The Watershed Institute
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey

1 INTRODUCTION

Atwell, LLC (Atwell) was retained by Badger Wind, LLC (Badger Wind), a wholly-owned subsidiary of Ørsted Onshore North America, LLC (Ørsted), to conduct a desktop assessment evaluating the potential for Whooping Crane (*Grus americana*) to use the Badger Wind Project Area (the project area) as stopover habitat during seasonal spring and fall migrations. The project area is located in Logan and McIntosh counties, North Dakota (Figure 1).

Whooping Cranes use a variety of stopover habitats during migration. Stopover roost habitats include palustrine, lacustrine, and riverine wetlands. Stopover foraging habitats include grasslands and croplands, and foraging sites are often within 1.6 kilometers (km, or approximately one mile) of roost habitat (The Watershed Institute; TWI 2013; Austin and Richert 2005). The objectives of the assessment are to determine whether potentially suitable Whooping Crane stopover habitat is present within the project area and to compare this habitat to four reference areas adjacent to the project area.

The Whooping Crane is listed federally as an endangered species (U.S. Fish and Wildlife Service [USFWS] 2016). The Aransas/Wood Buffalo subpopulation (AWP) is the only self-sustaining population in existence (Urbanek and Lewis 2015) and was estimated at 505 individuals in 2017 (Devokaitis 2018). Whooping Cranes that constitute the AWP winter at locations in the Texas Gulf Coast, including the Aransas National Wildlife Refuge. In the spring, the subpopulation migrates northward to its nesting grounds at Wood Buffalo National Park in Alberta and the Northwest Territories of Canada, passing through North Dakota en route. Cranes return to Texas in the fall, following approximately the same pathway on both their northern and southern migrations. Whooping Cranes occur in North Dakota in the spring from April into May and in the fall from October into November.

Researchers have defined Whooping Crane migration corridors using accrued sightings reported by the public from 1942 to the present, including locations from telemetered birds between 2010 to 2016. The migration corridor has been delineated with 50%, 75%, and 95% core areas. The 95% core area (i.e., the area containing 95% of all recorded observations) averages 294 km (183 miles) in width (Pearse et al. 2018). The project area is located within the 75% migration corridor (Figure 1).

2 PROJECT AREA

The current project area boundary (December 2020) is depicted in Figure 1. The project area is approximately 57,097 acres, with approximately 46% of the area (26,000 acres) in McIntosh County and approximately 54% (31,098 acres) in Logan County. The general topography is undulating and rises from the west to the east, with elevations between 1,940 and 2,180 feet above mean sea level (amsl). The project area is predominately within the Missouri Coteau Slope Level IV Ecoregion, with portions of the eastern boundary extending upward into the Missouri Coteau Level IV Ecoregion (Bryce et al. 1996). The Missouri Coteau is an escarpment of glacial till containing numerous hills, small lakes, and poorly drained depressions that are referred to as "potholes" that receive most of their water from snow melt and precipitation (Bryce et al. 1996). The Missouri Coteau Slope descends westward toward the Missouri River from the Coteau and is characterized by a thinner glacial till layer and integrated drainages that flow toward the Missouri River (Clayton 1962).

According to the 2016 U.S. Geological Survey National Land Cover Database (National Land Cover Database [NLCD]; Yang et al. 2018), the project area is composed primarily of cultivated crops (46.2%) and herbaceous/grassland (44.9%) (Figure 2). Wetlands and open water cover 2.5% of the project area. Other land cover types found within the project area include developed areas (3.1% of the project area), pasture/hay (2.2%), shrub/scrub (1.2%), woodland forest (less than 0.1%), and barren land (less than 0.1%). It is noted that percentage totals exceed 100% due to rounding.

2.1 Reference Areas

As discussed in more detail in the Methods section (Section 3), , four reference areas of equal shape and dimension as the project area were established in each of the four cardinal directions, at equal distances from the project's centroid (referred to as the North, East, South, and West reference areas and as depicted on Figure 1). The reference areas were spaced to be adjacent to, but without overlapping, the project area. Due to the project boundary configuration and to avoid overlap, the West and East reference areas are slightly farther from the project boundary than the North and South reference areas (Figure 1). All of the reference areas are within the Missouri Coteau Slope and Missouri Coteau Level IV Ecoregions described above. Elevations and topography of the reference areas are similar to elevations and topography of the project area described above. Notable differences include a relatively greater amount of topographic relief in the West reference area due to the intrusion of dissected river break physiography associated with the Missouri River and a relatively lower amount of topographic relief due to the lower elevation outwash plain present in the East reference area. The East reference area is also within the Collapsed Glacial Outwash Level IV Ecoregion. The Collapsed Glacial Outwash Ecoregion is characterized by large, shallow, alkaline lakes. The West reference area is also within the River Breaks Level IV Ecoregion. The River Breaks ecoregion is characterized by broken terraces and

uplands surrounding the floodplains of the Missouri River and its major tributaries (Bryce et al. 1996).

3 METHODS

The Whooping Crane stopover habitat assessment was conducted using data sources and publicly available reports recommended by the USFWS and North Dakota Game and Fish Department (NDGF) during a January 28, 2020 agency meeting. The assessment follows a reference area-analysis approach and is consistent with the methodology used in other publicly available reports produced for wind energy facilities in North Dakota (Derby and Thorn 2018; WEST 2018; Chodachek 2019). The stopover habitat assessment was conducted in four steps:

1) Habitat Mapping - habitat mapping was completed to compare land cover between the project area and each of the four reference areas;

2) Potential Stopover Roosting Site Assessment - stopover wetland habitat was scored to compare availability of stopover habitat between the project area and each reference area using previously published wetland assessment methodology developed by TWI (TWI 2013);

3) Stopover Use Intensity - stopover site use intensity analysis was conducted using modeling outputs (Pearse et al. 2015) produced by the U.S Geological Survey (USGS) to compare stopover use intensity between the project area and each reference area; and

4) Probability of Habitat Use - probability of stopover habitat use in North and South Dakota modeled by the USFWS Habitat and Population Evaluation Team (HAPET) was used to compare each reference area using modeling outputs produced by Niemuth et al. (2018). The USFWS also furnished Atwell an unpublished, annually updated data set of opportunistically collected Whooping Crane sightings dating back to 1942. USFWS sightings data are not intended for public distribution but can be used to provide additional context for regional habitat and Whooping Crane use patterns.

3.1 HABITAT MAPPING

Desktop analysis was used to assess terrestrial and wetland habitat parameters within the project boundary and within surrounding reference areas using ArcMap 10.8.1 (ESRI 2020); land cover information from the NLCD (Yang et al. 2018) (Figure 2); wetland data from the USFWS National Wetland Inventory (USFWS 2019) (Figure 3); agricultural aerial imagery provided by the National Agriculture Imagery Program (U.S Department of Agriculture [USDA] 2018); and cropland coverage data from the potentially undisturbed lands (PUDL) assessment recently completed by the Prairie Pothole Joint Venture (Fields and Barnes 2019).

A site visit was not conducted to ground-truth the desktop analysis. However, Atwell has conducted ground-based avian use surveys at 53 fixed point count stations throughout the project area since May 2019, as well as aerial nesting raptor and grouse lek surveys throughout

the project area and surrounding biological survey buffer areas extending to ten miles (as part of surveys conducted between May 2019 through April 2020). Through these efforts, Atwell confirmed that desktop habitats are generally consistent with on-the-ground conditions observed as part of field studies.

3.2 POTENTIAL STOPOVER ROOSTING SITE ASSESSMENT

The stopover roosting wetland assessment methodology used for this report was developed by TWI (TWI 2013) and consists of: 1) elimination of unsuitable wetlands (wetlands considered not suitable as Whooping Crane stopover habitat) from consideration after screening all wetlands for conditions including size, proximity to human disturbance, and proximity to visual obstructions; 2) a score-based assessment of screened suitable wetlands that considers water regime, distance to food, wetland size, whether the wetland is natural or manmade, and wetland density (TWI 2013); and, 3) comparison of stopover wetland density, acreage, and favorability as Whooping Crane stopover roosting sites between the project area and reference areas.

3.3 STOPOVER USE INTENSITY

To map stopover use intensity, Pearse et al. (2015) used five years of migration stopover data provided by radio-tagged Whooping Cranes to categorize 20 km^2 (7.72 $miles^2$) grid cells throughout the migration pathway by number of stopover sites and duration of time spent at stopover locations.

Grid cells were classified from low to high stopover intensity as unoccupied, low intensity, core intensity, and extended-use core intensity (Pearse et al. 2015). Unoccupied grid cells have no evidence of Whooping Crane use. Low intensity grid cells have at least one stopover site, with low duration of time spent at the site(s). Core intensity cells have a density of stopover sites below calculated stopover volume, which is a measure of duration of use. Core intensity cells also have a lower density of crane days, an additional metric of stopover intensity, than extended-use core intensity cells. Extended-use core intensity cells have density of stopover sites below calculated stopover volume and have the highest volume of crane days.

The project area and reference areas were overlaid atop grid classifications. Coverage values were calculated for each stopover use intensity class for the project area and for each reference area.

3.4 PROBABILITY OF HABITAT USE

Niemuth et al. (2018) created a predictive model and map showing relative probability of Whooping Crane habitat use during migration through North and South Dakota. In this model, Whooping Crane stopover habitat selection is influenced by land cover and by wetland

characteristics including water regime, size, water depth, and proximity to food resources and other wetland habitats nearby (TWI 2013; Niemuth et al. 2018).

The predictive model was generated using historic Whooping Crane stopover data for the Whooping Crane migration corridor and was combined with high resolution landscape data. Model outputs were used to produce a relative probability of habitat use map for North and South Dakota. Researchers then divided this map into deciles of ten equal-area bins, or classes, to rank probability of use across the two states. Areas with decile values of 1 have the lowest probability of use while areas with decile values of 10 have the highest probability of Whooping Crane use. The project area and reference areas were overlaid atop decile values and coverage values were calculated for each decile class for the project area and for the four reference areas.

4 RESULTS

4.1 HABITAT MAPPING

The project area contains more cultivated cropland and less grassland/herbaceous cover than surrounding reference areas (Table 1). Cover values for other terrestrial land cover classifications were similar between the project area and the reference areas.

Cultivated Cropland

The project area has a comparable amount of cultivated cropland (26,362.1 acres, or 46.2% of the project area) to each of the four reference areas. Cultivated cropland within reference areas ranged from 16,573.2, or 33.9% for the North reference area to 35,070.5 acres, or 52.1% for the South reference area.

Grassland/Herbaceous

The project area has a comparable amount of grassland and herbaceous cover (25,622.6 acres, or 44.9% of the project area) to each of the four reference areas. Grassland and herbaceous cover within reference areas ranged from 15,194.5 acres or 38.0% for the South reference area to 31,292.7 acres or 49% for the North reference area.

Wetlands/Waters

The project area had less wetlands/waters compared to the four reference areas, with less than 2.36% or 2,872.7 acres within the project area comprised of wetlands/waters. Wetlands/waters within the reference areas ranged from 3,006.7 acres or 2.47% for the West reference area to 18,283.2 acres or 15.0% for the East reference area. The East and North reference areas had the highest wetlands / waters habitat.

4.2 POTENTIAL STOPOVER ROOSTING SITE ASSESSMENT

Wetland density within the project area increases moving from west to east and from the south to north in Logan and McIntosh counties as the topography rises from the Missouri Coteau Slope eastward into the Missouri Coteau (Figure 3). The project area and West reference area are located predominately within the Missouri Coteau Slope, and they have similar low percentages of wetland coverage. The North, East, and South reference areas extend further into the Missouri Coteau and the wetland compositions of these three reference areas are higher than that of the project area. The project area and the West reference area have less wetland acreage (2,297.9 acres and 1,943.6 acres respectively) than the North (7,324.0 acres), East (7,724.5 acres) and South (3,831.7 acres) reference areas, respectively (Table 2).

Riverine wetlands associated with the integrated drainages of the Missouri Coteau Slope were more numerous within the project area and West reference area (394.3 acres and 377.1 acres respectively) than in the North, East, and South reference areas (83.81 – 95.7 acres, Table 2), indicting that wetlands in these areas are more commonly associated with linear water features (such as streams). Conversely, freshwater emergent wetlands covered more acreage in the North, East, and South reference areas (3,652.5 – 6,398.0 acres) than in the project area (1,824.2 acres) and West reference area (1,477.6 acres, Table 2), indicating that wetlands in these areas are more commonly associated with other topographic features, including pothole areas.

Potential Roosting Habitat Scoring Assessment

The project area includes 370 wetland basins that passed initial wetland screening to be subsequently processed using the TWI score-based assessment to evaluate their potential as stopover roosting habitat. Wetlands that passed the wetland screening are hereafter referred to as "screened wetlands". These screened wetlands cover approximately 955.0 acres of the project area (Table 3a). The project holds fewer screened wetland basins with less acreage than each of the reference areas. The total number of screened wetlands in reference areas ranged from 460 in the West reference area to 1,603 in the East reference area (Table 3a). Screened wetland habitat acreage in the reference areas ranged from 1,406.1 acres in the West reference area to 5,587.2 acres in the East reference area. Mean screened wetland size in the project area was 2.6 acres. This is also smaller than mean screened wetland sizes for the four reference areas (which had mean scored wetland sizes ranging from 3.0 acres in the North reference area to 3.5 acres in the East reference area).

As noted earlier, the wetland scoring system developed by TWI scores potential roosting habitat based on criteria such as water regime, distance to food, wetland size, whether the wetland is natural or manmade, and wetland density (TWI 2013). Mean wetland assessment scores for the project area and surrounding reference areas for screened wetlands ranged from 10.7 – 12.8 out of a total possible score of 20 (Table 3a). Mean assessment scores were highest in the East and North reference areas, which extend into the Missouri Coteau. Screened wetlands within the project area held a mean score of 10.7.

Stopover roosting habitat scores derived from this methodology have been truthed with roosting Whooping Crane observations at Quivira National Wildlife Refuge in Kansas. TWI researchers used stopover roosting data gathered from Whooping Cranes sightings to determine that wetlands with cumulative scores of at least 12 qualified as potentially suitable stopover roosting habitat (TWI 2013). Project area and reference area wetlands with cumulative assessment scores of at least 12 are summarized in Table 3b.

The project area holds 114 wetlands that are potential stopover roosting habitat with assessment scores of at least 12. The project area has a lower number of potential roosting habitat wetlands

than each of the four reference areas (Table 3b). Surrounding reference areas contain a range of 177 potential roosting habitat wetlands within the West reference area to 1,240 potential roosting habitat wetlands within the East reference area. Potential roosting habitat wetlands also cover a smaller portion of the project area (744.3 acres) than each of the reference areas (1,116.3 in the West reference area to 5,306.7 acres in the East reference area).

4.3 STOPOVER USE INTENSITY

Whooping Crane stopover use intensity generally increases moving westward from the project area toward the migration corridor's centerline (Figure 4). In the case of the project area, even though relatively higher quality stopover habitat exists to the north and east of the project area, these reference areas are also to the east of the portion of the Whooping Crane migration corridor that encompasses a higher density of recorded historic stopovers.

The project area and reference areas do not contain any lands classified as extended use core intensity, which is the classification representing highest use (Figure 4). The project area and surrounding reference areas are located in an area generally classified as low intensity use (Tables 4a and 4b). The low intensity classification is described in Pearse et al. (2015) as a classification containing grid cells with Whooping Crane stopovers, but whose ratio of total Whooping Crane observation days to total stopovers was not as high as ratios found in core intensity cells.

4.4 PROBABILITY OF HABITAT USE

The USFWS HAPET found that the best supported model indicated that Whooping Crane occurrence was positively associated with wetland area, wetland variety, cropland area, and road density (reflecting the opportunistic nature of Whooping Crane sightings). Whooping Crane occurrence was negatively associated with distance to the migration corridor's centerline, number of wetlands, and terrain roughness. Areas included with the highest decile rankings best fit these parameters and have the highest probability of use.

As with stopover use intensity (Section 4.3), probability of Whooping Crane habitat use modeled by the USFWS HAPET (Niemuth et al. 2018) also increases moving westward from the project area toward the migration corridor's centerline (Figure 5). On an east to west axis, the decile ranking with highest probability of use (depicted in red in Figure 5) covers approximately 3.5% of the East reference area, increases to cover 4.4% of the project area, then further increases to cover 13.5% of the West reference area (Tables 5a and 5b).

5 DISCUSSION

This desktop analysis assesses the likelihood that Whooping Cranes will use the project area for stopover habitat by using methodologies that consider both stopover roosting and foraging

requirements of Whooping Cranes. The results of this analysis generally confirm that on a regional basis, and in comparison to four reference areas adjacent to the project area, the project area has been sited in an area that has relatively lower quality and quantity Whooping Crane stopover habitat. The Project Area is primarily comprised of croplands, has the relatively lowest portion of wetland and water habitat, and is located in the 75th percentile of the Whooping Crane migration corridor. Areas to the west (which is located in the 50th percentile migration corridor) and to the north and east (which have a relatively higher percentage of wetlands and waters) have relatively more potentially suitable Whooping Crane stopover habitat.

Considering land cover alone, the project area has equal or more cropland than the surrounding reference areas. Cropland habitat is present throughout the project area but is found in highest density in the project area and to the south and west, on the Missouri Coteau Slope. The project area has a similar amount of herbaceous grassland cover as the reference areas. Grassland cover is more prevalent north of the project area and less prevalent south of the project area. Wetlands are present throughout the project area but are found in highest densities on the Missouri Coteau to the east, north, and south of the project area.

USFWS HAPET analyzed probability of habitat use and found that Whooping Crane occurrence was positively associated with wetland area, wetland variety, cropland area, and road density. Whooping Crane occurrence was negatively associated with distance to the migration corridor centerline, wetland density, distance to areas of increased survey effort, and terrain roughness (Niemuth et al. 2018). Importantly, the best-supported habitat use model also was positively influenced by interactions of wetland area and wetland density; and by interactions of wetland area, cropland area, and distance to the centerline of the migration corridor. Red-shaded areas in Figure 5 encompass the highest modeled probability of Whooping Crane habitat use that best captures relationships between the parameters that are listed above.

The project area appears to have a greater probability of use than much of the East reference area, which lies farther from the migration corridor's center line but within the 95% migration corridor band. The project area is modeled to generally have a lower probability of use than the South and West reference areas. The project area also includes a lower number of potentially suitable stopover roosting sites with an assessment score of at least 12 out of 20 (Table 3b) than each of the four reference areas, and that the North and East reference areas on the Missouri Coteau hold notably more wetlands with assessment scores of at least 12 than the project area. Stopover wetland habitat scoring suggests that the project area has a lower potential to host roosting Whooping Cranes during stopovers than the surrounding reference areas because it holds a smaller number of high-scoring wetland basins as well as less acreage of high-scoring wetland basins than the surrounding reference areas.

The project area and reference areas tended to contain low intensity use areas or areas left unclassified by this system due to a lack of evidence of use, and only the South reference area contained any areas that were classified as core use (Pearse et al. 2015). The South reference area had the highest modeled stopover use intensity, the North and West reference areas were comparable in stopover use intensity to the project area, and the East reference area had the lowest modeled stopover use intensity. The closest areas with the highest stopover use intensity classification were approximately 30 miles (48 km) to the northwest of the project area, near the Missouri River and Lake Oahe. The closest core use cell (the second highest use intensity classification), was approximately 22 miles (35 km) south of the project area, near the town of Ventura (Figure 4).

Whooping Crane Observations

An unpublished Whooping Crane sighting data set curated by the USFWS contains only one record for the study area (specifically within the West reference area).

On April 15, 2020, an Atwell biologist incidentally observed three adult Whooping Cranes within the project area. This observation is the first known occurrence of Whooping Cranes within the project area. The Whooping Cranes were observed foraging in agricultural areas (corn fields) throughout the day, approximately four miles northwest of Wishek, North Dakota. Of note, due to poor harvesting conditions during the fall of 2019, the Whooping Cranes were foraging in unharvested stands of corn. The Atwell biologist noted at the time of observation that there are many other areas of unharvested corn within the project area, perhaps dispersing Whooping Crane stopover use farther from the migration corridor's centerline than expected.

Their stopover roosting location was not obtained on April 15. The Whooping Cranes were again present on April 16 and 17, and they were observed heading to roost near dusk approximately 0.7 miles (1,120 meters [m]) from their foraging location on the April 16 and 17. The roosting location is at the confluence of two riverine wetlands with seasonally flooded water regime classifications within the project area. The location is depicted by the yellow icon on Figure 5. Wetland density is not high at this location, with two NWI-delineated wetlands present within the one-mile section block. The roost is within a low stopover use intensity grid cell. It is within the second-highest probability of habitat use decile. The Whooping Cranes may have been attracted to the area of unharvested corn where they foraged and then to a roost site near this foraging area. During future operations, Whooping Cranes would be expected to generally avoid wind turbines. However, a potential consideration would be to limit areas within the project area with unharvested crops to avoid attracting Whooping Cranes into the project area to forage.

6 REFERENCES

Austin J, Richert A. 2005. Patterns of habitat use by Whooping Cranes during migration: Summary from 1977-1999 site evaluation data. [accessed 2012 Oct 11]. http://digitalcommons.unl.edu/usgsnpwrc/6/.

Bryce SA, Omernik JM, Pater DA, Ulmer M, Schaar J, Freeouf J, Johnson P, Kuck P, Azevedo SH. 1996. Ecoregions of North Dakota and South Dakota. Reston, Virginia: U.S. Geological Survey.

Chodachek K. 2019. Whooping Crane migration habitat assessment: Ruso Wind Project, McHenry and Ward counties, North Dakota. Final report. Prepared for Ruso Wind Partners LLC. Bismarck (ND): Western EcoSystems Technology Inc.

Clayton L. 1962. Glacial Geology of Logan and McIntosh Counties North Dakota. Grand Forks, North Dakota: North Dakota Geological Survey Report No.: Bulletin 37. https://www.dmr.nd.gov/ndgs/documents/outofprint/Bulletins/Bulletin%2037.pdf.

Derby CE, Thorn TD. 2018. Whooping crane habitat review: Emmons-Logan Wind Energy Center and 230 kV transmission line, Emmons and Logan counties, North Dakota. Bismarck (ND). http://www.psc.nd.gov/database/documents/18-0280/023-010.pdf.

Devokaitis M. 2018. Whooping crane population hits historic high in 2018. All About Birds - Cornell Lab of Ornithology. https://www.allaboutbirds.org/news/whooping-crane-population-hits-historic-high-in-2018/.

ESRI. 2020. ArcGIS Desktop: release 10.8.1. Redlands (CA): Environmental Research Systems Institute.

Fields S, Barnes K. 2019. Grassland Assessment of North American Great Plains Migratory Bird Joint Ventures. Prairie Pothole Joint Venture.

Niemuth ND, Ryba AJ, Pearse AT, Kvas SM, Brandt DA, Wangler B, Austin JE, Carlisle MJ. 2018. Opportunistically collected data reveal habitat selection by migrating Whooping Cranes in the U.S. Northern Plains. The Condor. 120(2):343–356. doi:10.1650/CONDOR-17-80.1. [accessed 2018 Apr 23]. http://www.bioone.org/doi/10.1650/CONDOR-17-80.1.

Pearse AT, Brandt DA, Harrell WC, Metzger KL, Baasch DM, Hefley TJ. 2015. Whooping Crane Stopover Site Use Intensity within the Great Plains (Open-File Report 2015–1166). Reston, Virginia: US Geological Survey. http://dx.doi. org/10.3133/ofr20151166.

Pearse AT, Rabbe M, Juliusson LM, Bidwell MT, Craig-Moore L, Brandt DA, Harrell W. 2018. Delineating and identifying long-term changes in the whooping crane (*Grus americana*) migration corridor. PLoS ONE. 13(2):e0192737.

TWI [The Watershed Institute Inc]. 2013. Potentially suitable habitat assessment for the Whooping Crane (*Grus americana*). Topeka, Kansas.

Urbanek RP, Lewis JC. 2015. Whooping Crane (*Grus americana*). Poole A, editor. http://bna.birds.cornell.edu/bna/species/153/articles/migration?searchterm=whooping%20crane.

USDA [United States Department of Agriculture]. 2018. NAIP imagery. Farm Service Agency. https://www.fsa.usda.gov/programs-and-services/aerial-photography/imagery-programs/naip-imagery/.

USFWS [U.S. Fish and Wildlife Service]. 2016. Species Profile for Whooping crane *(Grus americana)*. ECOS: Environmental Conservation Online System. https://ecos.fws.gov/ecp0/profile/speciesProfile?spcode=B003.

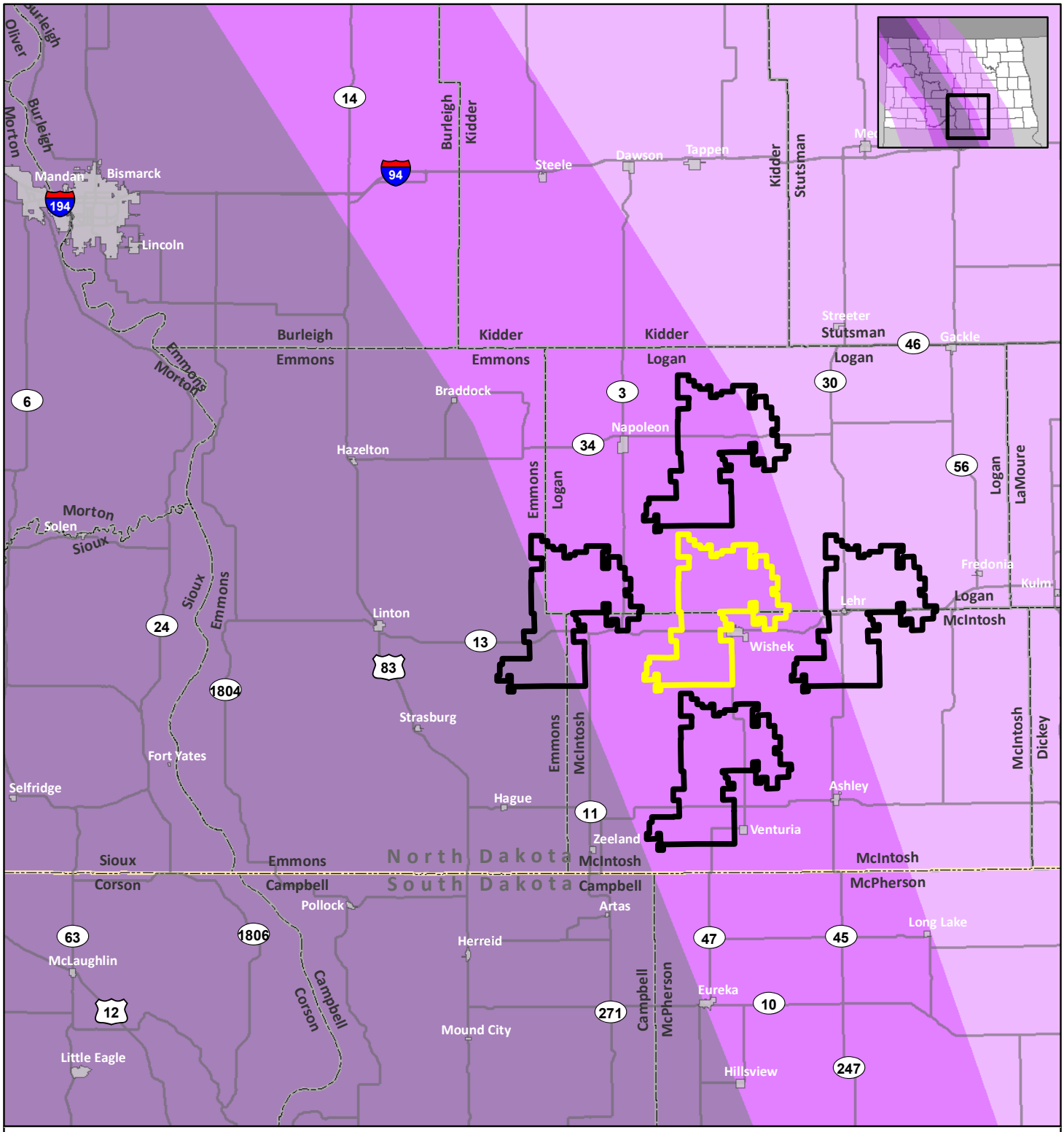
USFWS [U.S. Fish and Wildlife Service]. 2019. National Wetlands Inventory [NWI]. US Fish and Wildlife Service - NWI Wetland Mapper. http://www.fws.gov/wetlands/Data/Mapper.html.

WEST [Western EcoSystems Technology Inc]. 2018. Whooping crane habitat analysis: Aurora Wind Energy Project, Williams County, North South Dakota. Final report. Prepared for Aurora Wind Energy LLC. Bismarck (ND). http://www.psc.nd.gov/database/documents/18-0352/007-010.pdf.

Yang L, Jin S, Danielson P, Homer C, Gass L, Bender SM, Case A, Costello C, Dewitz J, Fry J, et al. 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. https://www.fs.fed.us/nrs/pubs/jrnl/2018/nrs_2018_yang-l_001.pdf.

FIGURES

BW Exhibit 28



Whooping Crane Migration Corridor (USFWS)
- 50%
- 75%
- 95%

- Project Area (12/4/2020, ~57,097 acres)
- Reference Areas

- Road
- Town/Village
- County
- State

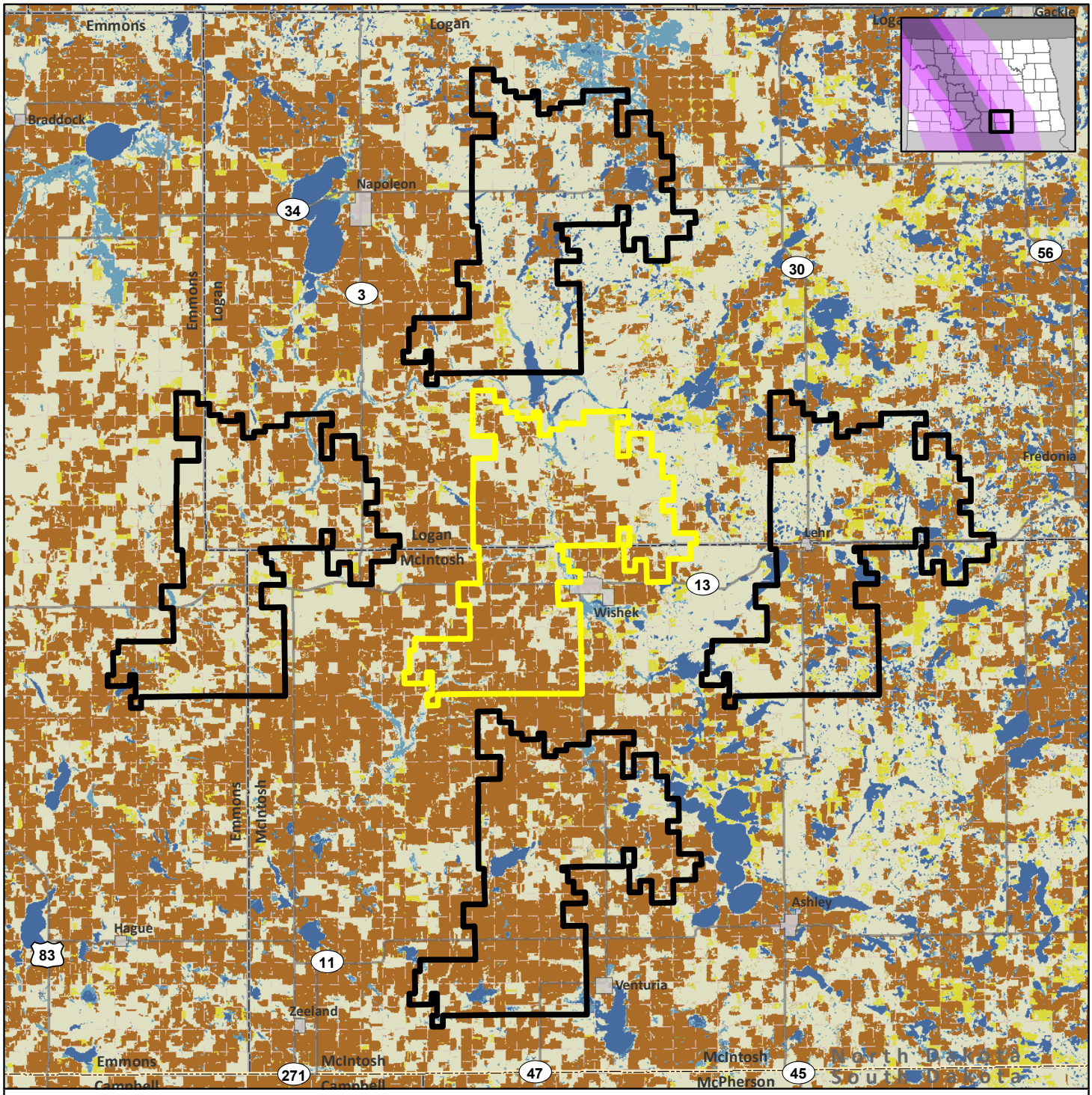
0 10 Miles

ATWELL

Whooping Crane Habitat Assessment
Badger Wind
19000785
March 09, 2021

Figure 1
Project Area and Reference Areas
North Dakota

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0 6
Miles

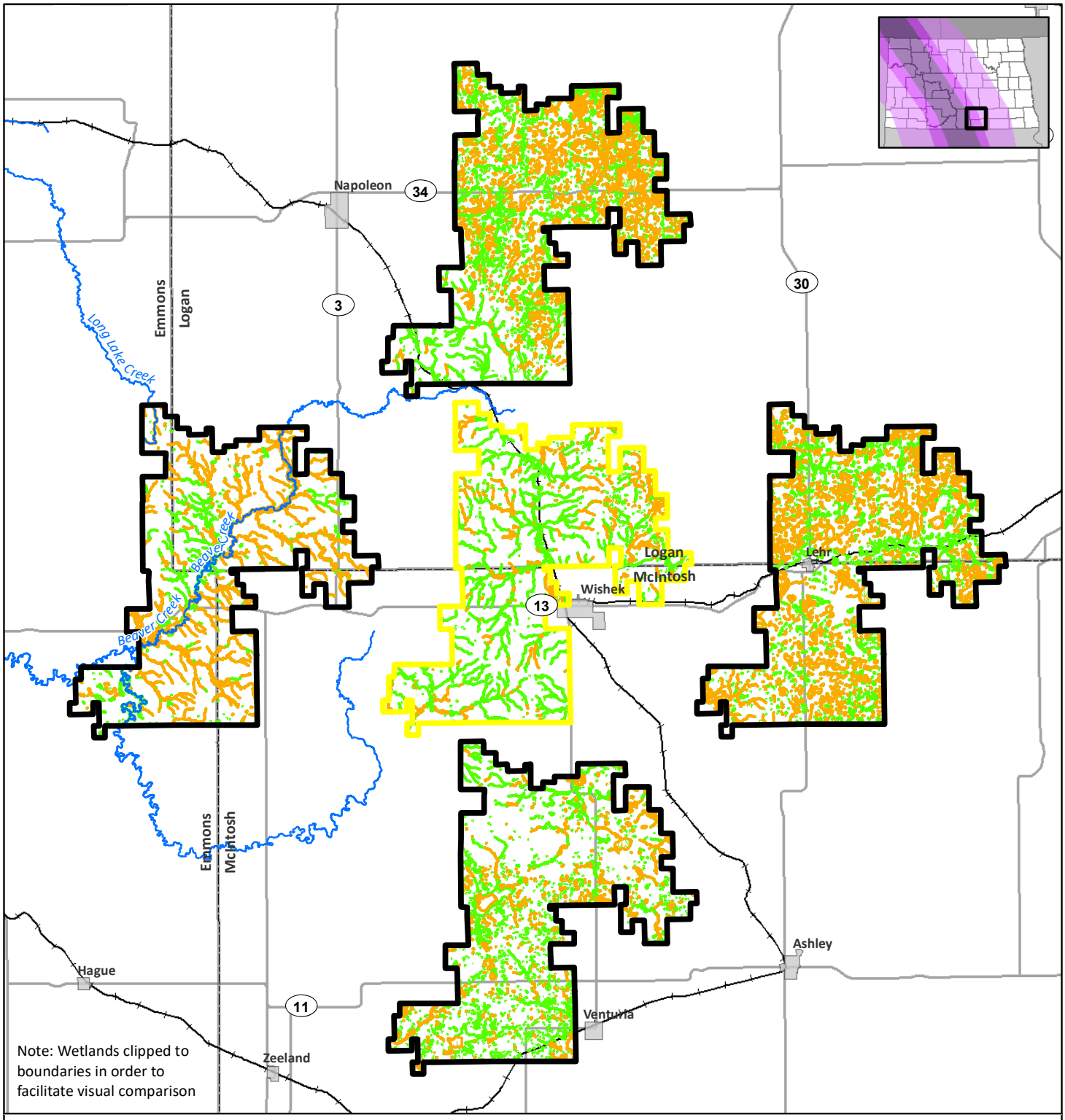
ATWELL

Whooping Crane Habitat Assessment
Badger Wind
19000785
March 09, 2021

Figure 2
NLCD Land Cover Classification
North Dakota

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BW Exhibit 28



Major Watercourse (NHD)
Wetland (Screened)
Wetland (NWI)

Whooping Crane Migration Corridor (USFWS)
50%
75%
95%

Project Area (12/4/2020, ~57,097 acres)
Reference Areas

Road
Railroad
County

0 6
Miles

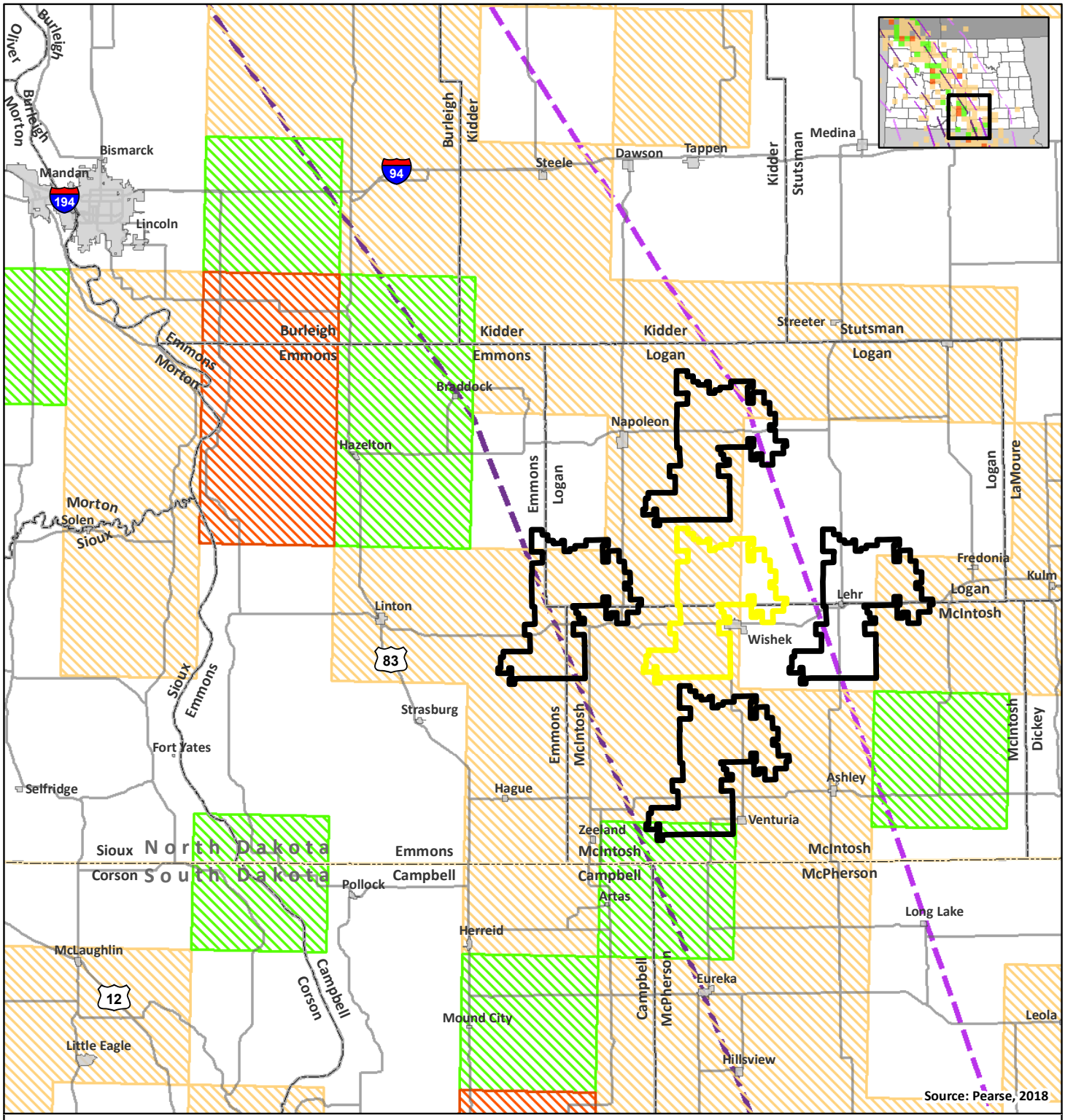
ATWELL

Whooping Crane Habitat Assessment
Badger Wind
19000785
March 10, 2021

Figure 3
NWI Wetlands
North Dakota

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BW Exhibit 28



Whooping Crane Stop Over Intensity
- Extended Use Core
- Core
- Low
- Unoccupied

Whooping Crane Migration Corridor (USFWS)
- 50%
- 75%
- 95%

- Project Area (12/4/2020, ~57,097 acres)
- Reference Areas

- Road
- Town/Village
- County
- State

0 10 Miles

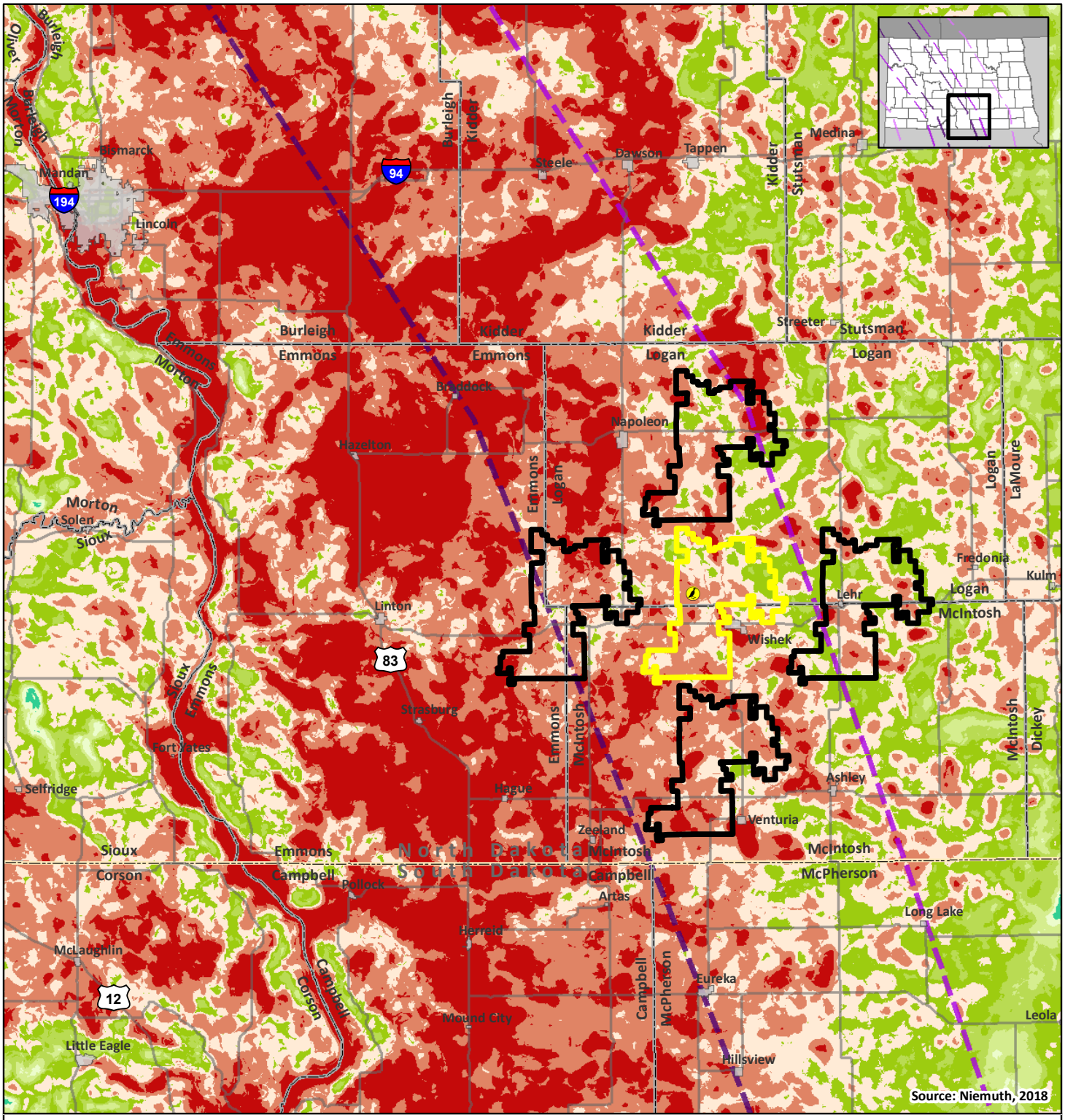
ATWELL

Whooping Crane Habitat Assessment
Badger Wind
19000785
March 09, 2021

Figure 4
Whooping Crane Stopover Use Intensity
North Dakota

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BW Exhibit 28



Whooping Crane Probability of Use
- High (10)
- High (9)
- High (8)
- Medium (7)
- Medium (6)
- Medium (5)
- Medium (4)
- Low (3)
- Low (2)

Whooping Crane Migration Corridor (USFWS)
- 50%
- 75%
- 95%

- Whooping Crane Sighting (April 2020)
- Project Area (12/4/2020, ~57,097 acres)
- Reference Areas
- Road
- Town/Village
- County
- State

0 10 Miles

ATWELL

Whooping Crane Habitat Assessment
Badger Wind
19000785
March 09, 2021

Figure 5
Whooping Crane Probability of Landscape-level Habitat Use
North Dakota

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TABLES

Table 1. NLCD Land Cover Classification

	Project		East		North		South		West	
Land Use/Cover	**Acres**	**%**	**Acres**	**%**	**Acres**	**%**	**Acres**	**%**	**Acres**	**%**
Cultivated Crops	26362.1	46.17%	16988.0	29.75%	16573.2	29.03%	35070.5	61.42%	26633.1	46.65%
Wetlands/Water	1402.8	2.46%	8279.7	14.50%	6774.6	11.87%	3097.0	5.42%	1105.6	1.94%
Grassland/Herbaceous	25622.6	44.88%	25098.9	43.96%	31292.7	54.81%	15194.5	26.61%	25451.2	44.58%
Pasture/Hay	1260.5	2.21%	4273.5	7.48%	976.7	1.71%	816.0	1.43%	2042.0	3.58%
Developed	1756.8	3.08%	1823.3	3.19%	1369.4	2.40%	1905.6	3.34%	1827.4	3.20%
Woodland/Forest	24.0	0.04%	13.6	0.02%	22.2	0.04%	11.3	0.02%	10.2	0.02%
Shrub/Scrub	664.7	1.16%	573.6	1.00%	70.5	0.12%	983.5	1.72%	22.9	0.04%
Barren Land	3.6	0.01%	46.5	0.08%	17.6	0.03%	18.5	0.03%	4.4	0.01%

National Land Cover Database (NLCD) classification values provided for the Badger Wind project area and four surrounding references areas in North Dakota. Project area and each reference area is approximately 57,097.0 acres in area.

Source: Yang et al. 2018

Table 2. NWI Wetland Assessment

	Project		East		North		South		West	
Land Use/Cover	**Acres**	**%**	**Acres**	**%**	**Acres**	**%**	**Acres**	**%**	**Acres**	**%**
Freshwater Emergent Wetland	1824.2	79.4%	6398.0	82.8%	5724.9	78.2%	3652.5	95.3%	1477.6	76.0%
Freshwater Forested/Shrub Wetland	1.9	0.1%	1.3	0.0%	4.9	0.1%	2.9	0.1%	0.0	0.0%
Freshwater Pond	57.0	2.5%	166.4	2.2%	127.4	1.7%	42.8	1.1%	89.0	4.6%
Lake	20.4	0.9%	1075.0	13.9%	1371.2	18.7%	39.3	1.0%	0.0	0.0%
Riverine	394.3	17.2%	83.8	1.1%	95.7	1.3%	94.2	2.5%	377.1	19.4%
Total	**2297.9**	**100.0%**	**7724.5**	**100.0%**	**7324.0**	**100.0%**	**3831.7**	**100.0%**	**1943.6**	**100.0%**

National Wetlands Inventory (NWI) classification values provided for the Badger Wind project area and four surrounding references areas in North Dakota. Project area and each reference area is approximately 57,097.0 acres in area.

Source: USFWS 2019

Table 3a. Wetland Scoring Assessment: All Scored Wetlands

Area	Number of Basins	Total Wetland Acres	Mean Basin Size in Acres	Basin Size Range in Acres	Mean Score	Score Range
Project	370	955.0	2.6	0.3 - 292.3	10.7	7 - 18
East	1603	5587.2	3.5	0.3 - 305.2	12.7	7 - 19
North	1393	4215.9	3.0	0.3 - 381.3	12.8	6 - 19
South	634	1945.5	3.1	0.3 - 206.4	11.0	7 - 17
West	460	1406.1	3.1	0.3 - 80.8	11.0	7 - 17

Number of wetland basins that passed wetland assessment screening, total acreage, mean acreage, acreage range, mean score, and score range of screened basins. Basin summary data are provided for the Badger Wind project area and four surrounding reference areas in North Dakota. Project area and each reference area is appoximately 57,097.0 acres. Screening and scoring methodology from The Watershed Institute (2013).

BW Exhibit 28

Table 3b. Wetland Scoring Assessment: Potential Roosting Habitat Wetlands

Area	Number of Basins	Total Wetland Acres	Mean Basin Size in Acres	Basin Size Range in Acres	Mean Score	Score Range
Project	114	744.3	6.5	0.3 - 146.4	13.2	12 - 18
East	1240	5306.7	4.3	0.3 - 192.4	13.5	12 - 19
North	1116	4021.0	3.6	0.3 - 108.6	13.4	12 - 18
South	273	1628.2	6.0	0.3 - 206.4	13.0	12 - 17
West	177	1116.3	6.3	0.3 - 353.0	13.5	12 - 18

Screened wetlands with assessment scores ≥ 12, signifying status as potential Whooping Crane stopover roosting habitat (Watershed Institute, Inc. 2013).
Number of potential stopover roosting habitat basins, total acreage, mean acreage, acreage range, mean score, and score range are provided for the Badger Wind project area and four surrounding reference areas in North Dakota. Project area and each reference area is approximately 57,097.0 acres.

BW Exhibit 28

Table 4a. Whooping Crane Stopover Use Intensity Acreage

Area	Extended Use Core Intensity	Core Intensity	Low Intensity	Unclassified
Project	0	0	45,374	11,723
East	0	0	13,901	43,196
North	0	0	49,997	7,100
South	0	5,367	51,731	0
West	0	0	53,806	3,291
Grand Total	**0**	**5,367**	**214,809**	**65,310**

Source: Pearse, A.T., M. Rabbe, L.M. Juliusson, M.T. Bidwell, L. Craig-Moore, D.A. Brandt, and W. Harrell. 2018.

BW Exhibit 28

Table 4b. Whooping Crane Stopover Use Intensity Percent Coverage

Area	Extended Use Core Intensity	Core Intensity	Low Intensity	Unclassified
Project	0.0%	0.0%	79.5%	20.5%
East	0.0%	0.0%	24.3%	75.7%
North	0.0%	0.0%	87.6%	12.4%
South	0.0%	9.4%	90.6%	0.0%
West	0.0%	0.0%	94.2%	5.8%
Average	**0.0%**	**1.9%**	**75.2%**	**22.9%**

Source: Pearse, A.T., M. Rabbe, L.M. Juliusson, M.T. Bidwell, L. Craig-Moore, D.A. Brandt, and W. Harrell. 2018.

BW Exhibit 28

Table 5a. Whooping Crane Probability of Habitat Use: Decile Acreage

Habitat Quality	Value	Project Area	East	North	South	West
High	**10**	2,518	2,001	7,081	7,330	7,692
	9	21,993	14,349	22,536	34,315	30,209
	8	23,741	22,780	18,684	14,785	17,653
High Total		**48,252**	**39,130**	**48,301**	**56,430**	**55,554**
Medium	**7**	8,253	16,062	8,116	667	1,543
	6	591	1,901	650	0	0
	5	0	3	30	0	0
Medium Total		**8,844**	**17,966**	**8,796**	**667**	**1,543**

Source: Niemuth, N. D., A. J. Ryba, A. T. Pearse, S. M. Kvas, D. A. Brandt, B. Wangler, J. E. Austin, and M. J. Carlisle. 2018

BW Exhibit 28

Table 5b. Whooping Crane Probability of Habitat Use: Percent Coverage

Habitat Quality	Decile	Project Area	East	North	South	West
High	**10**	4.4%	3.5%	12.4%	12.8%	13.5%
	9	38.5%	25.1%	39.5%	60.1%	52.9%
	8	41.6%	39.9%	32.7%	25.9%	30.9%
High Total		**84.5%**	**68.5%**	**84.6%**	**98.8%**	**97.3%**
Medium	**7**	14.5%	28.1%	14.2%	1.2%	2.7%
	6	1.0%	3.3%	1.1%	0.0%	0.0%
	5	0.0%	0.0%	0.1%	0.0%	0.0%
Medium Total		**15.5%**	**31.4%**	**15.4%**	**1.2%**	**2.7%**

Source: Niemuth, N. D., A. J. Ryba, A. T. Pearse, S. M. Kvas, D. A. Brandt, B. Wangler, J. E. Austin, and M. J. Carlisle. 2018

BW Exhibit 28

YEAR 2 ACOUSTIC BAT MONITORING

BADGER WIND PROJECT

Prepared for

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Atwell Project No. 19000785

Submitted by Atwell, LLC

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ACRONYMS AND ABBREVIATIONS

AECI	*Aeorestes cinereus* (hoary bat)
amsl	above mean sea level
BCI	Bat Conservation International
EPFU	*Eptesicus fuscus* (big brown bat)
ESA	Endangered Species Act
ft	feet
HF	High Frequency
kHz	kilohertz
LABO	*Lasiurus borealis* (eastern red bat)
LANO	*Lasionycteris noctivagans* (silver-haired bat)
LF	Low Frequency
MET	Meteorological Evaluation Tower
MRLC	Multi-Resolution Land Characteristics
MYLU	*Myotis lucifugus* (little brown bat)
MYSE	*Myotis septentrionalis* (northern long-eared bat)
MYSP	*Myotis* species
NDWWC	North Dakota Wind and Wildlife Collaboration
NLCD	National Land Cover Database
NDGFD	North Dakota Game and Fish Department
noID	No identification to species
PVC	Poly-vinyl Chloride
RSZ	Rotor Sweep Zone
SCP	Species of Conservation Priority
SE	Standard Error
SWAP	State Wildlife Action Plan
TES	Threatened and Endangered Species
USFWS	United States Fish and Wildlife Service

1 INTRODUCTION

Badger Wind, LLC (Badger Wind) a wholly owned subsidiary of Ørsted Onshore North America retained Atwell, LLC (Atwell) to conduct migration acoustic monitoring for the Badger Wind Project (the project), an approximately 121,695-acre potential wind energy development site located in Logan and McIntosh counties, North Dakota (the project area; Figure 1). Acoustic monitoring was conducted in accordance with North Dakota Native Wildlife Resources: Guidelines for Reducing Impacts from Wind Energy Development (NDWWC 2018). The purpose of this monitoring is to conduct pre-construction surveys to document bat activity at meteorological evaluation tower (MET) stations and ground stations at locations representative of turbine locations within the study area.

1.1 STUDY AREA

Badger Wind is currently in the early stages of developing a wind energy project in rural south-central North Dakota. The approximate centroid of the project area is near 46.239702°N, 99.626697°W. The project area, situated in Logan and McIntosh counties, is approximately 36 miles east of the Missouri River, 55 miles southeast of Bismarck, North Dakota, 54 miles southwest of Jamestown, North Dakota, and 11 miles north of the South Dakota border. Approximately 60% (73,380 acres) of the 121,695-acre project area is in McIntosh County and approximately 40% (48,315 acres) is in Logan County (Figure 1).

The project area is located within a largely rural landscape containing agricultural fields, herbaceous lands including pastures, and some dispersed single-family rural residences. A network of paved and unpaved roads provides access throughout the project area. According to the 2016 National Land Cover Database (NLCD), the major land use types within the project area include: cultivated crops (approximately 56% of the project area), and herbaceous land (approximately 35% of the project area; MRLC 2016). Overall, the project area is dominated by agricultural land use and supports a mix of cultivated cropland, hayfields, pasturelands, and grasslands. A network of streams with herbaceous riparian buffers and scattered freshwater ponds, emergent wetlands, and livestock ponds are present. Forested habitat is limited and highly fragmented, consisting primarily of planted shelterbelts. The general topography of the region and the project area can be described as undulating, with approximate elevations between 1,970 and 2,200 feet (ft) above mean sea level (amsl) within the project area.

1.2 NORTH DAKOTA STATE WILDLIFE ACTION PLAN

North Dakota Game and Fish Department (NDGFD) does not maintain a list of state-level threatened and endangered species (TES), but rather defaults to those species federally protected under the Endangered Species Act (ESA) as those it recognizes with a threatened or

endangered status (NDGFD 2015). The U.S. Fish and Wildlife Service (USFWS) has primary oversight of TES in North Dakota.

The North Dakota State Wildlife Action Plan (SWAP) is the principle guiding document for safeguarding rare and declining species of fish and wildlife within the state. The plan places an emphasis on the protection of diverse native habitats to maximize the preservation of native wildlife diversity. The SWAP includes a list of 115 species of greatest conservation priority, and each has been given a priority designation based on conservation need (Species of Conservation Priority [SCP] Levels I, II, and III). SCP Level I are species that have declining populations in North Dakota or across their range, or are species that are at risk, range-wide, and have a high rate of occurrence in North Dakota constituting the core of the species' breeding range. SCP Level I receive the most funding from the state wildlife grant. SCP Level II are species of moderate conservation priority, or species with a high level of conservation priority that receive a substantial level of monetary support from non-state wildlife grant funding. SCP Level III are species of moderate conservation priority but are peripheral or non-breeding in North Dakota (NDGFD 2016d). The SWAP has no regulatory authority over industrial development on private land (NDGFD 2016 pers. comm.). Should a project development impact state-listed species of conservation concern on public lands, the NDGFD and SWAP can assist in providing steps to reduce or minimize these impacts.

1.3 BATS OF NORTH DAKOTA

Eleven species of bats are known to occur in North Dakota: Townsend's big-eared bat (*Corynorhinus townsendii*), big brown bat (*Eptesicus fuscus*), silver-haired bat (*Lasionycteris noctivagans*), eastern red bat (*Lasiurus borealis*), , hoary bat (*Aeorestes cinereus*), western small-footed bat (*Myotis ciliolabrum*), long-eared myotis (*Myotis evotis*), little brown bat (*Myotis lucifugus*), fringed myotis (*Myotis thysanodes*), long-legged myotis (*Myotis volans*), and northern long-eared bat (*Myotis septentronalis;* MYSE) (Nelson, Barnhart, and Gillam 2015). The MYSE is the only listed species and is federally threatened. NDGFD has classified Townsend's big-eared bat, big brown bat, little brown bat, and MYSE as SCP Level I and western small-footed bat, long-eared myotis, and long-legged myotis as SCP Level III (Dyke, Johnson, and Isakson 2015).

According to Bat Conservation International (BCI) species profiles and previous studies in North Dakota, the ranges of Townsend's big-eared bat, western small-footed bat, long-eared myotis, fringed myotis, and long-legged myotis include small portions of western North Dakota (BCI 2019; Nelson, Barnhart, and Gillam 2015). These five SCP were only documented in the Badlands (Nelson, Barnhart, and Gillam 2015); thus, they are unlikely to occur within the project area and will not be discussed further.

Species that may occur, with varying likelihood, within the project area include (NDGFD 2016a; 2016b; 2016c; BCI 2019):

- eastern red bat (LABO)
- hoary bat (AECI)
- silver-haired bat (LANO)
- big brown bat (EPFU; SCP Level I)
- little brown bat (MYLU; SCP Level I)
- northern long-eared bat (MYSE; SCP Level I; federally threatened)

Additional information regarding these species and habitat within the project area can be found within the Bat Habitat Assessment dated January 23, 2020 (Atwell 2020).

2 METHODS

2.1 Bat Acoustic Monitoring

Acoustic surveys were completed during the spring (April 14 – May 15), summer (May 15 – August 15), and fall (August 16 – October 15) seasons in 2020. Six (6) Song Meter full spectrum ultrasonic detectors (SM3 or SM4; Wildlife Acoustics, Inc; www.wildlifeacoustics.com) were deployed at representative turbine locations utilizing available MET stations and ground stations within the project area. Refer to Figure 2 for monitoring station locations.

2.2 Station Installment

Four ground-based stations (BMg1, BMg2, BMg3, BMg4) and two raised MET stations (BMr1, BMr2) were deployed using SM3 or SM4 detectors for the study (Figure 2). Detectors installed on MET towers were positioned to record bat activity at approximately ground level and to record bat activity within the rotor sweep zone (RSZ), in accordance with the North Dakota Native Wildlife Resources: Guidelines for Reducing Impacts from Wind Energy Development (NDWWC 2018).

Each ground-based station included one detector that was secured to a poly-vinyl chloride (PVC) tube encasing the microphone cable. Atop the PVC tubing was a 90-degree PVC elbow to secure the SMM-U1 external ultrasonic microphone. Allowing the microphone to sit parallel to the ground recording at an approximate height of 3 meters (m).

MET stations (BMr1 and BMr2) were paired with a ground-based station (BMg1 and BMg2, respectively). Each MET station included one detector that was secured to fencing around the MET. Each microphone and microphone cable were raised using a K-bat pulley system installed on the MET. The SMM-U1 external ultrasonic microphones recorded acoustic data at an approximate height of 50 m, representative of the RSZ.

A photo log of all stations is included in Appendix C.

2.3 Detector Deployment

All ground-based detectors were deployed on April 15, 2020 (BMg1, BMg2, BMg3, BMg4). The raised MET detectors were deployed on April 14, 2020 (BMr1, BMr2). BMg2 was deployed with an SM3 detector, while all other stations were deployed with SM4 detectors. Detectors recorded from approximately 30 minutes before sunset to 30 minutes after sunrise each night during the monitoring period. Detectors were visited routinely to ensure units worked properly, to collect data, and to change data cards and batteries.

A detector night was equivalent to one detector properly operating for one entire night (30 minutes before sunset to 30 minutes after sunrise). Detector hours were defined as the number of hours a detector was properly operating for each detector night.

2.4 Acoustic Files Analysis

Acoustic files (files) were assessed using USFWS-approved Kaleidoscope Pro automated ID software (Wildlife Acoustics, Inc. v. 4.2.0) sand were identified to species when appropriate and where feasible. The following parameters were applied to the software (approved for use by USFWS; USFWS 2020):

- Classifier: NA 4.1.0
- "0" Sensitivity
- Approved for both Indiana bat and northern long-eared bat calls
- Analysis was set to include all species with ranges overlapping with project area

A bat pass was defined as a sequence of at least two echolocation calls (pulses) produced by an individual bat. Bat passes classified by the software as MYLU (little brown bat), MYSE (northern long-eared bat), or noID (indicating that a bat pass was identified but could not be categorized to species) underwent qualitative analysis by a biologist with sufficient bat acoustic call vetting experience through visual comparison of echolocation call metrics (i.e., call sequence activity and call duration, call slope, minimum frequency, and individual call characteristics representative of individual species). These files were manually vetted using the viewer in SonoBat acoustic software (v4.2.2 North America). Files were initially differentiated into two classes: high frequency calls (those with a low frequency above 30 kilohertz, kHz) and low frequency calls (those with a low frequency below 30 kHz). From here, files were identified to species/species group when possible or remained in the coarse high frequency call (HF) or low frequency call (LF) classification. Species categories evaluated for as part of the analysis consisted of AECI (hoary bat), EPFU/LANO (big brown bat and silver-haired bat), LABO (eastern-red bat), MYLU (little brown bat), MYSE (northern long-eared bat), and MYSP (unidentified myotis species). Additionally, any file that did not include obvious bat calls were classified as "noise" and removed from further analysis.

Low frequency bats included EPFU, LANO, and AECI. EPFU and LANO were paired due to similar call characteristics. The passes for EPFU and LANO were differentiated from AECI based on the low frequency of the calls in the sequence. EPFU and LANO calls are consistently above 25 kHz, while AECI calls are consistently below 25 kHz, with some calls below 20 kHz. If a mix of calls was found in the sequence or the recording was determined to be a bat but possessed too few calls for conclusive identification, they were classified as LF.

High frequency bats included LABO, MYLU, MYSE, and MYSP. Of the high frequency bats, LABO were differentiated from *Myotis* species by having long, sweeping calls with variable frequencies. *Myotis* calls possessed an obvious "tail" at the end of the call that is indicative of the genus in the state. Some calls of LABO, most notably feeding buzzes (a short duration call used when approaching prey items), can be confused as *Myotis* species. If enough of the LABO call sequence is recorded, the calls leading to the feeding buzz possess the typical characteristics of LABO and thus can be classified as such. MYSE and MYLU were differentiated by the shape and duration of the call as MYSE has a steeper, shorter duration call than MYLU (Humboldt State University Bat Lab 2011). Files were only classified as MYSE if all calls in the sequence possessed the steeper, shorter duration indicative of the species. If calls indicative of both MYSE and MYLU were present in the sequence, the pass was classified as MYSP. For files classified as MYSP, identification to the species level is inaccurate and inconclusive based on the bat passes recorded; therefore, the course identification to the *Myotis* genus is utilized for file classification. Similar to LF files, files classified as HF were inconclusive and could not be classified beyond the coarse identification.

2.5 Data Analysis

Data were organized and analyzed with Microsoft Excel, Program R, and Program RStudio (R Core Team 2019; R StudioTeam 2018). Statistics/data analysis in this report includes:

- Detector recording effectiveness
- Site species richness
- High frequency and low frequency mean use
    - Nightly mean use
    - Hourly mean use
- Species Proportions
- Location distribution of species

Acoustic data were standardized across time. Mean use statistics were calculated for each call frequency group (e.g., high frequency [HF], low frequency [LF], and all bats [Total]) per station per deployment period (e.g., detector nights or detector hours). It is important to note that mean use does not reflect absolute density of a particular call frequency group, and the number of individuals present cannot be determined by number of passes identified.

Standard errors (SE) are reported alongside total bat passes per station mean use values. To calculate the SE, bat passes were theoretically resampled 1,000 times using bootstrapping.

Frequency of bat passes is the percentage that a particular species was recorded on completed detector nights per station and for completed detector nights per project area.

3 RESULTS

3.1 Survey Effectiveness

SM3 and SM4 detectors collected data for 1,097 detector nights, an overall 99.73% effectiveness for the study period. Survey effectiveness per detector unit ranged from 98.36% (BMg2) to 100% (BMg1, BMg3, BMg4, BMr1, BMr2).

3.2 Mean Use

All detectors were operational for 15,358 hours over 1,097 detector nights. Mean use by station and detector nights are displayed in Table 1 and Figure 3. Across all six stations, the average number of bat passes per night was 1.03 ± 0.07 and an hourly mean of 0.07 ± 0.00. Ground stations had a mean of 1.01 ± 0.09 SE bat passes per detector night and the MET stations had a mean of 1.06 ± 0.11 SE bat passes per detector night. Ground stations and MET stations operated for 10,206 hours and 5,152 hours, respectively. Mean use by station and detector hours are displayed in Table 2 and Figure 4. Ground stations had a mean of 0.07 ± 0.00 SE bat passes per hour and MET stations had a mean use of 0.07 ± 0.00 SE bat passes per hour.

Overall, bat mean use by night and by hour for all detector locations was relatively low. BMg1 saw the highest mean use by night and by hour, 2.01 ± 0.30 SE and 0.13 ± 0.01 SE, respectively.

3.3 Species Percentages and Spatial Distribution

Throughout the survey period, 63,417 total files were recorded. Of these, 62,283 files (98.21%) were categorized as “Noise” and were consequently filtered out during automated identification and manual vetting, leaving 1,134 total bat passes for analysis (Table 4).

Approximately 81.66% of all recorded bat activity came from LF species (AECI, EPFU/LANO, LF passes). The remaining 18.34% of passes included HF species (LABO, MYLU, MYSP and HF passes). Following analysis using the automated Kaleidoscope software, nine files were classified as MYSE; however, following manual vetting, all nine files were debunked as noise files that were misidentified by the automated software. Of the remaining files analyzed, only two were manually classified as *Myotis* species as there were calls characteristic of MYSE and MYLU (one was classified by the automated software as noID and the other was classified as MYLU). It should be noted that MYSP is a course identification for *Myotis* spp. and identification to the species level was therefore not obtained. However, with only two files classified, MYSP only made up approximately 0.18% of all recorded bat passes. For a breakdown of recorded bat passes refer to Table 3.

EPFU/LANO had the highest frequency of passes across all stations (485 passes; 42.77% of bat passes) followed by AECI (418 passes; 36.86% of bat passes), LABO (202 passes; 17.81% of bat passes), MYLU (3 passes; 0.26% of bat passes), and MYSP (2 passes, 0.18% of bat passes; Table 3). HF and LF categorized bat passes made up 0.09% and 2.03% of bat passes, respectfully.

BMg1 possessed the highest number of bat passes among the six detector locations (370 passes; 32.63% of the bat passes) followed by BMr1 (204 passes; 17.99%), BMr2 (190 passes; 16.75%), BMg3 (161 passes; 14.20%), and BMg4 (102 passes; 8.99%). In comparisons of the MET locations with two simultaneously recording detectors, BM1 had more activity (574 passes) than BM2 (298 passes). Ground based units also recorded more activity (478 passes) than raised units (394 passes), but the sample size for these two comparisons was too small to test for statistical significance.

EPFU/LANO and AECI had the highest percentage of bat passes per station (42.77% and 36.86%, respectfully). However, AECI activity represented a minimal percentage of total bat passes at BMr2 (3.79%). EPFU/LANO had the highest percent of bat passes at BMg2, BMg3, BMg4, and BMr2. AECI had the highest percent of bat passes at BMg1 and BMr1 (Table 3; Figure 5). At MET locations where both detectors were recording, EPFU/LANO and AECI were more commonly detected at ground locations (180 and 234, respectively) than at raised locations (166 and 135, respectively). LABO was highest at BMg2 and BMr1 (24.26% and 22.77%, respectively). LABO was the only species more commonly detected at raised sites (91 passes) compared to ground sites (56 passes) at MET locations where two detectors were recording. Only five *Myotis* spp. files (three passes identified as MYLU; 0.26% of recorded bat activity, and two passes identified as MYSP, 0.18% of recorded bat activity) were recorded during the study, all of which occurred on ground-based detector locations.

3.4 Temporal Species Distribution

All files identified as bat passes are displayed by their identification through Kaleidoscope software and/or manual vetting (i.e., species and/or call frequency group) and station across date and time in Figure 6. AECI exhibited activity distributed throughout the night, including shortly after sunset and prior to sunrise, throughout the entire monitoring season. EPFU/LANO activity was also distributed throughout the night, but had more concentrated activity in May, June, September and October. Activity was substantially lower for these species from mid-June to mid-July. LABO had distributions of activity throughout the survey period but were most notable in August. In addition, this peak in LABO activity occurred mostly at the raised stations, BMr1 and BMr2 (Table 3).

Seasonal distribution of species is grouped by week in Figure 7. Overall bat passes recorded across the project area had a slight peak in late-April and early-May and had a large peak in

mid- and late-August (Figure 7). Recorded bat passes across all species rapidly declined by late-September.

Throughout most of the survey season, EPFU/LANO was the dominant species detected across all stations and accounted for 42.77% of all bat passes (Table 3). EPFU/LANO species had peak activity in the spring (April 14 – May 18) and fall (August 24 – September 28) seasons (Figure 7). AECI exhibited the greatest frequency of bat passes during nights in the summer season (May 18 – July 13) AECI accounted for 36.86% of all bat passes and accounted for the second most recorded identification category. LABO accounted for the third highest percentage of all recorded bat passes (17.81%) and had the greatest total bat passes in the late summer, early fall (July 27 – Aug 3), and at the end of the survey period in October. Total bat passes were driven by AECI in May, June, and July with EPFU/LANO species dominating most of the bat species activity in spring and fall. Four *Myotis* spp. (MYLU and MYSP) passes were detected in late July and a MYLU bat pass was also detected at the end of August.

4 DISCUSSION AND CONCLUSIONS

Overall bat activity throughout the project was low with an average of one bat pass per night. Due to the lack of suitable bat habitat in the project area (i.e., waterways and forested areas), this observation was expected as bats would have to commute longer distances from roost locations to forage in these areas. A preconstruction survey in similar habitat in South Dakota (approximately 200 km SE) yielded fewer than two passes per night (Pickle, Bishop-Boros, and Solick 2017). Bat activity between ground-based stations and MET stations were similar (1.01 ± 0.09 SE bat passes per detector night, and 1.06 ± 0.11 SE bat passes per detector night, respectively). However, MET stations had fewer detector nights than the ground-based stations, making the sample size smaller and incurring a slightly higher standard error (SE) than the ground-based mean.

BMg1 had the highest bat activity compared to all stations, and this higher activity was largely driven by AECI (58.92% of bat passes at BMg1). However, BMg1 has very limited suitable habitat and/or shelterbelts within the vicinity of the station. There is a livestock pond approximately 0.34 miles east of the station. AECI are large bats and accustomed to foraging in open areas, which may have contributed to the activity observed for this species (Norberg and Rayner 1987).

BMg4 had the lowest bat activity compared to all stations, with only 0.16% of all files throughout the project area categorized as bat passes. BMg4 is in a very open area of the project, with limited suitable habitat in the immediate vicinity. In contrast with 2020 results, BMg4 saw the highest level of bat activity during the Year 1 Migration Bat Activity Monitoring in 2019.

Over two years of monitoring, the relatively highest level of bat activity was observed in association with ground-based acoustic stations located in the northeastern portion of the project area and during fall migration. Much of this activity can be attributed to activity peaks related to AECI migration. A peak in AECI activity was observed at BMg4 in the spring of 2019 and a peak in AECI activity was observed at BMg1 in the fall of 2020. It therefore appears that there are short periods of AECI activity that occur seasonally during spring and fall migration. However, large peaks in AECI activity was not observed across all migration seasons.

Additionally, during acoustic file analysis it was noted that BMr1 possessed a disproportionately high number of passes classified to species compared to the other five stations. Upon manual review, these files contained pulsing noises that were being classified to species. In many cases, the low frequency noises resembled those of low frequency bats (AECI, EPFU, LANO) and would have normally been classified as such. However, the manual vetting process found little to no evidence of bat activity throughout the night and the consistency with which these noise files were found indicated that they were misidentified noise files by the software program. As a result, the manual vetting of files classified by the automated software as noID or as any bat species recorded on BMr1 allowed for the proper identification and removal of false positives.

The majority of bat passes over the monitoring period were made by LF bats and a seasonal bimodal distribution was largely driven by LF bats in spring, mid-April through mid-May (dominated by EPFU/LANO) and fall, mid-August through mid-September (dominated by AECI and/or EPFU/LANO) (Figure 7). AECI also exhibited a nightly bimodal distribution (evening and morning peaks), particularly in June and July, but AECI activity becomes less concentrated and more evenly distributed across the night in the early spring and fall seasons (Figure 6). These observed trends in activity can be attributed to migratory behaviors in AECI and LANO which travel north to breeding grounds in the spring before traveling south in the fall to overwinter (Cryan 2003). These species are likely not year-round residents in the project area. Occurrences of EPFU/LANO through the summer stems from the grouping of these species as the two possess similar call characteristics and can be diffficult to distinguish. EPFU are year-round residents in North Dakota; thus, the recordings through the summer are most likely this species and not LANO.

Unlike low frequency species, high frequency species, such as MYLU, MYSP, and LABO, did not reflect these strong bimodal distributions in nightly activity. LABO did exhibit increased activity in the fall season. Due to the relative absence of activity earlier in the study, it is likely that these influxes were more related to seasonal migration. MYLU call data is limited (only three total calls), and no distinctive trends in activity can be discerned from this small sample size.

Despite the identification of the federally threatened MYSE in the Kaleidoscope automated analysis, evaluation of these nine files through manual vetting concluded that these were noise

files. While no MYSE passes were confirmed during the 2020 survey, two files were classified as MYSP indicating that the calls in the sequence possessed characteristics of MYLU and MYSE, but a conclusive identification could not be made. MYSE not being identified in the acoustic analysis could be attributed to a lack of suitable habitat within the project area, as discussed in the Bat Habitat Assessment Memorandum submitted by Atwell (Atwell 2020). MYSE are typically associated with forested habitat for foraging and roosting and do not normally venture into open agricultural landscapes in the midwest (White, Freeman, and Lemen 2017). Additionally, although previous bat survey work in North Dakota is limited, the eastern-most confirmed locations for MYSE in the state occur along the Missouri River, approximately 36 miles west of the study area (Nelson et al. 2015; Shank et al. 2015). Due to the lack of suitable habitat, the distance to the nearest known documentation of the species in the state, and the results of the acoustic monitoring study in 2020, we can conclude that MYSE are rare in the project area if they do occur, and are unlikely to be encountered. Note that migration monitoring is not intended to replace summer presence/absence studies for federally threatened and endangered species.

REFERENCES

Arnett, Edward B., Gregory D. Johnson, Wally P. Erickson, and Cris D. Hein. 2013. "A Synthesis of Operational Mitigation Studies to Reduce Bat Fatalities at Wind Energy Facilities in North America."
http://www.batsandwind.org/pdf/Operational%20Mitigation%20Synthesis%20FINAL%20REPORT%20UPDATED.pdf.

Atwell, [Atwell LLC]. 2020. "Bat Habitat Assessment Memorandum. Badger Wind Project." Southfield (MI).

AWWI, [American Wind Wildlife Institute]. 2018. "AWWI Technical Report: A Summary of Bat Fatality Data in a Nationwide Database." Washington (DC). https://awwi.org/wp-content/uploads/2019/02/AWWI-Bat-Technical-Report_07_25_18_FINAL.pdf.

Barnhart, Paul R., and Erin H. Gillam. 2017. "Documentation of Overwintering Bat Species Presence and Hibernacula Use In the Badlands of North Dakota." *Northwestern Naturalist* 98 (1): 48–56.

BCI, [Bat Conservation International]. 2019. "Species Profiles." 2019. http://www.batcon.org/resources/media-education/species-profiles.

Christopher Shank, Michael Gutzmer, Kurt Tooley, and Jeffrey Kelly. 2015. "Documentation of the Northern Long-Eared Myotis, Myotis Septentrionalis on Standing Rock Indian Reservation." *2015 Transactions of the Nebraska Academy of Sciences*, 1–5.

Cryan, Paul M. 2003. “Seasonal Distribution of Migratory Tree Bats (Lasiurus and Lasionycteris) in North America.” *Journal of Mammalogy* 84 (2): 579–93.

Dyke, Steve, Sandra Johnson, and Patrick Isakson. 2015. “North Dakota State Wildlife Action Plan 2015.” Bismarck, ND: North Dakota Game and Fish Department. http://gf.nd.gov/gnf/conservation/swap-2015/docs/swap-2015.pdf.

Gillam, Erin H., Paul Barnhart, Terry Steinwand, and Greg Link. 2012. “Distribution and Habitat Use of the Bats of North Dakota (Project #T2-5-R).” Bismarck, ND: North Dakota Game and Fish Department. https://gf.nd.gov/sites/default/files/publications/T2-5-R%20Bat%20Survey%20Final%20Report%202012_0.pdf.

Humboldt State University Bat Lab. 2011. “Echolocation Call Characteristics of Eastern US Bats.” http://www.sonobat.com/download/EasternUS_Acoustic_Table_Mar2011.pdf.

MRLC, [Multi-Resolution Land Characteristics Consortium]. 2016. “National Land Cover Database.” 2016. https://www.mrlc.gov/data?f%5B0%5D=category%3Aland%20cover&f%5B1%5D=region%3Aconus&f%5B2%5D=year%3A2016.

NDGFD. 2015. “Threatened and Endangered Species.” North Dakota Game and Fish Department. 2015. https://gf.nd.gov/wildlife/endangered.

———. 2016a. “Big Brown Bat.” North Dakota Game and Fish Department. 2016. https://gf.nd.gov/wildlife/id/bats/big-brown-bat.

———. 2016b. “Little Brown Bat.” North Dakota Game and Fish Department. 2016. https://gf.nd.gov/wildlife/id/bats/little-brown-bat.

———. 2016c. “Northern Long-Eared Bat.” North Dakota Game and Fish Department. 2016. https://gf.nd.gov/wildlife/id/bats/northern-long-eared.

———. 2016d. “State Wildlife Action Plan.” North Dakota Game and Fish. 2016. https://gf.nd.gov/wildlife/swap.

NDWWC. 2018. “North Dakota Native Wildlife Resources: Guidelines for Reducing Impacts from Wind Energy Development. Draft, April 10.” The North Dakota Wind and Wildlife Collaboration. https://static1.squarespace.com/static/588b55d046c3c4372c9bbfcb/t/5b913b8121c67c0efe6e23ee/1536244617824/ND+Wind+Energy-Wildlife+Guidelines_draft4-10-2018+%28002%29.pdf.
Nelson, Josiah J., Paul R. Barnhart, and Erin H. Gillam. 2015. “Distribution and Occurrence of Bat Species in North Dakota.” *The Prairie Naturalist* 47: 87–93.

Norberg, U.M., and J.M.V. Rayner. 1987. *Ecological Morphology and Flight in Bats (Mammalia; Chiroptera): Wing Adaptations, Flight Performance, Foraging Strategy, and Echolocation*. Vol.

316. The Royal Society Carlton House Terrace London. https://royalsocietypublishing.org/doi/pdf/10.1098/rstb.1987.0030.

Pickle, J., L. Bishop-Boros, and D. Solick. 2017. “Bat Acoustic Survey Report for the Crocker Wind Farm. Clark County, South Dakota.” Cheyenne (WY): Western EcoSystems Technology, Inc. (WEST). https://tethys.pnnl.gov/sites/default/files/publications/Crocker-Wind-Farm-2016.pdf.

R Core Team. 2019. *R: A Language and Environment for Statistical Computing*. Vienna, Austria: R Foundation for Statistical Computing. https://www.R-project.org.

R StudioTeam. 2018. *RStudio: Integrated Development for R*. Boston (MA): RStudio, Inc. http://www.rstudio.com/.

USFWS, [U.S. Fish and Wildlife Service]. 2020. “Range-Wide Indiana Bat Survey Guidelines.” U. S. Fish and Wildlife Service. https://www.fws.gov/midwest/endangered/mammals/inba/surveys/pdf/FINAL%20Range-wide%20IBat%20Survey%20Guidelines%203.23.20.pdf.

White, J. A., P. W. Freeman, and C. A. Lemen. 2017. “Habitat Selection by the Northern Long-Eared Myotis (*Myotis Septentrionalis*) in the Midwestern United States: Life in a Shredded Farmscape.” *Transactions of the Nebraska Academy of Sciences and Affiliated Societies* 37: 1–10.

APPENDIX A

FIGURES

Badger Wind

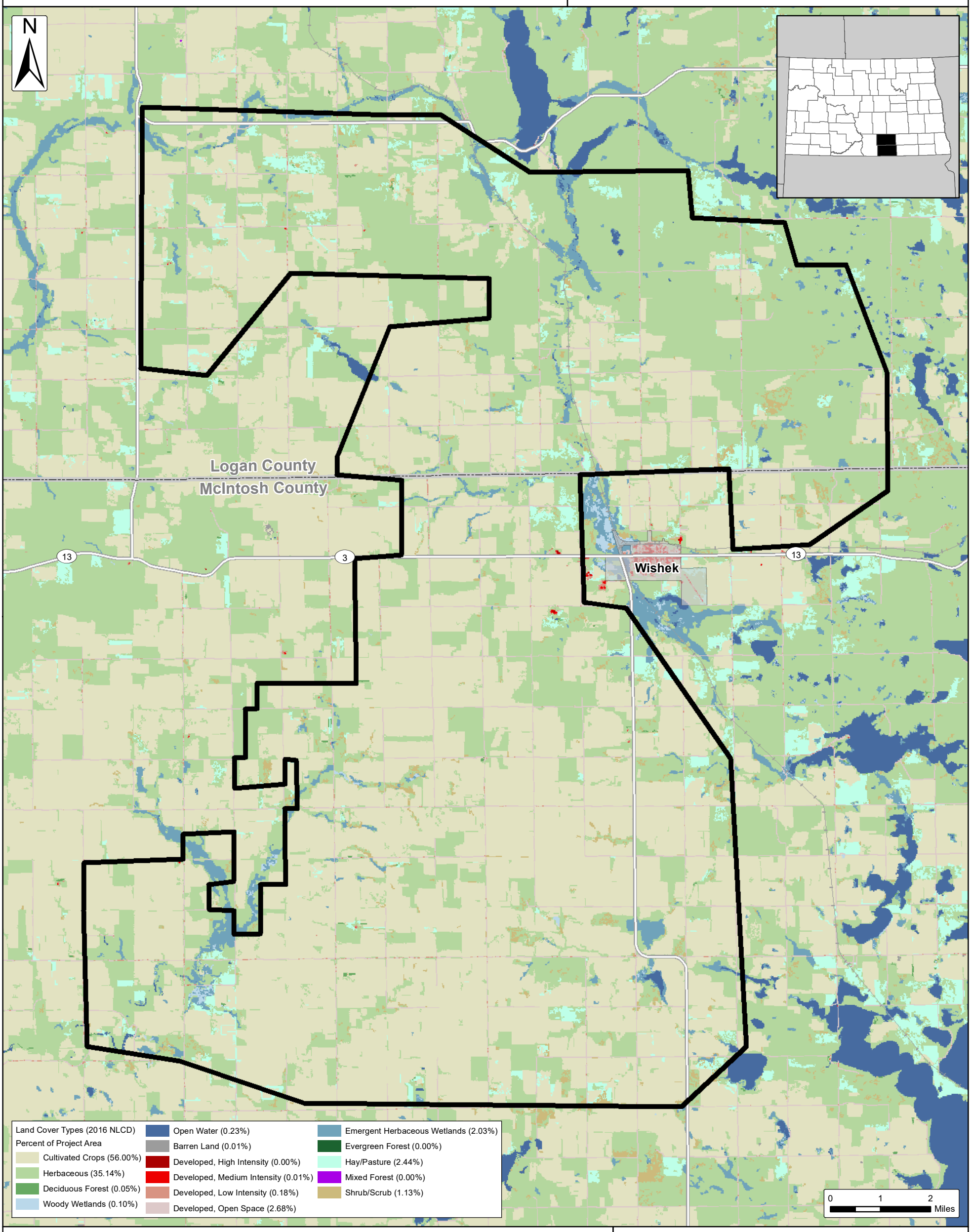
Figure 1. Land Cover

Logan County & McIntosh County, North Dakota

Client:
Badger Wind, LLC

Issue Date:
12/15/2020

Atwell, LLC Project:
19000785



Project Area
04/15/2019 (±121,695 Ac.)

City/Village

Counties

SOURCE: NATIONAL LAND COVER DATABASE 2016 (USGS)

ATWELL

The information contained on this map is proprietary and confidential. The use or disclosure of this information by you to third parties is prohibited by law and may give rise to civil or criminal liability.

Badger Wind

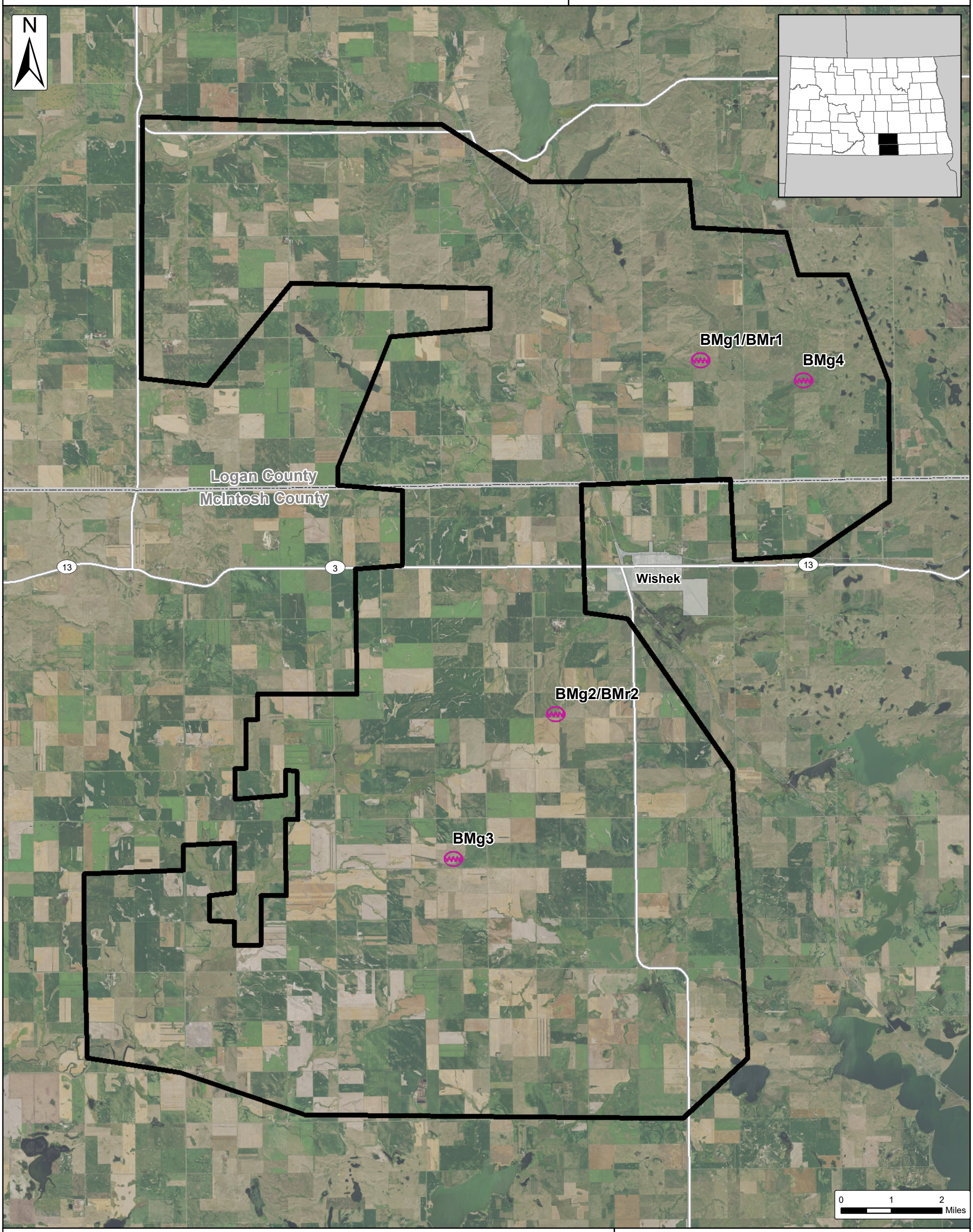
Figure 2. Bat Acoustic Monitoring

Logan County & McIntosh County, North Dakota

Client: Badger Wind, LLC

Issue Date: 2/4/2021

Atwell, LLC Project: 19000785



Acoustic Monitoring Site

Project Area
04/15/2019 (±121,695 Ac.)

City/Village

Counties

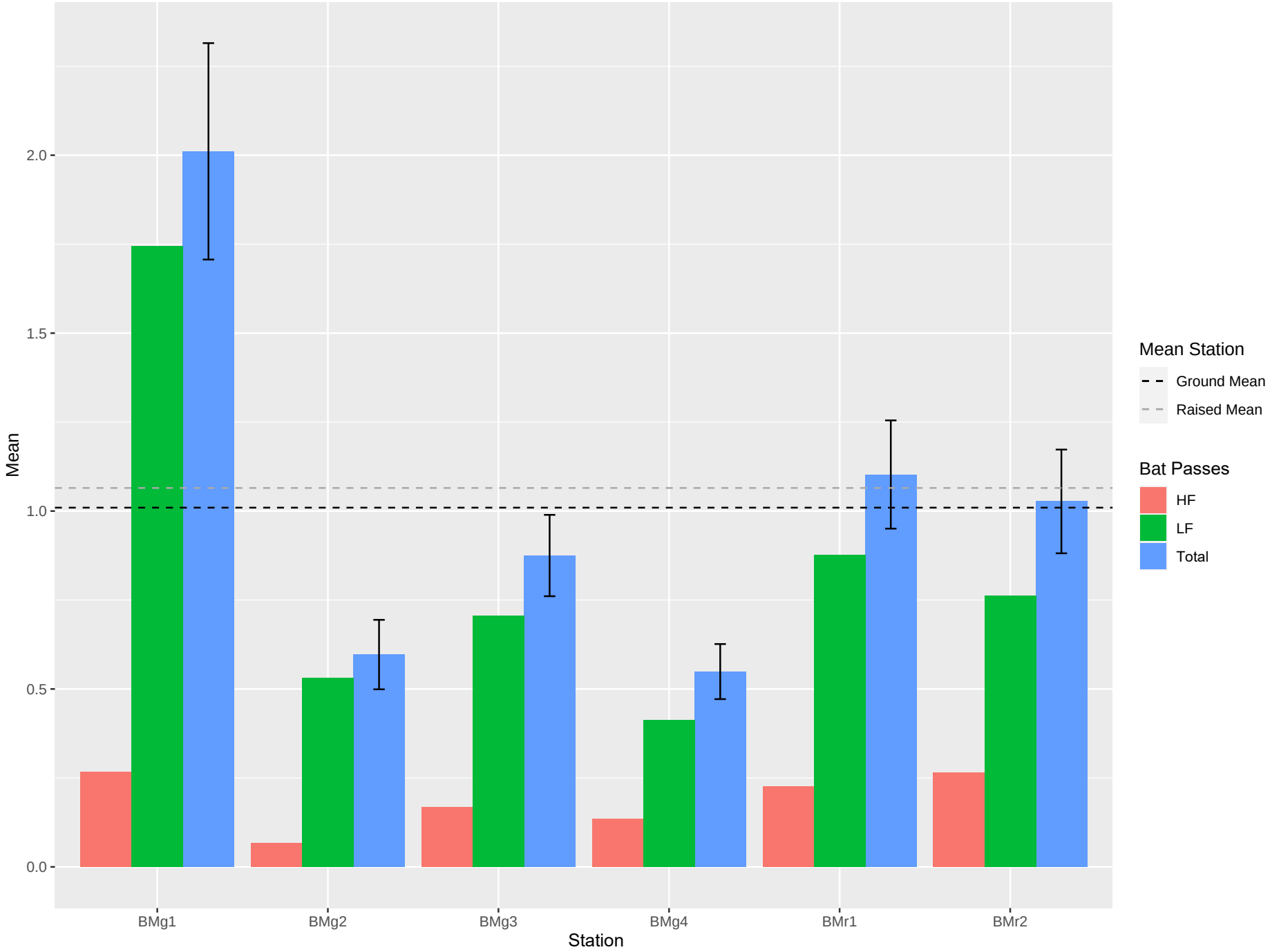
SOURCE: NATIONAL LAND COVER DATABASE 2016 (USGS)

ATWELL

The information contained on this map is proprietary and confidential. The use or disclosure of this information by you to third parties is prohibited by law and may give rise to civil or criminal liability.

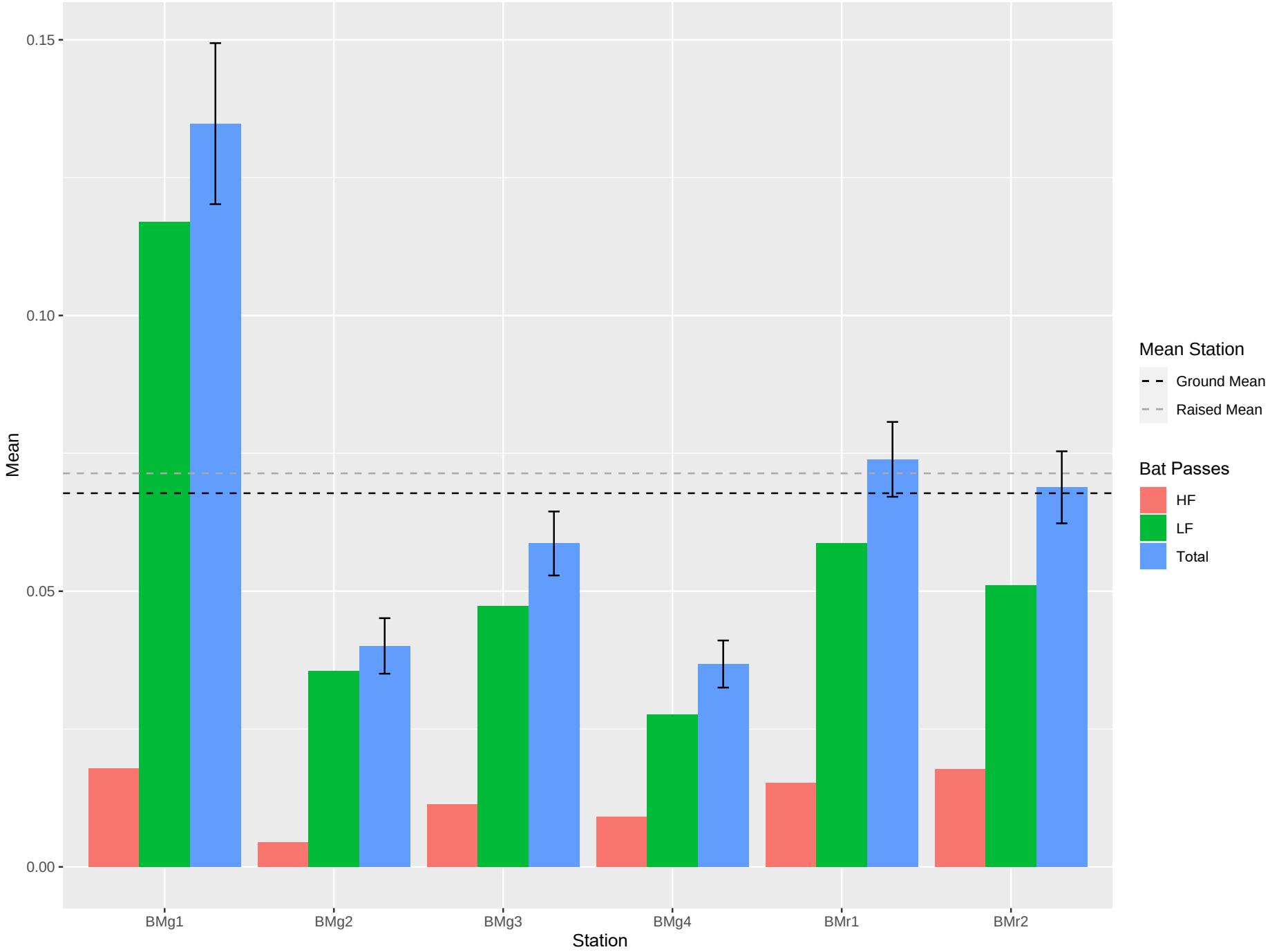
BW Exhibit 28

Figure 3: Nightly Mean Use



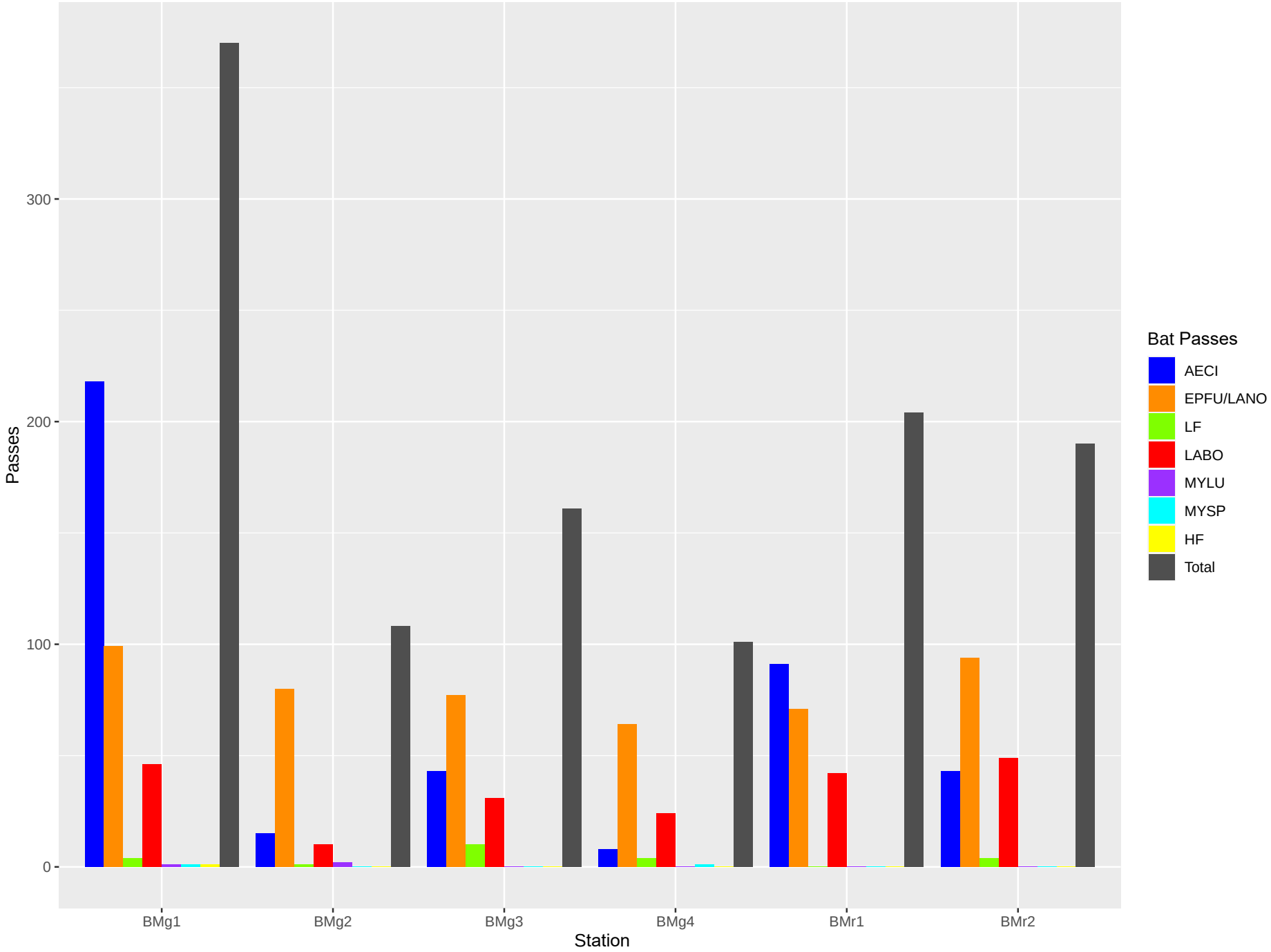
BW Exhibit 28

Fgiure 4: Hourly Mean Use



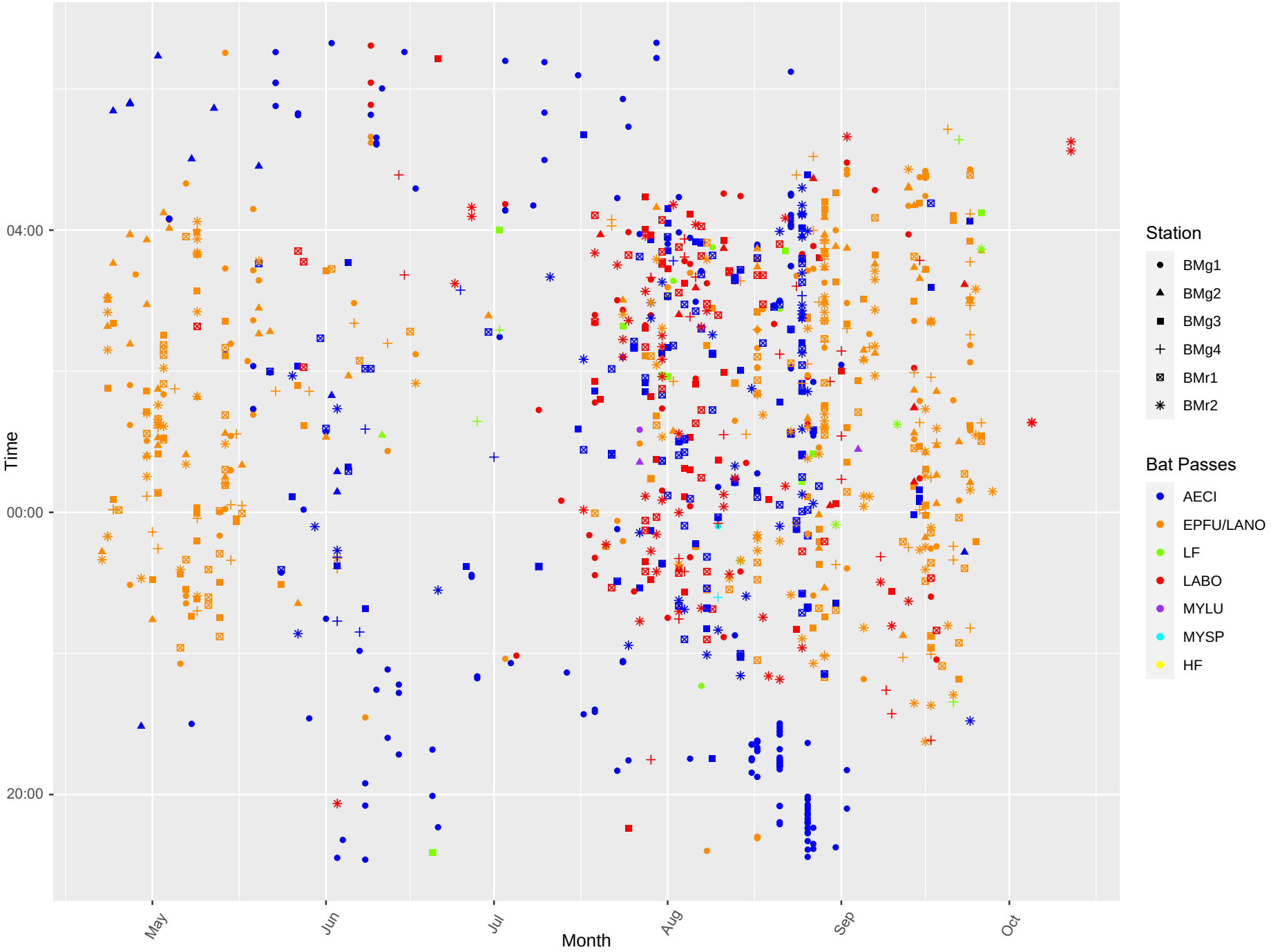
BW Exhibit 28

Figure 5: Species by Station



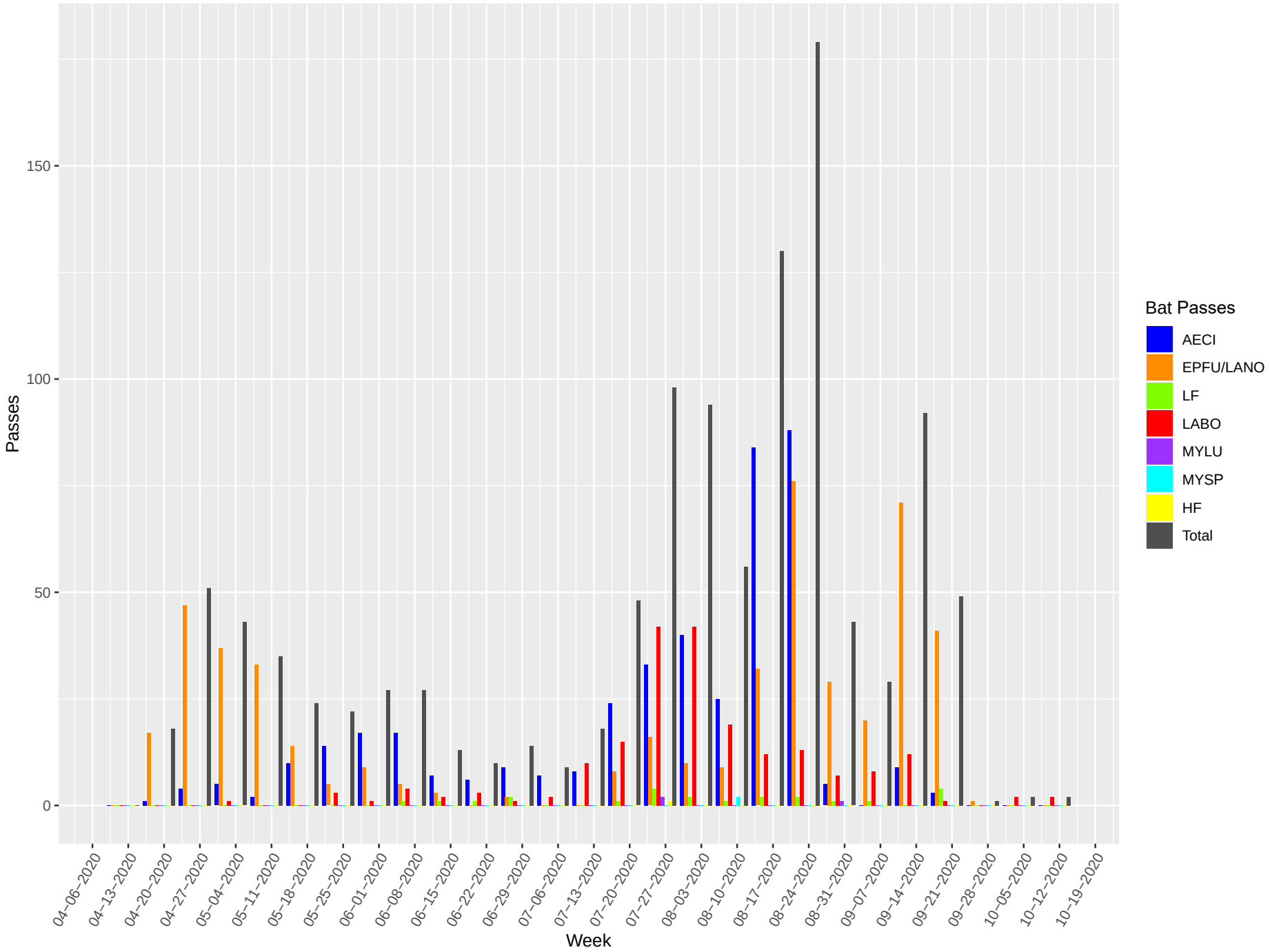
BW Exhibit 28

Figure 6: Call Files by Species and Station



BW Exhibit 28

Figure 7: Species by Week



APPENDIX B

TABLES

Table 1. Nightly Mean Bat Use per Station

Station	Type	Bat Passes			Detector Nights	Mean Nightly Bat Passes (± SE)[c]
		High Frequency[a]	Low Frequency[b]	Total		
BMg1	Ground	49	321	370	183	2.01 ± 0.30
BMg2	Ground	12	96	108	180	0.60 ± 0.10
BMg3	Ground	31	130	161	183	0.88 ± 0.11
BMg4	Ground	25	76	101	183	0.55 ± 0.08
BMr1	Raised	42	162	204	184	1.10 ± 0.15
BMr2	Raised	49	141	190	184	1.03 ± 0.15
Total Ground	Ground	117	623	740	729	1.01 ± 0.09
Total Raised	Raised	91	303	394	368	1.06 ± 0.11
Total	--	208	926	1134	1097	--

[a] High Frequency includes: LABO, MYLU, MYSP, and HF
[b] Low Frequency includes AECI, EPFU/LANO, and LF
[c] Rounding has occurred

Table 2: Hourly Mean Bat Use per Station

Station	Type	Bat Passes			Detector Hours	Mean Hourly Bat Passes (± SE)[c]
		High Frequency[a]	Low Frequency[b]	Total		
BMg1	Ground	49	321	370	2562	0.13 ± 0.01
BMg2	Ground	12	96	108	2520	0.04 ± 0.01
BMg3	Ground	31	130	161	2562	0.06 ± 0.01
BMg4	Ground	25	76	101	2562	0.04 ± 0.00
BMr1	Raised	42	162	204	2576	0.07 ± 0.01
BMr2	Raised	49	141	190	2576	0.07 ± 0.01
Total Ground	Ground	117	623	740	10206	0.07 ± 0.00
Total Raised	Raised	91	303	394	5152	0.07 ± 0.00
Total	--	208	926	1134	15358	--

[a] High Frequency includes: LABO, MYLU, MYSP, and HF
[b] Low Frequency includes AECI, EPFU/LANO, and LF
[c] Rounding has occurred

Table 3: Frequency of Recorded Bat Passes (noise excluded)

Station	Call Analysis ID	Passes	Site Percentage[a]	Project Percentage[a]
BMg1	AECI	218	58.92%	19.22%
	EPFU/LANO	99	26.76%	8.73%
	LF	4	1.08%	0.35%
	LABO	46	12.43%	4.06%
	MYLU	1	0.27%	0.09%
	MYSP	1	0.27%	0.09%
	HF	1	0.27%	0.09%
	Station Total	370	100.00%	32.63%
BMg2	AECI	15	13.89%	1.32%
	EPFU/LANO	80	74.07%	7.05%
	LF	1	0.93%	0.09%
	LABO	10	9.26%	0.88%
	MYLU	2	1.85%	0.18%
	MYSP	--	--	--
	HF	--	--	--
	Station Total	108	100.00%	9.52%
BMg3	AECI	43	26.71%	3.79%
	EPFU/LANO	77	47.83%	6.79%
	LF	10	6.21%	0.88%
	LABO	31	19.25%	2.73%
	MYLU	--	--	--
	MYSP	--	--	--
	HF	--	--	--
	Station Total	161	100.00%	14.20%
BMg4	AECI	8	7.92%	0.71%
	EPFU/LANO	64	63.37%	5.64%
	LF	4	3.96%	0.35%
	LABO	24	23.76%	2.12%
	MYLU	--	--	--
	MYSP	1	0.99%	0.09%
	HF	--	--	--
	Station Total	101	100.00%	8.91%
BMr1	AECI	91	44.61%	8.02%
	EPFU/LANO	71	34.80%	6.26%
	LF	--	--	--

Station	Call Analysis ID	Passes	Site Percentage[a]	Project Percentage[a]
BMr1	LABO	42	20.59%	3.70%
	MYLU	--	--	--
	MYSP	--	--	--
	HF	--	--	--
	Station Total	204	100.00%	17.99%
BMr2	AECI	43	22.63%	3.79%
	EPFU/LANO	94	49.47%	8.29%
	LF	4	2.11%	0.35%
	LABO	49	25.79%	4.32%
	MYLU	--	--	--
	MYSP	--	--	--
	HF	--	--	--
	Station Total	190	100.00%	16.75%
Totals	AECI	418	--	36.86%
	EPFU/LANO	485	--	42.77%
	LF	23	--	2.03%
	LABO	202	--	17.81%
	MYLU	3	--	0.26%
	MYSP	2	--	0.18%
	HF	1	--	0.09%
Total Bat Passes		1134	--	100.00%

[a] Rounding has occurred

Table 4. Frequency of All Files Recorded (includes noise)

Station	Call Analysis ID	Passes	Site Percentage[a]	Project Percentage[a]
BMg1	AECI	218	9.78%	0.34%
	EPFU/LANO	99	4.44%	0.16%
	LF	4	0.18%	0.01%
	LABO	46	2.06%	0.07%
	MYLU	1	0.04%	0.00%
	MYSP	1	0.04%	0.00%
	HF	1	0.04%	0.00%
	Noise	1858	83.39%	2.93%
	Station Total	2228	100.00%	3.51%
BMg2	AECI	15	0.22%	0.02%
	EPFU/LANO	80	1.17%	0.13%
	LF	1	0.01%	0.00%
	LABO	10	0.15%	0.02%
	MYLU	2	0.03%	0.00%
	MYSP	--	--	--
	HF	--	--	--
	Noise	6702	98.41%	10.57%
	Station Total	6810	100.00%	10.74%
BMg3	AECI	43	0.86%	0.07%
	EPFU/LANO	77	1.53%	0.12%
	LF	10	0.20%	0.02%
	LABO	31	0.62%	0.05%
	MYLU	--	--	--
	MYSP	--	--	--
	HF	--	--	--
	Noise	4860	96.79%	7.66%
	Station Total	5021	100.00%	7.92%
BMg4	AECI	8	0.45%	0.01%
	EPFU/LANO	64	3.60%	0.10%
	LF	4	0.22%	0.01%
	LABO	24	1.35%	0.04%
	MYLU	--	--	--
	MYSP	1	0.06%	0.00%
	HF	--	--	--
	Noise	1679	94.33%	2.65%
	Station Total	1780	100.00%	2.81%
BMr1	AECI	91	0.23%	0.14%
	EPFU/LANO	71	0.18%	0.11%
	LF	--	--	--
	LABO	42	0.11%	0.07%

Station	Call Analysis ID	Passes	Site Percentage[a]	Project Percentage[a]
BMr1	MYLU	--	--	--
	MYSP	--	--	--
	HF	--	--	--
	Noise	38994	99.48%	61.49%
	Station Total	39198	100.00%	61.81%
BMr2	AECI	43	0.51%	0.07%
	EPFU/LANO	94	1.12%	0.15%
	LF	4	0.05%	0.01%
	LABO	49	0.58%	0.08%
	MYLU	--	--	--
	MYSP	--	--	--
	HF	--	--	--
	Noise	8190	97.73%	12.91%
	Station Total	8380	100.00%	13.21%
Totals	AECI	418	--	0.66%
	EPFU/LANO	485	--	0.76%
	LF	23	--	0.04%
	LABO	202	--	0.32%
	MYLU	3	--	0.00%
	MYSP	2	--	0.00%
	HF	1	--	0.00%
	Noise	62283	--	98.21%
Total Recordings		63417	--	100.00%

[a] Rounding has occurred

APPENDIX C

PHOTO LOG

PHOTO LOG

Badger Wind Project

Logan and McIntosh Counties, North Dakota, April 14-October 15, 2020



Photo 1. A view of pastureland within the project area. Agricultural and grazing are common practices throughout the project area.



Photo 2. Initial deployment of BMg1, with an SM4 unit, at ground level.



Photo 3. Initial deployment of BMg2, with an SM3 unit, at ground level.



Photo 4. Initial deployment of BMg3, with an SM4, at ground level.



Photo 5. Initial deployment of BMg4, with an SM4, at ground level.



Photo 6. A west facing view of BMr1. This is a representative view of the landscape surrounding the MET tower where BMr1 is located.



Photo 7. A west facing view of BMr2. This is a representative view of the landscape surrounding the MET tower where BMr2 is located.

YEAR 2
PRE-CONSTRUCTION AVIAN STUDIES

BADGER WIND PROJECT
LOGAN AND MCINTOSH COUNTIES, NORTH DAKOTA

Prepared for

Badger Wind, LLC
401 North Michigan Avenue, Suite 501
Chicago, IL 60611

Atwell Project No. 19000785

Submitted by Atwell, LLC

3000 Center Green Drive, Suite 210
Boulder, CO 80301

August 2021 (finalized February 2022)

EXECUTIVE SUMMARY

This year-two (Y2) report summarizes the results of pre-construction avian studies conducted May 2020 through April 2021 by Atwell, LLC (Atwell) on behalf of Badger Wind, LLC (Badger Wind) for the proposed Badger Wind Project (the project) in Logan and McIntosh counties, North Dakota. Field studies were designed to document eagle and avian use, raptor nest activity, and Sharp-tailed Grouse (*Tympanuchus phasianellus*) lek activity in the vicinity of the project. A year-one (Y1) report summarizes the same results from May 2019 through April 2020 (Atwell 2020a). The project area was revised in December 2020, midway through the Y2 study period.

Avian use studies were conducted in accordance with the United States Fish and Wildlife Service Land-Based Wind Energy Guidelines (USFWS WEG) (USFWS 2012), the Eagle Conservation Plan Guidance: Module 1 - Land-based Wind Energy, Version 2 (ECPG) (USFWS 2013), and the Revisions to Regulations for Eagle Incidental Take and Take of Eagle Nests (i.e., "final Eagle Rule"; USFWS 2016).

Studies conducted during the Y2 surveys included nest surveys for Bald Eagles (*Haliaeetus leucocephalus*), Golden Eagles (*Aquila chrysaetos*), and other raptor species; lek surveys for Sharp-tailed Grouse; monthly eagle use surveys; and avian use surveys during the spring and fall migration periods. Results of Y2 avian use studies are summarized below.

Raptor Nests

- A single in-use Bald Eagle nest was noted in 2019 and 2020. This nest was found within the project area during aerial nest surveys in 2019 and was confirmed occupied in 2020. The Bald Eagle pair fledged young from this nest in 2019 and 2020. In early 2021, the nest appeared to be missing. The nesting pair initiated a new nesting location approximately two miles to the east of the original site in March 2021.
- No Golden Eagle nests were found within the project area or ten-mile buffer.
- Five occupied Ferruginous Hawk (*Buteo regalis*) nests, eleven Red-tailed Hawk (*Buteo jamaicensis*) nests, five Swainson's Hawk nests (*Buteo swainsoni*), and five Great Horned Owl nests (*Bubo virginianus*) were found within the revised December 2020 project area boundary and a surrounding two-mile buffer during Y2 avian surveys. A sixth Ferruginous Hawk nest was discovered during micrositing activities in May 2021.

Sharp-tailed Grouse

- Thirteen confirmed Sharp-tailed Grouse leks, and two possible leks, were found during Y2 lek surveys. Four of the confirmed leks were within the December 2020 project boundary and four confirmed leks and one possible lek were within a surrounding one-mile buffer.

Bald Eagle and Golden Eagle Use

- Overall Bald Eagle use of the project area was similar over the Y1 and Y2 study periods. Thirty-Four Bald Eagles were observed over the course of 636 hours of standardized eagle use surveys over the Y1 study period and 35 Bald Eagles were observed over the same amount of survey effort during Y2. An additional 46 Bald Eagles were detected incidental to standardized surveys in Y1 and 30 incidental Bald Eagle detections were recorded during Y2. Incidental observations include sightings outside of the standardized sample plot as well as encounters outside of 60-minute eagle use survey periods.
- Golden Eagle use of the project area was also similar over the Y1 and Y2 study periods. Six Golden Eagles were observed over a year of eagle use surveys in both Y1 and Y2. Seven Golden Eagles were detected incidentally to standardized use surveys during Y1 and 6 incidental Golden Eagle detections were recorded during Y2.

  Golden Eagles were sporadically encountered during the spring, fall, and winter periods. Detections appeared to represent both migrating and wintering individuals.

  Bald Eagle mean use rates were highest during the fall and spring over the Y2 study period. Several summer Bald Eagle observations were recorded in association with the in-use nest location. Bald Eagles were infrequently observed during the winter and were never observed in January or February during the Y1 and Y2 study periods.

Species Listed under the Endangered Species Act

- Three Whooping Cranes (*Grus americana*), listed as endangered by the Endangered Species Act (ESA), were observed within the project area from April 15 to 17, 2020. The cranes were first observed during eagle use surveys at a nearby point count station. Return visits found that the cranes foraged during daylight hours in unharvested corn and roosted in riverine wetlands nearby at night. No Whooping Cranes were observed in Y2.
- No other ESA- listed avian species were observed within the project boundary during the two years of avian use studies.

General Avian Use

- Many of the bird species that were commonly observed in the project area are habitat generalists that are regularly observed in agricultural areas, including several species of blackbirds and Lapland Longspurs (*Calcarius lapponicus*). Large groups of birds were observed moving through the project area during migration. These included Snow Geese (*Anser caerulescens*), Franklin's Gulls (*Leucophaeus pipixcan*), a North Dakota species of conservation priority (SCP), and Sandhill Cranes (*Grus canadensis*).

- Small-bodied passerines (particularly Icterids and Lapland Longspurs) and waterfowl (particularly Snow Geese) together comprised the majority (93 percent) of avian detections during the Y2 study period.
- Avian species groups with mean flight heights within the pre-defined 35 to 150-meter rotor-swept zone included large-bodied corvids (e.g., crows and ravens), raptors, waterbirds (e.g., gulls, pelicans, cormorants), and waterfowl.
- Several passerine species of conservation priority that are associated with grassland habitats were observed extensively throughout the project area during avian use surveys. These included Chestnut-collared Longspur (*Calcarius ornatus*), Grasshopper Sparrow (*Ammodramus savannarum*), Bobolink (*Dolichonyx oryzivorus*), and Western Meadowlark (*Sturnella neglecta*). Nelson's Sparrows (*Ammospiza nelsoni*) and LeConte's Sparrows (*Ammospiza leconteii*) were infrequently encountered at localized sites within the project area. Sprague's Pipits (*Anthus spragueii*) were observed on infrequent occasions during fall migration, but evidence of this species breeding within the project area was not noted.

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ACRONYMS AND ABBREVIATIONS

AKN	Avian Knowledge Network
Atwell	Atwell, LLC
BGEPA	Bald and Golden Eagle Protection Act
ECPG	United States Fish and Wildlife Service Eagle Conservation Plan Guidance: Module 1 - Land-based Wind Energy Version 2
ESA	Endangered Species Act
Ft	feet
km	kilometer(s)
m	meter(s)
MBTA	Migratory Bird Treaty Act
MCP	Minimum Convex Polygon
MW	Megawatt(s)
NDGF	North Dakota Game and Fish Department
ND SWAP	North Dakota State Wildlife Action Plan
NLCD	National Land Cover Database
QA/QC	Quality Assurance/Quality Control
project	Badger Wind Project
RSZ	rotor-swept zone
SCP	Species of Conservation Priority
SD	standard deviation
T&E	Threatened and Endangered Species under ESA
USFWS	United States Fish and Wildlife Service
WEG	United States Fish and Wildlife Service 2012 Land-Based Wind Energy Guidelines
WTG	Wind Turbine Generator

1 INTRODUCTION

Atwell, LLC (Atwell) was contracted by Badger Wind, LLC (Badger Wind) to conduct avian studies for the proposed Badger Wind Project (the project) in Logan and McIntosh counties, North Dakota (Figure 1). The proposed 250-megawatt (MW) project would include the development of 60 to 120 wind turbine generators (WTGs), associated collection lines, access roads, and a collector substation.

The project boundary was modified in December 2020 and is now an estimated 57,097 acres (Figure 1). Approximately 46 percent of the project area (26,000 acres) is in McIntosh County and approximately 54 percent (31,098 acres) is in Logan County The general topography is undulating and rises from the west to the east, with approximate elevations between 1,960 and 2,230 feet above mean sea level within the project boundary. The project is predominately within the Missouri Coteau Slope Level IV Ecoregion, with portions of the project area's eastern boundary extending upward into the Missouri Coteau Level IV Ecoregion (Bryce et al. 1996). The Missouri Coteau is an escarpment of glacial till containing numerous hills, small lakes, and poorly drained depressions that are referred to as "potholes" that receive most of their water from snow melt and precipitation (Bryce et al. 1996). These potholes increase in density to the north and east of the project boundary. The Missouri Coteau Slope descends westward toward the Missouri River from the Coteau and is characterized by a thinner glacial till layer and integrated drainages flowing toward the Missouri River (Clayton 1962).

According to the 2016 U.S. Geological Survey National Land Cover Database (NLCD; MRLC 2019), the project area is composed primarily of cultivated crops (46.2 percent) and herbaceous/grassland (44.9 percent). Wetlands and open water comprise 2.5 percent of the project area. Other land cover types found within the project area include developed areas (3.1 percent), pasture/hay (2.2 percent), shrub/scrub (1.2 percent), woodland forest (less than 0.1 percent), and barren land (less than 0.1 percent) (Figure 2).

The objectives of the studies summarized in this report were to document eagle and avian use, raptor nest activity, and grouse lekking activity in the project area and its vicinity. Survey protocols described herein were designed to adhere to Tier 3 of the United States Fish and Wildlife Service (USFWS) 2012 Land-Based Wind Energy Guidelines (WEG); the USFWS Region 6 Recommended Protocol for Conducting Pre-construction Eagle Nest Surveys at Wind Energy Projects Version 3, and Stage 2 assessments described in the USFWS Eagle Conservation Plan Guidance: Module 1 - Land-based Wind Energy Version 2 (ECPG; (USFWS 2012; USFWS 2013; USFWS 2021). These two documents provide wind energy developers and operators guidance for adhering to the Migratory Bird Treaty Act (MBTA) and Bald and Golden Eagle Protection Act (BGEPA), respectively. Additionally, Atwell utilized industry standard approaches for avian use

studies as promoted by the National Wind Wildlife Collaborative (Strickland et al. 2011). This report summarizes the results of the second year of avian studies. Table 1 summarizes avian studies conducted over the two years and respective survey extents, frequencies, and durations.

This report adheres to avian taxonomy outlined in the American Ornithological Society's Online Checklist of North & Middle American Birds: 62nd Supplement (Chesser et al. 2021).

Table 1. Survey Periods for Pre-Construction Avian Studies - Year 2

Survey	Frequency	Apr 2020	May 2020	Jun 2020	Jul 2020	Aug 2020	Sep 2020	Oct 2020	Nov 2020	Dec 2020	Jan 2021	Feb 2021	Mar 2021	Apr 2021
Eagle and Raptor Nest Surveys	Single Survey Event	■	■											
Sharp-tailed Grouse Lek Surveys	Single Survey Event	■												
Eagle Use Surveys	Monthly		■	■	■	■	■	■	■	■	■	■	■	■
Avian Use Surveys	Monthly		■			■	■	■	■				■	■

Shaded boxes represent months in which the surveys occurred.

2 METHODS

2.1 EAGLE AND RAPTOR NEST SURVEY

The Y2 eagle and raptor nest surveys were conducted during April and May of 2020. The project area established in April 2019 and its surrounding nest survey area were assessed through a combination of targeted aerial surveys conducted on April 10, 2020 and ground-based surveys that continued through May 15, 2020 (Figure 3). The aerial Y2 survey occurred shortly before updated USFWS eagle nest survey guidance was released that recommended a 2-mile nest survey buffer surrounding the project area (USFWS 2020). Therefore, the eagle nest survey buffer extended 10 miles from the project boundary as during the Y1 nest survey and described in the ECPG (USFWS 2013). All non-eagle raptor nests were recorded for the project area and a surrounding two-mile buffer as described in the WEG (USFWS 2012).

Flight time was restricted to one day of aerial surveys due to safety concerns regarding a) the COVID-19 coronavirus outbreak across the United States; and b) recent aircraft accidents associated with aerial wildlife surveys at other proposed wind facilities in the region. The plan for conducting restricted aerial surveys was communicated to the USFWS and North Dakota Game and Fish Department (NDGF) during a safety update meeting on April 3, 2020.

The Y2 survey's targeted aerial transect areas are depicted in purple-outlined polygons in Figure 3. Areas targeted for aerial surveys included:

- Roadless portions of the project area
- Habitat-based focal areas within the April 2019 project area and 10-mile eagle nest survey buffer
- Known eagle nests and nests of other raptor species that were found during the Y1 survey.

Habitat-based focal areas were identified using desktop analysis of the eagle nest survey area. Large bodies of water, riparian areas, and areas with large trees that could serve as potential eagle nesting sites were prioritized when identifying target areas.

Fixed-wing aerial transects were conducted by two Atwell biologists in a Cessna Skyhawk 172M on April 10, 2020. Transects were flown by locally based Bismarck Aero at speeds ranging from approximately 75-100 knots, and at an approximate altitude of 500 feet (ft). Altitude and speed varied to some degree based upon landscape conditions, safety concerns, and the need to investigate potential nests. Aerial survey transects were oriented north-south, and riparian-based transects were flown along the northern and southern edges of the Beaver Creek riparian corridor between Beaver Lake and the western edge of the eagle nest survey area (Figure 3).

In addition to aerial nest surveys, all raptor nests that were found during ground-based activities, including ground-based lek surveys, avian use surveys, and eagle use surveys were mapped, assessed for nesting status, and were added to the project nest database. Ground-based follow-up surveys were conducted to confirm species and status for nests that could not be attributed to species during the aerial survey.

When a raptor nest was encountered, the following data were collected (USFWS 2021):

- Nesting species
- Nest location (decimal degrees)
- Nest substrate (deciduous or coniferous)
- Nest status (in-use or alternate)
- Nest condition (good, fair, or poor)
- Nest contents (number of eggs or young)

Following completion of the surveys, data were reviewed and uploaded into the project database as part of the quality assurance/quality control (QA/QC) program.

Incidental observations of additional raptor nests were made during 2021 project micrositing efforts. These locations were noted by species and activity, when possible, and included in the project database.

2.2 SHARP-TAILED GROUSE LEK SURVEYS

The Y2 Sharp-tailed Grouse lek survey was also conducted using both aerial and ground-based survey methods. Targeted portions of the grouse survey area (specifically the April 2019 project area plus a one-mile buffer zone around the April 2019 project area) were assessed via aerial transects on April 10, 2020 and are depicted with black north-south transects in Figure 4.

As described above, safety concerns limited flight time to one morning of aerial surveys that targeted specific areas within the broader grouse survey area and focused on portions of the grouse survey area that could not be reached or observed from publicly accessible roadside vantage points. Targeted aerial survey areas were believed to have higher likelihood of harboring grouse leks (shaded green in Figure 4) based on 1) results from 2019 aerial grouse lek surveys, 2) observations of grouse recorded during Y1 eagle use and avian use surveys, and 3) identification of potential Sharp-tailed Grouse breeding habitat through desktop review.

Additional portions of the grouse survey area were sampled using 3 rounds of standardized ground-based surveys between April 11 and May 15, 2020. Standardized ground-based grouse survey locations are depicted with orange circles in Figure 4. Each round of surveys was spaced

approximately 8 to 10 days apart. During each survey round, an Atwell biologist surveyed 77 publicly accessible roadside points spaced 0.5 miles (800 m) apart for two minutes, scanning visually and listening for Sharp-tailed Grouse vocalizations and other non-vocal sounds associated with lekking behavior.

In addition to dedicated ground-based lek surveys, survey schedules for concurrently occurring eagle use and avian use surveys (see Sections 2.3 and 2.4 below) were modified to opportunistically increase the likelihood of incidental detections of lekking Sharp-tailed Grouse during the use surveys. Eagle use and avian use sample plots are depicted with dashed black circles in Figure 4. Survey schedules for eagle use surveys were adjusted so that plots within potential grouse habitat (shaded green in Figure 4) were surveyed earliest in the morning in the months of March, April, and May of 2020.

When a Sharp-tailed Grouse lek was encountered, the following data were collected:

- Lek location (decimal degrees)
- Number of individuals present
- Observed behaviors
- Land use

Lek locations were additionally referenced with nearby landmarks (e.g., hilltops, potholes or wetlands, trees) to improve location precision and to help relocate the lek if assessed for ground-based lek counts at a later date.

Confirmed leks were defined as two or more birds together, with at least one male displaying. Possible leks were defined as auditory detections of multiple grouse that could not be verified visually after their initial detection on a ground-based survey.

Following completion of the surveys, data were reviewed and uploaded into the project database.

2.3 EAGLE USE SURVEYS

A long-duration, fixed-point eagle use survey protocol (Strickland et al. 2011) was used to document seasonal activity and behavior of eagles within the project area. All eagle detections within a three-dimensional cylindrical plot (the sample plot) were recorded following a fixed-radius, point count survey approach (Hutto et al. 1986; Ralph et al. 1993) that is referenced in the ECPG (USFWS 2013). Though fixed-radius plots were used, the distance to each detection was estimated to allow for density estimation (Reynolds et al. 1980). Sample plots measured 2,625 feet (800 meters [m]) in radius by 656 ft (200 m) in height, as described in the final Eagle Rule (USFWS 2016). These surveys are referred to as standardized eagle use surveys hereafter.

Study Period

Eagle use surveys were conducted over one full year to encompass spring migration and the breeding season, fall migration, and the wintering season (Strickland et al. 2011). Each sample plot was visited for one hour each month, as described in the final Eagle Rule (USFWS 2016). Seasonal periods were defined as spring (March through May), summer (June through July), fall (August through November), and winter (January through February). The Y2 study period began on May 1, 2020 and ended on April 30, 2021.

Survey Methodology

Consistent with the Eagle Rule, a one-hour survey duration was used throughout the study period for all visits (USFWS 2016). Surveys were conducted between dawn and dusk. Surveys were conducted in all weather conditions, provided that conditions were safe for the observer and that horizontal visibility was at least 800 m and vertical visibility was at least 200 m.

While broadly referred to here as point count surveys, the ECPG recognizes that eagle use surveys are more accurately described as a 'point-based recording of activity duration (minutes of flight) within the sample plot (USFWS 2013).

The following information was recorded for each individual that was observed:

- Time of day at first and final observation within the sample plot
- Eagle species
- Horizontal distance to initial observation and closest observation in meters
- Count
- Flight height altitude within the sample plot (initial height, minimum height, maximum height in meters)
- Flight direction
- Age (with dependent juveniles not included in mean use analyses)
- Behavior
- Duration of flight within a generic rotor-swept zone's (RSZ) portion of the sample plot (35 to 150 m in height), to the nearest 0.1 minute
- Duration of flight within the entire (0 to 200 m in height) sample plot (i.e. eagle minutes described in the ECPG [USFWS 2013])
- Habitat

- Flight path mapped through the sample plot,

A starting monitoring station was randomly selected from the 53-monitoring stations before each of the 12 survey events across the year.

At the completion of each survey, the observer confirmed that data sheets were complete and legible prior to proceeding to the next point count station. Following completion of the surveys, data were reviewed and uploaded into the project database as part of the QA/QC program.

Selection and Location of Point Count Stations

Fifty-three point count stations were established overall within a study area predicated on the previous April 2019 project boundary (Figure 5). Point count station coordinates are detailed in Appendix A. Consistent with guidelines in the final Eagle Rule (USFWS 2016) and the Appendix C of the ECPG (USFWS 2013), Atwell established 18 of the 53 point count stations within the minimum convex polygon (MCP) to achieve 30 percent spatial coverage of an approximately 28,269-acre MCP. The MCP is depicted by the blue polygon in Figure 5 and was generated from a preliminary turbine array provided by Badger Wind in April 2019. The MCP encompasses the project footprint, inclusive of the hazardous area around all turbine and associated infrastructure, including utility lines, out buildings, and roads.

An additional 35 point count stations were added to provide coverage of the project area given a potential for future expansion and/or modification of the project area. Three of these 35 stations were positioned to the east and outside of the project boundary, in an area that was also under consideration for development at the start of surveys.

The following criteria were used when selecting point count station locations:

- Stations were located on low-traffic roadways for safety and to minimize noise disturbance during surveys.
- Stations were located within or adjacent habitat types that are representative of the project area.
- Stations were spaced so that sample plots did not overlap.
- Stations provided a 360-degree view of the horizon to the extent feasible.
- Stations were located in areas accessible year-round to the extent feasible.

Atwell ground-truthed all 53 point count stations in May 2019. Stations with landowner conflicts, an inadequate viewshed, or anticipated poor observer access during heavy precipitation were adjusted as necessary.

Land cover types were reviewed during ground-truthing to confirm that the survey points were representative of habitats found within the project area. The point count stations were located within representative land cover types as follows: 53.6 percent cultivated crops, 38.1 percent herbaceous cover, 3.6 percent open-space developed areas, 1.9 percent hay/pastureland, 1.1 percent emergent herbaceous wetland, and 1.0 percent shrub scrub. The following land cover types each represented less than 1 percent of the area covered by survey point count stations: development (low, medium, and high intensities), open water, woody wetland, deciduous forest, and barren land.

Alternate Point Count Station Strategy for Winter Surveys

Point count stations were surveyed for eagle use during the winter (December through February) to the extent feasible. Twelve point count stations had safety or access issues during winter storm events. Point count station 14, 21, 22, 30, 32, 35, 36, 40 and 48 are located on infrequently traveled roads with uncertain plowing frequency. These stations were inaccessible during periods of high snow depths. Point count stations 26, 39, and 50 are located on frequently traveled roads with minimal roadside clearance. Roadside snowbanks that accumulated during plowing could further limit roadside clearance, rendering these points unsafe during surveys.

Nearby point count stations were pre-selected as to serve alternates for the above point count stations in the event that these stations could not be accessed in inclement weather (Table 2). Alternate nearby point count stations were proximate in location and were located within similar habitats when possible. This strategy allowed surveyors to safely meet standardized survey effort goals while maintaining appropriate spatial coverage of the study area.

Table 2. List of Alternate Winter Point Count Stations

Original Point Count Station	Alternate Point Count Station
14	13
19	17
21	18
22	5
26	20
30	11
32	33
35	49
36	37
39	46
40	47
48	42
50	44

2.4 AVIAN ACTIVITY POINT COUNT SURVEYS

A short-duration, fixed-point protocol (Strickland et al. 2011) was used to characterize general avian use within the study area, consistent with the WEG (USFWS 2012). Avian use surveys were used to estimate mean use and species richness, to determine presence of species of concern, and to determine areas of concentrated avian use within the study area.

Detections of small-bodied birds and large-bodied birds were recorded within three-dimensional cylindrical plots (the sample plot areas varied for small-bodied and large-bodied birds), following a fixed-radius plot point count survey approach. Small-bodied birds included hummingbirds, cuckoos, doves, swifts, woodpeckers, and most passerines. Sample plots for small-bodied birds measured 492 ft (300 m) in radius. Large-bodied birds included upland gamebirds, waterfowl, waterbirds (wading birds, cormorants, pelicans, grebes), shorebirds, raptors, nightjars, pigeons, and large corvids (American Crows [*Corvus brachyrhynchos*] and Common Ravens [*Corvus corax*]). Sample plots for large-bodied birds measured 2,625 feet (800 meters) in radius.

Study Period and Study Area

Surveys were completed during the spring (May 2020, and March to April 2021) and fall (August to November 2020) seasons. The same 53 point count station locations established for eagle use surveys were also used for avian use surveys (Figure 5).

Survey Methodology

Short duration avian use surveys followed point count methodology as described in Ralph et al. (1993), Ralph et al. (1995), in the WEG (USFWS 2012), and in standard industry recommendations (National Wind Coordinating Committee 1999; Strickland et al. 2011).

Short duration point count surveys were 10 minutes in duration and were conducted after the completion of the 60-minute eagle use survey. All birds that were seen or heard during the survey were recorded. Surveys were conducted throughout the day, their timing contingent on the completion of the preceding eagle use survey.

The following information was recorded for each auditory and visual detection during the short-duration count:

- Species or parent taxa group (e.g., sparrow species)
- Detection type (song, visual, call, other)
- Distance to detection
- Count
- Age (with dependent fledglings not counted in mean use analyses)
- Flight height altitude at initial detection (coded as above RSZ, within RSZ, or below RSZ)
    - Numeric flight height estimate also recorded to accommodate analyses using a wider RSZ if desired
    - Whether the individual eventually entered the RSZ if not within RSZ at first detection
- Habitat
- Breeding observations (e.g., nesting material carry, food material carry, nest, copulation, etc.).

At the completion of each survey, the observer confirmed that data sheets were complete and legible prior to proceeding to the next point count station. Following completion of the surveys, data were reviewed and uploaded into the project database as part of the QA/QC program.

2.5 INCIDENTAL DATA COLLECTION AND LISTED SPECIES

Incidental detections of eagles, ESA-listed threatened or endangered species (T&E), and North Dakota species of conservation priority (SCP) as defined by the North Dakota State Wildlife Action

Plan (ND SWAP) (Dyke et al. 2015) were recorded during survey activities. Level I SCP are species of high conservation priority that may be declining in North Dakota or which may occur regularly in North Dakota but are otherwise in decline range wide. Level II SCP are species with moderate conservation priority or with higher conservation priority and significant non-state wildlife grant funding available to provide for their conservation. Level III SCP have moderate conservation priority and North Dakota is ephemeral to their range (Dyke et al. 2015). Incidental detections include observations recorded while en route to point count stations, non-eagle observations during eagle use surveys, observations outside the survey plots, and observations that were recorded at point count stations but outside the survey period.

3 RESULTS

3.1 EAGLE AND RAPTOR NEST SURVEY

3.1.1 Eagle Nests

Atwell detected one in-use Bald Eagle (Level II SCP) nest within the project area during the April 2020 aerial survey (Figure 6). This nest was located in a small cluster of cottonwood (*Populus*) trees southwest of Beaver Lake, Logan County (approximate coordinates: 46.3493° N, 99.6274° W). This is the same grove of trees where a pair of Bald Eagles was observed to have successfully nested during Y1 (2019) studies (Atwell 2020a). Two adults were observed tending to the nest at the time of the aerial survey on April 10, 2020, and they continued to be seen during subsequent ground-based survey efforts into the summer, when fledged juveniles were observed near the nest. No other eagle nest structures were detected within the eagle nest survey area.

Golden Eagles (Level II SCP) were not observed during the aerial survey and no Golden Eagle nests were found during the study period.

3.1.1.1 New 2021 Bald Eagle Nest Location

Atwell located an in-use Bald Eagle nest within the project area on March 10, 2021 (approximate coordinates: 46.3474° N, 99.5856° W) (Figure 6) The nest was found incidentally during eagle-use surveys and is located in a small grove of cottonwoods immediately east of a tributary of Beaver Creek. The nest is located over a mile from a publicly accessible road and was visited on foot after permission was secured from a property owner on April 22, 2021. An adult was observed on the nest during this check, confirming its status as in-use and occupied

The 2021 nest was previously noted as unoccupied during the Y2 nest survey (Atwell 2020b). It was noted to be somewhat large but was not suspected to be an alternate to the 2019-2020 nest due to their distance apart. It was checked later in the spring of 2020 and found to still be unoccupied.

The 2019-2020 and 2021 nests are believed to belong to the same nesting territory. The 2021 Bald Eagle in-use nest is approximately 3.19 km (1.98 miles) east of the 2019-2020 nest. The 2019-2020 nest is now classified as an alternate nest site (USFWS 2013; USFWS 2016). The 2019-2020 nest was checked repeatedly after the March 10 discovery of the 2021 nest and it was found to be missing and perhaps fallen from its substrate. Bald Eagles were not observed at the old nest site during these subsequent checks.

3.1.2 Non-Eagle Raptor Nests

During the Y2 nesting raptor survey Atwell identified 15 non-eagle raptor nests within the December 2020 project area boundary and an additional 22 non-eagle raptor nests within its surrounding 2-mile raptor nest survey buffer. All 37 non-eagle raptor nests are depicted in Figure 6 and summarized in Table 3.

Several of the 37 non-eagle raptor nests were found during ground-based eagle use and avian use surveys. An additional three nests were located within the December 2020 project area boundary during micrositing efforts in May 2021. While these nests are included in Table 3, they are not depicted in Figure 6. Locations and descriptions of these nests are provided in a separate 2021 Raptor Nest Supplement memorandum (Atwell 2021).

Table 3. Eagle Nests and Nests of Other Raptor Species

Territory Number[a]	Nest ID[b]	Species	Date Found	Latitude	Longitude	Survey Type	2019 Nesting Season Status[c]	2020 Nesting Season Status[d]	2021 Nesting Season Status[d]	December 2020 Boundary Survey Buffer[e]
1	BAEA19_01	Bald Eagle	5/2/2019	46.3490	-99.6275	Aerial	In-Use, Active	In-Use, Active	Alternate, Unoccupied	Project Area
1	BAEA21_01	Bald Eagle	3/10/2021	46.3474	-99.5856	Ground	--	Alternate, Unoccupied	In-Use, Active	Project Area
--	FEHA19_01	Ferruginous Hawk	5/10/2019	46.1630	-99.7057	Aerial	Occupied	Occupied	Not Checked	2-mile
--	FEHA19_03	Ferruginous Hawk	5/16/2019	46.3512	-99.6420	Ground	Occupied	Occupied	Not Checked	Project Area
--	FEHA19_04	Ferruginous Hawk	5/16/2019	46.3873	-99.5620	Ground	Occupied	Occupied	Not Checked	2-mile
--	FEHA19_05	Ferruginous Hawk	5/19/2019	46.3071	-99.5618	Ground	Occupied	Occupied	Not Checked	Project Area
--	FEHA19_06	Ferruginous Hawk	5/19/2019	46.3580	-99.5203	Ground	Occupied	Occupied	Not Checked	2-mile
--	FEHA21_07	Ferruginous Hawk	5/13/2021	46.2339	-99.6154	Micrositing	--	--	Occupied	Project Area
--	GHOW19_01	Great Horned Owl	5/2/2019	46.2600	-99.7051	Aerial	Occupied	Occupied	Not Checked	2-mile
--	GHOW19_02	Great Horned Owl	5/21/2019	46.1879	-99.5891	Ground	Occupied	Occupied	Not Checked	Project Area
--	GHOW20_01	Great Horned Owl	5/8/2020	46.2340	-99.5535	Ground	--	Occupied	Not Checked	2-mile
--	GHOW20_02	Great Horned Owl	4/23/2020	46.3665	-99.5214	Ground	--	Occupied	Not Checked	Project Area
--	GHOW20_04	Great Horned Owl	4/17/2020	46.2564	-99.6051	Ground	--	Occupied	Not Checked	Project Area
--	RTHA19_02	Red-tailed Hawk	5/16/2019	46.3847	-99.5228	Ground	Occupied	Occupied	Not Checked	2-mile
--	RTHA19_03	Red-tailed Hawk	5/19/2019	46.1898	-99.6262	Ground	Occupied	Missing	Not Checked	Project Area

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Territory Number[a]	Nest ID[b]	Species	Date Found	Latitude	Longitude	Survey Type	2019 Nesting Season Status[c]	2020 Nesting Season Status[d]	2021 Nesting Season Status[d]	December 2020 Boundary Survey Buffer[e]
--	RTHA19_04	Red-tailed Hawk	7/25/2019	46.3410	-99.5591	Ground	Occupied	Unknown	Not Checked	Project Area
--	RTHA19_05	Red-tailed Hawk	7/29/2019	46.2153	-99.7157	Ground	Occupied	Unknown	Not Checked	Project Area
--	RTHA20_02	Red-tailed Hawk	4/17/2020	46.1999	-99.5420	Ground	--	Occupied	Not Checked	2-mile
--	RTHA20_03	Red-tailed Hawk	4/14/2020	46.3656	-99.7037	Ground	--	Occupied	Not Checked	2-mile
--	RTHA20_05	Red-tailed Hawk	4/23/2020	46.3935	-99.6891	Ground	--	Occupied	Not Checked	2-mile
--	RTHA20_06	Red-tailed Hawk	4/15/2020	46.3002	-99.5959	Ground	--	Occupied	Not Checked	Project Area
--	RTHA20_07	Red-tailed Hawk	4/10/2020	46.3947	-99.5978	Aerial	--	Occupied	Not Checked	2-mile
--	RTHA20_08	Red-tailed Hawk	5/15/2020	46.3127	-99.6056	Ground	--	Occupied	Not Checked	Project Area
--	RTHA20_09	Red-tailed Hawk	5/12/2020	46.3380	-99.4565	Ground	--	Occupied	Not Checked	2-mile
--	RTHA20_10	Red-tailed Hawk	4/22/2020	46.1734	-99.6837	Ground	--	Occupied	Not Checked	2-mile
--	SWHA19_01	Swainson's Hawk	7/25/2019	46.3494	-99.5188	Ground	Occupied	Occupied	Not Checked	2-mile
--	SWHA20_01	Swainson's Hawk	4/23/2020	46.3963	-99.5214	Ground	--	Occupied	Not Checked	2-mile
--	SWHA20_02	Swainson's Hawk	4/26/2020	46.3999	-99.6342	Ground	--	Occupied	Not Checked	2-mile
--	SWHA20_03	Swainson's Hawk	5/8/2020	46.2525	-99.6075	Ground	--	Occupied	Unknown[f]	Project Area
--	SWHA20_04	Swainson's Hawk	5/14/2020	46.1869	-99.6626	Ground	--	Occupied	Not Checked	2-mile
--	UKRA19_05	Unknown raptor	5/2/2019	46.2036	-99.7030	Aerial	Unknown	Unknown	Not Checked	Project Area

BW Exhibit 28

Territory Number[a]	Nest ID[b]	Species	Date Found	Latitude	Longitude	Survey Type	2019 Nesting Season Status[c]	2020 Nesting Season Status[d]	2021 Nesting Season Status[d]	December 2020 Boundary Survey Buffer[e]
--	UKRA20_14	Unknown raptor	4/10/2020	46.2488	-99.6432	Aerial	--	Unknown	Not Checked	Project Area
--	UKRA20_15	Unknown raptor	4/17/2020	46.2609	-99.5647	Ground	--	Unknown	Not Checked	2-mile
--	UKRA20_16	Unknown raptor	4/17/2020	46.2704	-99.5476	Ground	--	Unknown	Not Checked	2-mile
--	UKRA20_17	Unknown raptor	4/17/2020	46.3432	-99.5130	Ground	--	Unknown	Not Checked	Project Area
--	UKRA20_18	Unknown raptor	4/17/2020	46.3432	-99.5130	Ground	--	Unknown	Not Checked	Project Area
--	UKRA20_19	Unknown raptor	4/17/2020	46.2762	-99.6676	Ground	--	Unknown	Not Checked	2-mile
--	UKRA20_21	Unknown raptor	4/22/2020	46.2680	-99.6578	Ground	--	Unknown	Not Checked	Project Area
--	UKRA20_22	Unknown raptor	4/22/2020	46.1845	-99.6872	Ground	--	Unknown	Not Checked	2-mile
--	UKRA20_26	Unknown raptor	4/10/2020	46.2382	-99.5333	Ground	--	Unknown	Not Checked	2-mile
--	UKRA20_27	Unknown raptor	5/13/2020	46.2401	-99.6868	Ground	--	Unknown	Not Checked	2-mile
--	UKRA21_01	Unknown raptor	5/13/2021	46.2357	-99.6102	Micrositing	--	--	Unoccupied	Project Area
--	UKRA21_02	Unknown raptor	5/13/2021	46.2912	-99.6579	Micrositing	--	--	Unoccupied	Project Area

[a] Territory number is used for Bald Eagles to label distinct territories that may contain both in-use and alternate nests. A territory may only have one in-use nest (USFWS 2016).

[b] Nest ID numbers may not be consecutive as only raptor nests within two miles of the December 2020 project area are included.

[c] 2019 and 2020 nesting season status fields classify Bald Eagle nests following USFWS (2016).

[d] Raptor nest surveys were not scheduled in 2021 and most of the 2020 nests were therefore not checked in 2021. BAEA 21_01 was found during standardized eagle use surveys.

[e] December 2020 Survey buffer describes whether the observation occurred within the December 2020 project area or the 2-mile raptor nest survey buffer. Nests located beyond a 2-mile buffer of the December 2020 project area boundary are not included in this table.

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Territory Number[a]	Nest ID[b]	Species	Date Found	Latitude	Longitude	Survey Type	2019 Nesting Season Status[c]	2020 Nesting Season Status[d]	2021 Nesting Season Status[d]	December 2020 Boundary Survey Buffer[e]

[f] SWHA20_03 was observed during micrositing activities in May 2021 but no individuals were observed at the time. However, Swainson's Hawks have later nesting phenology than other raptors found within the project area and this nest may have become occupied later in the 2021 season.

- Surveys were conducted from the ground in 2020 and nest contents could not be seen. All nests holding a sitting adult were assumed to be incubating, though it is possible that adults were brooding young chicks. All nests were built in deciduous trees.

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Five occupied Ferruginous Hawk nests were found within the December 2020 project area and a surrounding two-mile raptor nest buffer. Two nests were found within the project area and three nests were found within the two-mile buffer (Figure 6). All five Ferruginous Hawk nests were initially discovered during Y1 surveys in 2019 (Atwell 2020a). A sixth occupied Ferruginous Hawk nest was found within the project area during micrositing activities in May of 2021. As previously mentioned, this nest is not depicted in Figure 6.

Five occupied Swainson's Hawk nests were found within the December 2020 project area boundary and a surrounding 2-mile raptor nest buffer (Figure 6). One nest was found within the project area and four nests were found within the two-mile buffer. All Swainson's Hawk nests were found during ground-based efforts; Swainson's Hawks have later nesting phenology than other raptors found within the project area and were still scarce at the time of the aerial raptor nest survey on April 10, 2020.

Eleven Red-tailed Hawk nests were found within the December 2020 project area and a surrounding two-mile raptor nest buffer (Figure 6). Four nests were found within the project area and seven nests were found within the two-mile buffer. Two of the nests within the project area that were occupied during the Y1 survey were found unoccupied during the Y2 survey. One Red-tailed Hawk nest that was found occupied within the project area during Y1 surveys was missing during Y2 surveys. The location of this nest is included in Table 3 and shown on Figure 6 but is not summarized in the above nest counts.

Five occupied Great Horned Owl nests were found within the December 2020 project area and a surrounding two-mile raptor nest buffer, three of them within the project boundary (Figure 6). One of the three nests within the project boundary was initially discovered during Y1 surveys in 2019.

Eleven likely raptor stick nests (unoccupied and not identified to species) were found within the revised December 2020 project area and a surrounding two-mile raptor nest buffer (Figure 6). Five of these were within the project area and six within the two-mile buffer (Figure 6). Ground-based follow-up surveys found the nests unoccupied and did not provide further information on the species identities for these unknown raptor nests. Two additional likely raptor stick nests (both unoccupied) were found within the project area during micrositing activities in May of 2021. As previously mentioned, these nest are not depicted in Figure 6. Furthermore, as described in Section 3.1.1.1, above, one unknown raptor nest that was initially discovered during Y2 surveys in April 2020 was later determined to be a Bald Eagle nest. This nest is not included in the summarized non-eagle nest counts, above, and is assigned Nest ID BAEA21_01 in Table 3.

3.2 SHARP-TAILED GROUSE LEK SURVEYS

Thirteen confirmed Sharp-tailed Grouse lek locations and two possible lek locations were found within the grouse survey area through a combination of aerial and ground-based efforts during the Y2 lek survey (Figure 7 and Table 4). The same area was surveyed in 2019 and 2020, which included the April 2019 project area and a surrounding one-mile survey buffer.

Table 4. Sharp-tailed Grouse Lek Locations

Lek Number	Latitude	Longitude	Status	April 2019 Boundary Buffer	December 2020 Boundary Buffer	Distance to December 2020 Project Area (miles)	Maximum Count[a]
1	46.341966	-99.458353	Possible Lek	1-mile	Beyond 1-mile	1.39	3
2	46.359088	-99.571498	Confirmed Lek	Project Area	Project Area	0.00	10*
3	46.286172	-99.524005	Confirmed Lek	Project Area	1-mile	0.21	15*
4	46.300468	-99.463506	Confirmed Lek	Project Area	1-mile	0.65	10*
5	46.281264	-99.476778	Confirmed Lek	Project Area	Project Area	0.00	14
6	46.324065	-99.453897	Confirmed Lek	1-mile	Beyond 1-mile	1.10	10*
7	46.22101	-99.71988	Confirmed Lek	Project Area	Project Area	0.00	4
8	46.382441	-99.710489	Confirmed Lek	Project Area	Beyond 1-mile	2.17	5
9	46.314892	-99.495277	Confirmed Lek	Project Area	Project Area	0.00	15
10	46.294829	-99.684162	Confirmed Lek	1-mile	1-mile	0.89	27
11	46.361242	-99.714363	Confirmed Lek	Project Area	Beyond 1-mile	2.32	6
12	46.374129	-99.689697	Confirmed Lek	1-mile	Beyond 1-mile	1.20	10*
13	46.349941	-99.65008	Possible Lek	Project Area	1-mile	0.25	1
14	46.394152	-99.767987	Confirmed Lek	1-mile	Beyond 1-mile	4.95	5*
15	46.37213	-99.56779	Confirmed Lek	1-mile	1-mile	0.36	3

[a] An asterisk (*) following the maximum count in this column indicates that count was an estimate as all or part of the lek was heard only.

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Four confirmed lek locations were observed within the December 2020 project area, four confirmed and one possible lek location were observed within the one-mile buffer, and five confirmed and one possible lek location were observed beyond the December 2020 project area's one-mile buffer.

Four confirmed leks were found during aerial surveys and the remaining nine were found during ground-based surveys. Confirmed leks held four to 27 individuals. Confirmed and possible leks are depicted with 0.5-mile-radius buffers to represent likely nesting areas for females (Dyke et al. 2015).

3.3 EAGLE USE SURVEYS

Eagle use survey results, along with discussion regarding annual and seasonal patterns, spatial distribution of observations across the project area, individuals' directional movements at the time of observation, and flight heights are presented below.

3.3.1 Eagle Use Survey Effort

Table 5 summarizes the Y2 eagle use survey effort by point count station. Eagle use surveys occurred over 636 total hours of standardized survey effort during the study period. Total effort included 159 hours of spring surveys, 106 hours of summer surveys, 212 hours of fall surveys, and 159 hours of winter surveys. This matched seasonal and annual survey effort totals during Y1.

Table 5. Total Standardized Survey Effort by Point Count Station

Point Count Station	60 Minute Eagle Use Survey Standardized Effort (hours)[a]					10 Minute Avian Activity Survey Standardized Effort- Small-Bodied Species (hours)[a]		
	Spring	Summer	Fall	Winter	Total Hours	Spring	Fall	Total Hours
1	3	2	4	3	12	0.50	0.67	1.17
2	3	2	4	3	12	0.50	0.67	1.17
3	3	2	4	3	12	0.50	0.67	1.17
4	3	2	4	3	12	0.50	0.67	1.17
5	3	2	4	3	12	0.50	0.67	1.17
6	3	2	4	3	12	0.50	0.67	1.17
7	3	2	4	3	12	0.50	0.67	1.17
8	3	2	4	3	12	0.50	0.67	1.17
9	3	2	4	3	12	0.50	0.67	1.17
10	3	2	4	3	12	0.50	0.67	1.17
11	3	2	4	3	12	0.50	0.67	1.17
12	3	2	4	3	12	0.50	0.67	1.17

Point Count Station	60 Minute Eagle Use Survey Standardized Effort (hours)[a]					10 Minute Avian Activity Survey Standardized Effort- Small-Bodied Species (hours)[a]		
	Spring	Summer	Fall	Winter	Total Hours	Spring	Fall	Total Hours
13[a]	4	2	4	6	16	0.67	0.67	1.33
14[a]	2	2	4	0	8	0.33	0.67	1.00
15	3	2	4	3	12	0.50	0.67	1.17
16	3	2	4	3	12	0.50	0.67	1.17
17	3	2	4	3	12	0.50	0.67	1.17
18	3	2	4	3	12	0.50	0.67	1.17
19	3	2	4	3	12	0.50	0.67	1.17
20	3	2	4	3	12	0.50	0.67	1.17
21	3	2	4	3	12	0.50	0.67	1.17
22	3	2	4	3	12	0.50	0.67	1.17
23	3	2	4	3	12	0.50	0.67	1.17
24	3	2	4	3	12	0.50	0.67	1.17
25	3	2	4	3	12	0.50	0.67	1.17
26	3	2	4	3	12	0.50	0.67	1.17
27[b]	0	0	0	0	0	0.00	0.00	0.00
28[b]	0	0	0	0	0	0.00	0.00	0.00
29	3	2	4	3	12	0.50	0.67	1.17
30	3	2	4	3	12	0.50	0.67	1.17
31	3	2	4	3	12	0.50	0.67	1.17
32	3	2	4	3	12	0.50	0.67	1.17
33	3	2	4	3	12	0.50	0.67	1.17
34	3	2	4	3	12	0.50	0.67	1.17
35[c]	0	0	0	0	0	0.00	0.00	0.00
36[c]	0	0	0	0	0	0.00	0.00	0.00
37	3	2	4	3	12	0.50	0.67	1.17
38	3	2	4	3	12	0.50	0.67	1.17
39	3	2	4	3	12	0.50	0.67	1.17
40	3	2	4	3	12	0.50	0.67	1.17
41	3	2	4	3	12	0.50	0.67	1.17
42	3	2	4	3	12	0.50	0.67	1.17
43	3	2	4	3	12	0.50	0.67	1.17
44	3	2	4	3	12	0.50	0.67	1.17
45	3	2	4	3	12	0.50	0.67	1.17
46	3	2	4	3	12	0.50	0.67	1.17
47	3	2	4	3	12	0.50	0.67	1.17
48	3	2	4	3	12	0.50	0.67	1.17

Point Count Station	60 Minute Eagle Use Survey Standardized Effort (hours)[a]					10 Minute Avian Activity Survey Standardized Effort- Small-Bodied Species (hours)[a]		
	Spring	Summer	Fall	Winter	Total Hours	Spring	Fall	Total Hours
49	3	2	4	3	12	0.50	0.67	1.17
50	3	2	4	3	12	0.50	0.67	1.17
51	3	2	4	3	12	0.50	0.67	1.17
52	3	2	4	3	12	0.50	0.67	1.17
53	3	2	4	3	12	0.50	0.67	1.17
54[d]	3	2	4	3	12	0.50	0.67	1.17
55[d]	3	2	4	3	12	0.50	0.67	1.17
56[d]	3	2	4	3	12	0.50	0.67	1.17
57[d]	3	2	4	3	12	0.50	0.67	1.17
Grand Total	**159**	**106**	**212**	**159**	**636**	**26.50**	**35.33**	**61.83**

[a] Due to the seasonal inaccessibility of some point count stations between November 2019 and March 2020, a winter alternate point count survey strategy was employed (see Section 2.3). Refer to Table 2 for a list point count stations with their paired alternate stations.

[b] Point count station dropped in August 2019 (Year 1) due to landowner concerns.

[c] Point count station dropped in April 2020 (Year 1) due to landowner concerns

[d] Point count station added in August 2019 (Year 1) as a replacement for dropped point count station.

Over the course of the Y2 study period station 14 was not accessible during the winter and early spring, and its paired replacement (station 13) was surveyed as an alternative, as described in Section 2.3 above.

3.3.2 Cumulative Detections of Bald Eagles and Golden Eagles

Overall, 35 Bald Eagles were detected over 636 hours across one year of standardized eagle use survey effort in Y2 (Figure 8). These results were similar to the 34 detections recorded over the same amount of survey effort during Y1. An additional 30 incidental detections of Bald Eagles were documented across the project area during the Y2 survey period (Figure 8).

Six Golden Eagles were detected over 636 hours across one year of standardized eagle use survey effort in Y2, matching the number of standardized Golden Eagle detections recorded over 636 hours of standardized effort during Y1 (Figure 8). An additional 6 incidental Golden Eagle detections were documented across the project area during Y2.

3.3.3 Seasonality

During Y2 surveys Bald Eagles were recorded throughout most of the year, with most detections occurring during the fall migratory period. Bald Eagles were not detected during standardized eagle use surveys in January and February in both Y1 and Y2.

Mean use rates during the spring, summer, and winter periods were similar. Seasonal standardized mean use within the project area follows, as summarized in Table 6:

Table 6. Eagle Use Surveys - Seasonal Eagle Mean Use

	Spring				Summer				Fall				Winter			
Common Name	**Total Std. Detections[a]**	**Mean Use[b]**	**SD[c]**	**Occur. Freq.[d]**	**Total Std. Detections[a]**	**Mean Use[b]**	**SD[c]**	**Occur. Freq.[d]**	**Total Std. Detections[a]**	**Mean Use[b]**	**SD[c]**	**Occur. Freq.[d]**	**Total Std. Detections[a]**	**Mean Use[b]**	**SD[c]**	**Occur. Freq.[d]**
Bald Eagle	5	0.031	0.175	0.031	5	0.047	0.349	0.019	19	0.090	0.409	0.061	6	0.038	0.222	0.031
Bald Eagle – *all heights*[e]	6	0.038	0.222	0.031	5	0.047	0.349	0.019	19	0.090	0.409	0.061	6	0.038	0.222	0.031
Golden Eagle	0	-	-	-	0	-	-	-	2	0.009	0.097	0.009	4	0.025	0.157	0.025

[a] Total Std. Detections is the total number of standardized individuals detected within the 800 m–radius by 200 m-high survey cylinder during standardized use surveys

[b] Mean Use is the total standardized detections divided by the total number of 60-minute point count surveys conducted within the season. It is reported as "eagles/60-minute survey/800-m survey plot"

[c] SD is the standard deviation of Mean Use.

[d] Occur. Freq. (i.e., Occurrence Frequency) is the proportion of point count surveys at which a particular species was detected during the season

[e] "*all heights*" indicate that presented data includes an individual greater than 200 m in height.

- 0.03 Bald Eagle detections/60-minute survey/800 m plot (standard deviation [SD] = 0.175) during the spring period
- 0.05 Bald Eagle detections/60-minute survey/800 m plot (SD = 0.35) during the summer period
- 0.09 Bald Eagle detections/60-minute survey/800 m plot (SD = 0.41) during the fall survey period
- 0.04 Bald Eagle detections/60-minute survey/800 m plot (standard deviation [SD] = 0.22) during the winter period.

Accounting for the total eagle use survey effort across the project area during the year, the equivalent of one Bald Eagle was detected for every 26.5 hours, 21.2 hours, 11.2 hours, and 26.5 hours of standardized eagle use survey effort during the spring, summer, fall, and winter survey periods, respectively.

The observed decrease in standardized spring Bald Eagle detections between Y1 and Y2 was partly attributable to the establishment of a new nesting location in 2021 that was farther away from the nearest point count station than the 2019-2020 nest. Unlike the 2019-2020 nesting location, the new 2021 nest site was beyond 800 meters from the closest point count station. Spring 2021 detections of the nesting adults were therefore outside of the sample plot, necessitating their categorization as incidental detections. All standardized summer detections were associated with the nest that was in-use in 2020.

Golden Eagle detections were noted during the fall and winter periods. Standardized mean use within the project area was:

- 0.01 Golden Eagle detections/60-minute survey/800 m plot (SD = 0.10) during the fall period
- 0.03 Golden Eagle detections/60-minute survey/800 m plot (SD = 0.16) during the winter period

Accounting for the total eagle use survey effort across the project area during the year, the equivalent of one Golden Eagle was detected for every 106 hours of survey effort during the fall period and every 39.8 hours of survey effort during the winter period.

3.3.4 Spatial Distribution of Detections

Bald Eagle mean use rates were generally low across the project area (see Table 7 for a summary of use and Figure 5 for point count station locations). Thirteen of the 69 (19 percent) Bald Eagle observations across study area in Y1 and Y2 were recorded at station 4 and were of individuals associated with the in-use nest that was occupied in 2019 and 2020.

Table 7. Eagle Use Surveys - Seasonal Bald Eagle Mean Use by Point Count Station

	Spring			Summer			Fall			Winter			Full Year		
Point Count Station	Total Std. Detections[a]	Mean Use[b]	Standard Deviation	Total Std. Detections[a]	Mean Use[b]	Standard Deviation	Total Std. Detections[a]	Mean Use[b]	Standard Deviation	Total Std. Detections[a]	Mean Use[b]	Standard Deviation	Total Std. Detections[a]	Mean Use[b]	Standard Deviation
1	0	-	-	0	-	-	1	0.250	0.500	0	-	-	1	0.083	0.289
2	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
3	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
4	1	0.333	0.577	5	2.500	0.707	1	0.250	0.500	0	-	-	7	0.583	0.996
5	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
6	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
7	0	-	-	0	-	-	2	0.500	1.000	0	-	-	2	0.167	0.577
8	0	-	-	0	-	-	0	-	-	1	0.333	0.577	1	0.083	0.289
9	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
10	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
11	0	-	-	0	-	-	5	1.250	1.893	0	-	-	5	0.417	1.165
12	1	0.333	0.577	0	-	-	0	-	-	0	-	-	1	0.083	0.289
13	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
14[c]	0	-	-	0	-	-	0	-	-	N/A	N/A	N/A	0	-	-
15	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
16	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
17	1	0.333	0.577	0	-	-	0	-	-	0	-	-	1	0.083	0.289
18	0	-	-	0	-	-	0	-	-	1	0.333	0.577	1	0.083	0.289
19	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
20	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
21	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
22	1	0.333	0.577	0	-	-	0	-	-	0	-	-	1	0.083	0.289
23	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-

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	Spring			Summer			Fall			Winter			Full Year		
Point Count Station	Total Std. Detections[a]	Mean Use[b]	Standard Deviation	Total Std. Detections[a]	Mean Use[b]	Standard Deviation	Total Std. Detections[a]	Mean Use[b]	Standard Deviation	Total Std. Detections[a]	Mean Use[b]	Standard Deviation	Total Std. Detections[a]	Mean Use[b]	Standard Deviation
24	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
25	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
26	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
29	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
30	0	-	-	0	-	-	1	0.250	0.500	0	-	-	1	0.083	0.289
31	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
32	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
33	0	-	-	0	-	-	1	0.250	0.500	0	-	-	1	0.083	0.289
34	0	-	-	0	-	-	0	-	-	1	0.333	0.577	1	0.083	0.289
37	1	0.333	0.577	0	-	-	1	0.250	0.500	0	-	-	2	0.167	0.389
38	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
39	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
40	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
41	0	-	-	0	-	-	1	0.250	0.500	0	-	-	1	0.083	0.289
42	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
43	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
44	0	-	-	0	-	-	0	-	-	2	0.667	1.155	2	0.167	0.577
45	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
46	0	-	-	0	-	-	2	0.500	1.000	0	-	-	2	0.167	0.577
47	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
48	0	-	-	0	-	-	1	0.250	0.500	0	-	-	1	0.083	0.289
49	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
50	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
51	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
52	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-

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Point Count Station	Spring			Summer			Fall			Winter			Full Year		
	Total Std. Detections[a]	Mean Use[b]	Standard Deviation	Total Std. Detections[a]	Mean Use[b]	Standard Deviation	Total Std. Detections[a]	Mean Use[b]	Standard Deviation	Total Std. Detections[a]	Mean Use[b]	Standard Deviation	Total Std. Detections[a]	Mean Use[b]	Standard Deviation
53	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
54	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-
55	0	-	-	0	-	-	1	0.250	0.500	0	-	-	1	0.083	0.289
56	0	-	-	0	-	-	2	0.500	1.000	0	-	-	2	0.167	0.577
57	0	-	-	0	-	-	0	-	-	1	0.333	0.577	1	0.083	0.289

[a] Total Std. Detections is the total number of standardized individuals detected within the 800 m–radius survey cylinder during standardized use surveys

[b] Mean Use is the total standardized detections divided by the total number of 60-minute point count surveys conducted within the season. It is reported as "eagles/60-minute survey/800-m survey plot"

[c] Total Std. Detections and Mean Use are not applicable (N/A) at point 14 in the winter as this point was not accessible for surveys.

- This table only includes Bald Eagles within the sample plot at some point during the survey. One Bald Eagle was only observed above 200 m in altitude at station 22 in the spring and is excluded.

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Among the other 52 stations, stations 11 and 18 each recorded six standardized Bald Eagle detections within the sample plot over the Y1 and Y2 surveys cumulatively. Station 12 recorded five standardized detections over the 2-year period. Observations of small migrating groups of two to three Bald Eagles, which were infrequent events during the Y1 and Y2 surveys, contributed to higher numbers recorded at these three stations. The remaining 39 standardized Bald Eagle detections were recorded at 26 other point count stations.

Stations 11, 12, and 18 are in proximity and all three points are within 2 miles of a creek that flows northward from Wishek to Beaver Lake (Figure 5). All of the eagles observed at these three stations appeared to be in active migration. It is possible that migrating eagles may loosely follow this watercourse while moving through the area, slightly increasing use rates in this portion of the project area.

There was no apparent spatial pattern to Golden Eagle detections during Y2 surveys. The six Golden Eagle sightings were distributed across the project area. Golden Eagle detections were also similarly spread across the project area during Y1.

3.3.5 Directional Movements

Bald Eagle movements tended northward in the spring and southward in the fall during Y2 surveys, suggesting that most of the Bald Eagles observed during these seasons were actively migrating through the project area. This pattern resembled similar movement patterns observed during Y1.

Three of five Bald Eagle standardized detections that occurred during the spring season showed directional movement, with one individual moving to the north-northeast, one moving northeastward, and one moving eastward. Of 19 Bald Eagles observed in the fall, four were moving southward, three to the south-southeast, seven southeastward, and two eastwards.

Similar to Y1 surveys, four Bald Eagles were observed flying southward or southeastward in early to mid-December, suggesting that Bald Eagle fall migration continues through the project into mid-late December.

Golden Eagles were infrequently observed during Y2 surveys, and only three of the Golden Eagles observed showed directional movement. One individual observed on November 22, 2020 was flying southward and may have been actively migrating through the project area. Individuals observed flying northward in December and eastward in February may have been overwintering within or near the project area.

3.3.6 Flight Heights

Table 8 summarizes the mean distributions of minimum and maximum flight heights for eagles detected during standardized eagle use surveys. Y1 data and Y2 data have been pooled for more robust seasonal sample sizes.

Over the full 2-year study period, Bald Eagle mean minimum and maximum flight heights were within the RSZ during the spring and fall, and Bald Eagle mean maximum flight heights were within the RSZ during the winter. Sample sizes were low during some seasons, with only one Bald Eagle observed during standardized surveys in the summer and only eight Bald Eagles observed in the winter.

Golden Eagle seasonal results were similar, with spring and fall mean flight heights within the RSZ. Winter heights were lower and only the mean maximum flight height was within the RSZ during the winter.

Table 8. Eagle Use Surveys - Seasonal and Annual Eagle Mean Flight Heights

		Spring					Summer					Fall					Winter					Year-Round				
Species	Flight Height[a]	Sample Size[b]	Mean Flight Height (m)	SD[c]	Low 95% CI [d]	High 95% CI [d]	Sample Size[b]	Mean Flight Height (m)	SD[c]	Low 95% CI [d]	High 95% CI [d]	Sample Size[b]	Mean Flight Height (m)	SD[c]	Low 95% CI [d]	High 95% CI [d]	Sample Size[b]	Mean Flight Height (m)	SD[c]	Low 95% CI [d]	High 95% CI [d]	Sample Size[b]	Mean Flight Height (m)	SD[c]	Low 95% CI [d]	High 95% CI [d]
Bald Eagle	Min	22	87.6	114.7	36.8	138.5	1	25.0	N/A	N/A	N/A	29	40.5	38.3	26.0	55.1	8	22.0	17.3	7.5	36.5	60	55.1	77.9	34.9	75.2
Bald Eagle	Max	22	130.9	148.7	65.0	196.8	1	30.0	N/A	N/A	N/A	29	67.0	54.6	46.2	87.7	8	45.0	27.3	22.2	67.8	60	86.9	102.9	60.3	113.4
Golden Eagle	Min	1	80.0	N/A	N/A	N/A	-	-	-	-	-	5	40.2	46.2	-17.1	97.5	6	18.0	21.5	-4.5	40.5	12	32.4	36.5	9.2	55.6
Golden Eagle	Max	1	150.0	N/A	N/A	N/A	-	-	-	-	-	5	59.0	52.6	-6.3	124.3	6	42.5	20.2	21.3	63.7	12	58.3	45.7	29.3	87.4

[a] This column indicates if a particular row is providing results for the minimum (Min) or maximum (Max) flight height statistic.

[b] Sample size refers to the number of individuals that were detected in flight within 800 m of the point count station during standardized eagle use (60-minute) surveys. Raptor data from Year 1 and Year 2 have been combined to provide more robust sample sizes. Birds that were heard-only or perched-only were not included in the flight height analysis. All detections of birds observed in flight are included in flight height analyses, independent of whether the detection occurred above or below 200 m in height.

[c] SD is the standard deviation of Mean Minimum or Maximum Flight Height. N/A indicates that standard deviation could not be calculated as the sample size is one.

[d] This column indicates either the upper or lower bound of the 95% confidence interval. N/A indicates that the confidence interval could not be calculated as the sample size is one.

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A summary of accrued time within RSZ for Bald and Golden Eagles for the Y2 study period is presented in Table 9. The table also pools Y1 and Y2 data for more robust seasonal sample size.

Table 9. Eagle-Minutes and Time within Rotor Swept Zone Summaries for Bald Eagles and Golden Eagles

	Spring	Summer	Fall	Winter	Annual Total
Annual Survey Effort (hours)	159	106	212	159	636
Y2 EAGLE-MINUTES SUMMARY					
BAEA Eagle-Minutes[a]	8	0	49	19	76
BAEA Eagle-Minutes per Survey Hour	0.050	0.000	0.231	0.119	0.119
GOEA Eagle-Minutes	0	0	11	15	26
GOEA Eagle-Minutes per Survey Hour	0.000	0.000	0.052	0.094	0.041
Y1 and Y2 EAGLE MINUTES COMBINED					
BAEA Eagle-Minutes[a]	50	1	82	24	157
BAEA Eagle-Minutes per Survey Hour	0.157	0.005	0.193	0.075	0.123
GOEA Eagle-Minutes	6	0	23	18	47
GOEA Eagle-Minutes per Survey Hour	0.019	0.000	0.054	0.057	0.037
Y2 MINUTES WITHIN ROTOR SWEPT ZONE (RSZ) SUMMARY					
BAEA minutes within RSZ[b]	2.4	0	34.5	6	42.9
BAEA minutes within RSZ per Survey Hour	0.015	0.000	0.163	0.038	0.067
GOEA time within RSZ	0	0	5.6	6.2	11.8
GOEA minutes within RSZ per Survey Hour	0.000	0.000	0.026	0.039	0.019
Y1 and Y2 MINUTES WITHIN ROTOR SWEPT ZONE (RSZ) COMBINED					
BAEA minutes within RSZ[b]	20.2	0	45	8	73.2
BAEA minutes within RSZ per Survey Hour	0.064	0.000	0.106	0.025	0.058
GOEA time within RSZ	6	0	10.2	6.2	22.4
GOEA minutes within RSZ per Survey Hour	0.019	0.000	0.024	0.019	0.018

[a] Minutes within the standardized 800 m-radius by 200 m-high sample plot as described by the ECPG and final Eagle Rule. Each individual observation is rounded to the next highest integer. For example, an eagle observed for 1.3 minutes in flight within the sample plot is assigned two eagle minutes. Perched eagles and eagles outside of the sample plot are not assigned eagle minutes.

[b] Minutes within the rotor swept zone (RSZ) is used as a metric of flight behavior that could expose a passing bird to collision with operating turbine blades. RSZ represents a predetermined range of above-ground heights within a hypothetical turbine blade sweep of 35 - 150 m within the 800 m-radius sample plot. Measured to the 0.1 minute.

Bald Eagle rates of flying within the RSZ were highest in the fall (0.11 minutes within RSZ/ hour of standardized observation) and spring (0.06 minutes within RSZ/hour of standardized observation) over the Y1 and Y2 study periods combined. Bald Eagles were more infrequently observed within the RSZ during the winter and never observed to fly within the RSZ during the summer period over two years of observation (Table 9).

Golden Eagle rates of flying within the RSZ were similar during the spring, fall, and winter over the Y1 and Y2 study periods (Table 9). Golden Eagles were not observed to fly within the RSZ during the summer period over Y1 and Y2 surveys.

3.3.7 Eagle-Minutes Summary

Eagle-minutes represent accrued minutes of eagle observations for flying eagles within the sample plot associated with each point count station. Perched eagles or eagles observed outside of the sample plot are not assigned eagle-minutes (USFWS 2013). Eagle-minutes are summarized by season for the Y2 study period and also for Y1 and Y2 combined in Table 9. Seasonal survey effort is summarized in Section 3.3.1.

The Y2 cumulative total of 76 eagle minutes was similar to the Y1 annual total of 81 minutes over 636 hours of standardized surveys each year. Bald Eagle seasonal eagle minute rates were highest in the fall (0.23 Bald Eagle minutes per hour of standardized eagle use observation) and winter (0.12 Bald Eagle minutes per survey hour), and lower in the spring (0.05 Bald Eagle minutes per survey hour). All Y2 summer detections were of perched Bald Eagles associated with the in-use nest location.

Cumulatively, 157 total Bald Eagle minutes were recorded over 1,272 hours over two years, a rate of 0.12 eagle minutes / hour of standardized surveys.

Cumulatively, 47 total Golden Eagle minutes were recorded over 1,272 hours over two years, a rate of 0.04 eagle minutes / hour of standardized surveys. Observed Golden Eagle-minute rates were at their relative highest in the winter (0.09 Golden Eagle minutes per survey hour) and lower in the fall (0.05 Golden Eagle minutes per survey hour) across the Y2 study period. Golden Eagle minutes were not recorded during the spring or summer during Y2 surveys.

3.4 AVIAN USE POINT COUNT SURVEYS

The following sections summarize the results of the avian use surveys.

3.4.1 General Avian Use

Mean use data for all 97 species observed during Y2 avian use surveys are presented in Appendix B. A list of species observed within the project area over the full Y1 and Y2 study periods (including incidentally observed species) is included in Appendix C.

Passerine, non-passerine, upland gamebird, wader, waterbird, and waterfowl mean use statistics, discussed in more detail below, are summarized by species group in Table 11 and by individual species in Appendix B.

Table 10. Standardized Avian Use Surveys - Seasonal Mean Use by Species Group

	Spring					Fall				
Species Group	**Total Std. Detections[a]**	**% Comp.[b]**	**Mean Use[c]**	**SD[d]**	**Occur. Freq.[e]**	**Total Std. Detections[a]**	**% Comp.[b]**	**Mean Use[c]**	**SD[d]**	**Occur. Freq.[e]**
Large-bodied Corvid	6	0.05%	0.038	0.476	0.006	28	0.17%	0.132	1.720	0.019
Non-passerine (large)	46	0.38%	0.289	1.544	0.069	74	0.46%	0.349	1.742	0.075
Non-passerine (small)	35	0.29%	0.220	0.801	0.107	85	0.53%	0.401	1.108	0.189
Passerine	4,725	39.21%	29.717	59.438	0.943	13,617	85.02%	64.231	438.807	0.849
Raptor	41	0.34%	0.258	0.565	0.208	110	0.69%	0.519	1.009	0.311
Shorebird	113	0.94%	0.711	1.420	0.352	93	0.58%	0.439	1.467	0.179
Unknown Species Group	12	0.10%	0.075	0.485	0.031	39	0.24%	0.184	1.105	0.080
Upland Gamebird	43	0.36%	0.270	0.744	0.176	20	0.12%	0.094	0.576	0.047
Wader	420	3.49%	2.642	14.194	0.075	106	0.66%	0.500	3.562	0.061
Waterbird	412	3.42%	2.591	10.219	0.226	416	2.60%	1.962	9.091	0.108
Waterfowl	6,196	51.42%	38.969	250.351	0.346	1,429	8.92%	6.741	32.012	0.118
ALL BIRDS	**12,049**	**100.00%**	**75.780**	**254.263**	**0.969**	**16,017**	**100.00%**	**75.552**	**439.179**	**0.915**

[a] Total Std. Detections is the total number of standardized individuals detected within a 300-m radius (small-bodied species) or 800-m radius (large-bodied species) of the point count station during standardized use surveys. Because small-bodied birds species are the primary focus of avian use surveys, birds detected at all flight heights were recorded, analyzed, and presented in this table.

[b] % Comp. (i.e., percent composition) is the proportion of all birds that a particular species group comprises during the season using total standardized detections.

[c] Mean Use is the total standardized detections divided by the total number of 10-minute point count surveys conducted within the season. It is reported as birds/10-minute survey/survey plot, where the survey plot size varies as described in footnote a.

[d] SD is the standard deviation of Mean Use.

[e] Occur. Freq. (i.e., Occurrence Frequency) is the proportion of point count surveys at which a particular species group was detected during the season.

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3.4.2 Species Group Use of the Project Area during Spring and Fall Migration

Avian use surveys occurred over 26.50 spring hours and 35.33 fall hours at 53 point count stations (Table 5). This was the same effort completed for the Y1 avian use surveys. Interannual comparisons therefore are drawn from the same amount of survey effort in each year of study and are reported in number of standardized detections (rather than mean use rate values in units of detections/survey duration/plot radius) for readability.

Large-bodied Corvids

Large-bodied corvids include crows and ravens. Y2 results for this species group were similar to Y1,with small numbers of American Crows detected each year: Thirty-three American Crows were detected on standardized avian use surveys during Y2; and 30 American Crows were detected over the same amount of effort during Y1 (Appendix B-1). Approximately three-quarters of American Crow detections occurred in the fall in both years. One Common Raven was detected during the fall in each year of surveys.

Passerines (including Small-bodied Corvids)

This species group was analyzed out to 150 m during Y1 surveys and the plot radius was adjusted out to 300 m for the Y2 study period. This adjustment in sample plot radius better captured the effective detection radius for these and other easily-detected species in open habitats found in the project area during the spring and fall periods (Thomas et al. 2010).

As observed during Y1, passerines accounted for a large portion of all avian detections during Y2, both in the spring (76 percent of all detections) and fall (96 percent of all detections). Seasonal passerine mean use patterns were reversed from Y1, however. During Y1, passerine mean use of the project area was much higher in the spring than in the fall (45.89 detections/10-minute survey/150 m plot in the spring and 11.77 detections/10-minute survey/150 m plot in the fall). During Y2, passerine mean use was 64.23 detections/10-minute survey/300 m plot in the fall and 29.72 detections/10-minute survey/300 m plot in the spring (Appendix B-2).

The Y1 pattern of lower passerine fall mean use relative to spring mean use was unexpected and can in part be ascribed to the 150 m plot radius used during Y1 surveys. Specifically, large flocks of blackbirds were detected at distances between 150 and 300 m from the point during Y2 fall surveys. Detections of fall blackbirds at this distance were beyond 150 m and therefore regarded as incidental detections during Y1. Brewer's Blackbird (686 fall detections and 18 spring detections), Red-winged Blackbird (5,906 fall detections and 1,011 spring detections), and

Common Grackle (3,968 fall detections and 317 spring detections) all contributed to this seasonal pattern during Y2.

Large flocks of several hundred to 2,000 blackbirds of various species were observed at stations 2, 3, and 4 in the northwestern portion of the project area, apparently drawn to planted sunflower crops and to adjacent woodlots and shelterbelts that provided cover and roosting opportunities in close proximity to sunflowers. In addition, large flocks were associated with a livestock feedlot at station 39 in the southern portion of the project area.

Lapland Longspurs (*Calcarius lapponicus*) contributed to higher relative spring use found during Y1 and Y2. Seasonal differences in Lapland Longspur detections were not as pronounced in Y2 as in Y1 (6,245 spring detections and 498 fall detections during Y1; 2,294 spring and 1,238 fall detections during Y2). The observed decrease in Lapland Longspur detections between Y1 and Y2 may be due to changes in productivity on the species' breeding grounds, as longspurs were observed throughout the project area in cultivated cropland, and habitat and food availability did not appear to change for this species over the two years of study.

Encounters with large flocks of longspurs or blackbirds were not clearly attributable to unique habitats and/or physiography present at stations with highest recorded mean use rates for these species (blackbirds congregating at a feedlot near station 39 were a notable exception to this pattern), and the Atwell biologist noted that it was apparent that these longspur and blackbird flocks could have appeared at any location in the project area during migration given the condition and crops of nearby agricultural fields.

Large-bodied Non-Passerines

Large-bodied non-passerines include nightjars and Rock Pigeons (*Columba livia*). Large-bodied non-passerines were detected with less frequency during Y2 surveys (120 total detections) than during Y1 (183 total detections; Appendix B-1).

As observed during Y1, Rock Pigeons represented nearly all large-bodied non-passerine detections. Rock Pigeon were often detected near farms and home throughout the project area, and large flocks of 20 – 30 individuals were observed at a feedlot near station 39 during the Y1 study period. Large flocks of this size were not observed during Y2 surveys.

Small-bodied Non-Passerines

Small-bodied non-passerine mean use within the project area was higher in the fall (0.40 detections/10-minute survey/300 m plot) than in the spring (0.22 detections/10-minute survey/300 m plot; Appendix B-2). Mourning Doves (*Zenaida macroura*) were the most common small-bodied non-passerine detected and accounted for 86 percent of the observations of this

species group in the spring and 92 percent of the observations of birds within this group in the fall. Much of the seasonal difference in mean use rate for this species group was attributable to higher numbers of Mourning Doves detected during the fall season.

Shorebirds

Shorebirds include avocets, plovers, curlews, dowitchers, godwits, knots, phalaropes, sandpipers, snipes, stilts, turnstones, and woodcocks. Interannual shorebird mean use rates within the project area were similar; 208 shorebirds were detected during standardized avian use surveys in Y1, and 206 shorebirds were detected during Y2 (Appendix B-4).

Shorebirds were encountered in low numbers and frequencies throughout the project area and across several habitats. Over both Y1 and Y2 study periods the stations with highest shorebird detection rates were in higher elevation grassland/pothole habitats along the project area's northeastern boundary, particularly near point count stations 22, 51, and 52. Stations 51 and 52 are beyond the December 2020 project boundary. Killdeer accounted for nearly two-thirds of all shorebird detections during the Y2 study period.

Upland Gamebirds

Upland gamebirds include bobwhite, grouse, partridge, prairie-chickens, and turkey. Upland gamebird mean use within the project area was higher in the spring (0.27 detections/10-minute survey/800 m plot) than the fall (0.09 detections/10-minute survey/800 m plot) (Appendix B-1). These species are non-migratory and are present year-round within the project area. Seasonal differences are potentially attributable to seasonal differences in detectability stemming from behavior and vocalization frequency during the spring (Connelly et al. 1998; Giudice and Ratti 2020).

As a group, upland gamebird seasonal and overall mean use rates were nearly identical between Y1 (42 spring and 21 fall detections) and Y2 (43 spring and 20 fall detections). However, Sharp-tailed Grouse detections decreased between Y1 (38 detections) and Y2 (18 detections). Habitat availability appeared unchanged between Y1 and Y2. Of note, the project area experienced drier conditions during the late winter and early spring lekking period in Y2 than during the lekking period in Y1 (NOAA 2021).

All but one Sharp-tailed Grouse detection during the Y2 study period occurred within the green-shaded "Sharp-tailed Grouse Priority Areas" (Figure 7) that were used to target Y2 lek surveys (Section 2.2), suggesting that this habitat designation is a good indicator of Sharp-tailed Grouse occurrence.

Waders

Waders include cranes, bitterns, egrets, and herons. Nearly all (97 percent) Y2 detections of waders were Sandhill Cranes, and over 80 percent of Sandhill Crane detections occurred during the spring. Whooping Cranes were not observed during Y2 surveys.

Wader mean use rates were higher during the Y2 study period (526 total detections during standardized avian use surveys when considering individuals observed at all flight heights) than Y1 (388 total detections during avian use surveys at all heights). A large proportion of Sandhill Crane detections (35 percent) were noted at heights of over 200 m.

More standardized detections of waders of all species were recorded during the Y2 study period than during Y1, including Great Egret (*Ardea alba*) and American Bittern (*Botaurus lentiginosus*), two species that were only observed incidentally during the Y1 study period. The project area experienced drier conditions during the Y2 study period than during Y1, potentially limiting the extent of foraging habitat available to wading species during the Y2 study period.

Waterbirds

Waterbirds include cormorants, grebes, gulls, and loons. Overall waterbird mean use was 2.59 detections/10-minute survey/800 m plot in the spring and 1.96 detections/10-minute survey/800 m plot in the fall during the Y2 study period.

Waterbird detection rates were seasonally similar in Y2 (412 spring detections and 416 fall detections). There were notably more fall detections in Y1 (132 spring detections and 2,148 fall detections.

Most of the observed difference in seasonal and interannual use patterns can be attributed to patterns in Franklin's Gull (*Leucophaeus pipixcan*) use, an SCP Level I species. Franklin's Gulls were observed flying through the project area more frequently in the fall over both the Y1 and Y2 study periods (Y1: 2 spring detections and 2,023 fall detections; Y2: 199 spring detections and 342 fall detections; Appendix B-4).

There are no known Franklin's Gull nesting colony sites within the project area, and fall detections appear to represent post-breeding movements from locations beyond the project area. Reasons for diminished numbers observed during the fall period in Y2 are unclear. During Y1, large flocks were found opportunistically foraging in agricultural habitats following harvesting and haying activities (e.g., the August 27, 2019 observation of 500 individuals). This is an expected observation for gulls moving in large numbers over agricultural cropland habitats, yet one not observed during standardized surveys during the fall period in Y2. As found with Snow Geese above, the observed decrease in fall Franklin's Gull detections may have been due to chance. A large group of approximately 1,000 individuals was detected incidentally beyond 800 m during

standardized eagle use surveys on September 22, 2020 at station 23, demonstrating the presence of Franklin's Gull flocks during Y2 surveys.

The waterbird species that were most frequently observed at flight heights within the RSZ included Franklin's Gull, Ring-billed Gull (*Larus delawarensis*), California Gull (*Larus californicus*), American White Pelican (*Pelecanus erythrorhynchos*), and Double-crested Cormorant (*Phalacrocorax auritus*). These species tended to be observed in the northeastern third of the project area, in Logan County.

Waterfowl

The waterfowl species group refers to the taxonomic order Anseriformes and includes geese and ducks. Waterfowl mean use rates were significantly higher in the spring in both years of study, a pattern influenced by spring geese migration through the project area (Y1 spring and fall waterfowl mean use: 84.18 and 2.31 detections/10-minute survey/800 m plot, respectively; Y2 spring and fall waterfowl mean use: 38.97 and 6.74 detections/10-minute survey/800 m plot, respectively).

Several thousand fewer Snow Geese (*Anser caerulescens*) were detected during the Y2 spring study period (5,224 detections) than during the Y1 spring study period (11,093 detections). This interannual variation may have been due to chance encounters of large flocks. Large flocks were not encountered as frequently during the short duration counts in Y2, but large numbers of Snow Geese were observed in the vicinity of the project area yet were not observed during surveys. Regionally, peak Snow Goose migration occurred during the week of March 22 during both years of study (eBird 2021). Large numbers of Snow Geese were contemporaneously reported near the project area during peak migration in Y2, including a report of 10,000 Snow Geese at nearby Beaver Lake, within a mile of the project area (eBird 2021). In addition, several large groups of Snow Geese were observed incidentally during the second half of March (e.g., over 6,000 Snow Geese were observed at station 48 on March 18, 2021).

Migrating geese species accounted for the majority of overall waterfowl use in both years and in similar relative proportions in both years. Snow Geese, Ross's Geese (*Anser rossii*), Greater White-fronted Geese (*Anser albifrons*), Cackling Geese (*Branta hutchinsii*) and Canada Geese (*Branta canadensis*) together accounted for 5,926 of 6,196 (96 percent) of spring waterfowl detections during Y2. The Y2 spring mean use rates for the most commonly observed geese species included: 32.86 detections/10-minute survey/800 m plot for Snow Geese, and 2.17 detections/10-minute survey/800 m plot for Greater White-fronted Geese (Appendix B-5).

Prairie pothole habitats in the vicinity of the project primarily occur to the northeast of the project area. Point count stations 22, 51, 52, and 53 had highest annual waterfowl species

richness values during both Y1 and Y2. Stations 51, 52, and 53 are located beyond December 2020 project boundary.

3.4.3 Special Status Species

ESA-listed Species

No ESA-listed avian species were observed over the Y2 study period.

Species of Conservation Priority

Several species that are listed as North Dakota SCP were detected during standardized avian use surveys, summarized by group in the following sections.

Passerines

Sprague's Pipit: SCP Level I; zero spring detections and two fall detections during standardized avian use surveys; incidental detections during eagle use surveys at 10 of 53 (19 percent) point count stations. All observations occurred during fall migration, after July 28. Eleven of the 13 total Y2 observations of individuals or groups occurred in the northern half of the project area, within Logan County. It was not apparent why more observations were recorded over the Y2 study period than during Y1, when Sprague's Pipits were observed on only two occasions (also in the fall). Atwell did not note behaviors that would confirm local breeding (e.g., song displays, nesting material carries, food carries to dependent young, dependent fledglings) during the 13 detections. Observations occurred in wheat stubble and on grassy hilltops, habitat features found throughout the project area.

Grasshopper Sparrow: SCP Level I; 4 spring detections and zero fall detections during standardized avian use surveys. Atwell notes that Grasshopper Sparrows were also incidentally observed at approximately 50 percent of point count stations, were observed throughout the project area, and were often associated with grassland habitats. Grasshopper Sparrows were detected much more frequently during the summer survey period and likely breed within the project area. Atwell notes that the majority of incidental observations occurred during eagle use surveys in June or July, which was outside of the spring and fall survey periods.

Nelson's Sparrow: SCP Level I; Nelson's Sparrow was not observed during standardized avian use surveys. One individual was detected incidentally at station 37. Prefers shallow marsh edges and wet meadows (Dyke et al. 2015) and may nest locally in appropriate habitats within the project area. Station 37 is near riverine wetland associated with a tributary of the south branch of Beaver Creek flowing through the southwestern portion of the project area. Riparian areas north and west of Wishek may also support riverine wetlands that are favorable to this species.

Chestnut-collared Longspur: SCP Level I; 55 spring detections and 92 fall detections during avian use surveys. Atwell notes that Chestnut-collared Longspur was also incidentally observed at 70 percent of point count stations. Over the Y2 study period, Chestnut-collared Longspur mean use rates were 0.35 detections/10-minute survey/300 m plot during the spring and 0.43 detections/10-minute survey/300 m plot during the fall. Males were frequently seen singing, and this species likely breeds within the project area. While observed throughout the project area, Chestnut-collared Longspurs were most frequently observed in the northern and eastern portions of the project area that are higher in elevation and are dominated by herbaceous cover as shown in Figure 2 (e.g., stations 12, 13, 17, and 21).

LeConte's Sparrow: SCP Level II; LeConte's Sparrow was not observed during avian use surveys; however, singing males were detected incidentally in July at stations 37 and 57. Stations 37 and 57 are near riverine wetlands associated with tributaries of Beaver Creek. The wet/riparian areas associated with station 57 are west and outside of the December 2020 project area boundary. Similar to Nelson's Sparrow, LeConte's Sparrows may nest locally in and near similar riverine habitats within the project area.

Bobolink: SCP Level II; Bobolink was detected 22 times in the fall and 30 times in spring. Atwell notes that Bobolink were incidentally observed at 98 percent of point count stations in June and July. Dependent fledglings were observed in early August at station 32, confirming breeding. Bobolink mean use rates were 0.14 detections/10-minute survey/300 m plot during both the spring and fall.

Western Meadowlark: SCP Level II; 171 spring detections and 114 fall detections of Western Meadowlark were recorded during standardized avian use surveys. Atwell also notes that Western Meadowlark were incidentally observed as incidental detections at all point count stations in June and July. Western Meadowlark mean use rates were 1.08 detections/10-minute survey/300 m plot during the spring and 0.54 detections/10-minute survey/300 m plot during the fall.

Raptors

American Kestrel: SCP Level II; American Kestrels were detected three times in the spring and six times in the fall during Y2 standardized avian use surveys. Over the Y2 study period, American Kestrel mean use rates were 0.019 detections/10-minute survey/800 m plot during the spring and 0.028 detections/10-minute survey/800 m plot during the fall. Standardized and incidental observations of American Kestrel were distributed throughout the project area.

Bald Eagle: SCP Level II; Bald Eagles were detected four times in the spring and three times in the fall during Y2 standardized avian use surveys. Over the Y2 study period, Bald Eagle mean use rates

were 0.025 detections/10-minute survey/800 m plot during the spring and 0.14 detections/10-minute survey/800 m plot during the fall. Section 3.3 provides more in-depth detail on Bald Eagle use of the project area.

Ferruginous Hawk: SCP Level I; Ferruginous Hawks were detected twice times in the spring but was not detected in the fall during Y2 standardized avian use surveys. The spring mean use rate for Ferruginous Hawk was 0.013 detections/10-minute survey/800 m plot during Y2. Despite the low number of detections during standardized avian use surveys, standardized or incidental observations of Ferruginous Hawks occurred at 43 percent of point count stations and were distributed throughout the project area.

Northern Harrier: SCP Level II; Northern Harriers were detected eight times in the spring and 15 times in the fall during Y2 standardized avian use surveys. Over the Y2 study period, Northern Harrier mean use rates were 0.050 detections/10-minute survey/800 m plot during the spring and 0.071 detections/10-minute survey/800 m plot during the fall. Standardized and incidental observations of Northern Harrier were distributed throughout the project area. Northern Harriers were observed at nearly 40 percent of survey points during standardized avian use surveys and 96 percent of survey points when including incidental observations.

Swainson's Hawk: SCP Level I; A total of two Swainson's Hawk detections occurred in the spring and 27 occurred in the fall during Y2 standardized avian use surveys. Over the Y2 study period, Swainson's Hawk mean use rates were 0.013 detections/10-minute survey/800 m plot during the spring and 0.127 detections/10-minute survey/800 m plot during the fall. Standardized and incidental observations of Swainson's Hawk were distributed throughout the project area. Swainson's Hawks were observed at 32 percent of survey points during standardized avian use surveys and nearly 91 percent of survey points when including incidental observations.

Shorebirds

Marbled Godwit (*Limosa fedoa*): SCP Level I; There were seven spring detections of nine individuals and zero fall detections of Marbled Godwit. Atwell also incidentally observed Marbled Godwit at 19 percent of point count stations. Marbled Godwits may nest within the project area in low numbers, but specific favored locations were not apparent during Y1 and Y2 surveys. During the Y1 study period, agitated behavior was recorded at station 16 on June 10, 2019, suggesting that a nest or brood was nearby. Breeding behaviors were not observed during Y2 surveys, and godwits were not observed at station 16 during the Y2 study period.

Wilson's Phalarope (*Phalaropus tricolor*): SCP Level I; 3 detections of 4 individuals and zero fall detections of Wilson's Phalarope in Y2 compared to 2 detections of 6 individuals during

standardized avian use surveys in Y1. Wilson's Phalaropes were observed at stations 15 and 22 in both Y1 and Y2, suggesting that they may locally breed at some wetlands within the project area.

Upland Sandpiper (*Bartramia longicauda*): SCP Level II; 26 detections of 34 individual Upland Sandpipers were observed in the spring and fall into mid-August of Y2. Atwell notes that Upland Sandpipers were detected at 36 percent of point count stations. Upland Sandpipers likely nest in roadside habitats/ditches, grasslands, and cropland (particularly no-till) habitats throughout the project area.

Waders

American Bittern

American Bittern is a Level I SCP that nests in wetlands with tall emergent vegetation (Dyke et al. 2015) and was vocalizing at a wetland near station 53 on May 15, 2020. Bitterns were not observed at this location on subsequent surveys, but individuals are difficult to detect from roadsides when silent and may nonetheless nest at this location. Station 53 is outside of the project area's new December 2020 boundary, but this species may nest in similar habitats within the project area.

Waterbirds

Horned Grebe (*Podiceps auratus*): SCP Level I; only observed during the spring and summer in Y1 at station 52. Station 52 is near several prairie potholes and is not within the December 2020 project area.

American White Pelican: SCP Level II; three spring detections of 62 individuals and one fall detection of two individuals were recorded during surveys. American White Pelican were also incidentally observed in the spring, summer, and fall. Nesting colonies were not observed and are not known to exist within the project area. Flocks of up to 60 individuals were encountered at 20 of 53 point count stations (38 percent) throughout the project area.

Black Tern (*Chlidonias niger*): SCP Level 1; five spring detections and one fall detection in Y2. Black Tern were generally observed in low numbers in the northeastern portion of the project area in association with greater wetland density. Nesting colonies were not observed within the project area.

Waterfowl

Northern Pintail (*Anas acuta*): SCP Level II; 31 spring detections and 5 fall detections of Northern Pintail were documented during Y2 surveys. Atwell notes that Northern Pintail were also observed at 66 percent of point count stations during the Y2 study period. Thirty-six detections of

Northern Pintail during Y2, less than 109 detections recorded in Y1. Pintails were usually observed singly or in small groups of less than five individuals in wetlands cropland habitats throughout the project area. Pintail fledglings were not noted during Y2 surveys, but this species may nest near wetland complexes in associated prairie habitats.

Canvasback (*Aythya valisineria*): SCP Level II; Two Canvasback were observed during Y2 surveys. Both observations occurred at the northeastern portion of the study area at stations 5 and 53 in May. Atwell did not observe evidence of breeding within the project area.

3.4.4 Flight Heights by Species Group during Spring and Fall Migration

For large-bodied corvids, one of four (25 percent) fall flocks entered the RSZ during observation. When considering counts of individual large-bodied corvids instead of flocks, 1 of 28 (4 percent) individuals were detected within the RSZ in the fall. No large-bodied corvids were observed within the RSZ during standardized surveys in the spring.

For small-bodied birds (passerines and small-bodied non passerines), 42 of 1136 (4 percent) spring flocks and 58 of 958 (6 percent) fall flocks entered the RSZ during observation. When considering counts of individual small-bodied birds instead of flocks, 925 of 4,760 (19 percent) spring detections and 868 of 13,702 (6 percent) fall detections were observed within the RSZ. Large spring flocks of Lapland Longspurs and Red-winged Blackbirds contributed to the disproportionately high percentage of individual spring detections within the RSZ.

Approximately 41 percent of all raptors observed during the spring (17 out of 41 total raptor detections) flew within the RSZ at some point during observation. Similarly, 40 percent (42 out of 104 total raptor detections) of all raptors observed during the fall flew within RSZ at some point during the observation. Red-tailed hawks and Swainson's Hawks comprised the majority of raptor species observed within RSZ. Turkey Vultures, Red-tailed Hawks and Swainson's Hawks were often found within the RSZ. Only two level I SCP Ferruginous Hawks were recorded during year 2 avian use surveys, both of which were within the RSZ. Level II Northern Harriers and American Kestrels, however, tended to fly below RSZ. One Bald Eagle was observed flying above RSZ.

For shorebirds, five of 97 (5 percent) spring flocks and five of 69 (7 percent) fall flocks entered the RSZ during observation. When considering counts of individual shorebirds instead of flocks, seven of 113 (6 percent) spring detections and 16 of 93 (17 percent) fall detections were observed within the RSZ. Detections within the RSZ were primarily comprised of Killdeer, though Marbled Godwit and Upland Sandpiper were occasionally observed within the RSZ, as well.

For waders, nine of 28 (32 percent) spring flocks and 22 of 74 (30 percent) fall flocks entered the RSZ during observation. When considering counts of individual waders instead of flocks, 147 of

420 (35 percent) spring detections and 47 of 106 (44 percent) fall detections were observed within the RSZ. Detections within the RSZ were primarily comprised of Sandhill Cranes and, to a lesser extent, Great Blue Herons. A total of 18 flocks (64 percent of waterbird flocks), all Sandhill Cranes (257 individuals), were observed flying above RSZ. Fourteen of these flocks (205 individuals) were observed in the spring whereas four (52 individuals) were observed in the fall.

For waterbirds, 20 of 91 (22 percent) spring flocks and three of 14 (21 percent) fall flocks entered the RSZ during observation. When considering counts of individual waterbirds instead of flocks, 242 of 435 (56 percent) spring detections and 312 of 646 (48 percent) fall detections were observed within the RSZ. Franklin's Gulls were the main driver of detections within the RSZ as they accounted for 84 percent of waterbird detections within RSZ. American White Pelicans accounted for an additional 10 percent. Franklin's Gulls, Ring-billed Gulls, and American White Pelicans were occasionally observed above RSZ, though this was infrequent.

Waterfowl were often observed within or above RSZ. Thirty-six of 197 (18 percent) spring flocks and seven of 56 (13 percent) fall flocks entered the RSZ during observation. Approximately 10 percent of waterfowl flocks in the spring and 14 percent in the fall were observed above RSZ. When considering counts of individual waterfowl instead of flocks, 1,849 of 6,196 (30 percent) spring detections and 577 of 1,429 (40 percent) fall detections were observed within the RSZ. An additional 3,780 of 6196 (61 percent) spring detections and 521 of 1,429 (36 percent) fall detections were above RSZ. Snow Geese were the main driver of detections within the RSZ as they accounted for 78 percent of waterfowl detections within RSZ. Cackling Geese, Canada Geese, Greater White-fronted Geese, and Mallards collectively accounted for an additional 20 percent. In the spring, Snow Geese comprised the majority of flocks above RSZ (79 percent). In the fall, flocks above RSZ were primarily comprised of Snow Geese and Greater White-fronted Geese (63 percent).

No large-bodied non passerines or upland gamebirds were observed within RSZ over the courses of standardized avian use surveys. These species groups were typically seen either perched, flying below RST, or heard only in both spring and fall.

4 CONCLUSIONS

A total of 156 species were recorded over two years of pre-construction avian studies within the project area and its vicinity (Appendix C). Two full years of eagle use surveys have been completed, totaling 1,272 hours of observation standardized survey effort. Approximately 62 hours of surveys have been conducted over two spring and fall migratory periods. Standardized nesting raptor and grouse lek surveys were conducted in 2019 and 2020.

One active Bald Eagle nest was observed within the project area in Y2. The pair nested south of Beaver Lake in 2019, returned to the same location to nest in 2020, then apparently moved two miles to the east to a new nesting site in 2021. No other Bald Eagle nests were found within 10 miles of the project boundary, and no Golden Eagle nests were found during the nest surveys.

Thirteen confirmed Sharp-tailed Grouse leks and two possible leks were found within during the Y2 study period. Y2 surveys were conducted across a study area that included the April 2019 project area and a surrounding one-mile buffer. The project boundary was modified to cover a smaller area in December 2020, and four of the 13 confirmed lek locations are within the December 2020 boundary. Four additional confirmed leks and one of the possible lek locations are within the new boundary's one-mile buffer.

Bald Eagle mean use rates and mean flight heights were highest in the spring and fall, suggesting that most of the Bald Eagle use observed within the project area was comprised of migrating individuals heading northward in the spring and southward in the fall. Consistent with these patterns, Bald Eagles observations within the RSZ were also highest in the spring and fall.

Summer Bald Eagle use within the project area was entirely associated with the nesting pair near Beaver Lake, and Bald Eagles were not observed during January or February over both Y1 and Y2. Aside from the nesting pair, no areas of concentrated Bald Eagle use were identified in the project area, which suggests that the project area lacks physiographic features that might attract or concentrate Bald Eagle use during migration. Golden Eagles were rarely encountered during standardized eagle use surveys, with relative highest mean use rates in the fall and winter.

Passerines and waterfowl together accounted for over 93 percent of bird detections recorded during surveys in the spring and fall of the Y2 study period. Large groups of species that are typically abundant in agricultural habitats in the northern Great Plains, including blackbirds, Lapland Longspurs, and Snow Geese influenced this pattern. Sandhill Cranes (waders species group) and Snow Geese were regularly observed flying at high altitudes well above the 200 m-high sample plot and the RSZ during spring and fall avian use surveys.

Grassland-associated passerine species that are listed by the NDGF as SCP (Dyke et al. 2015), including Sprague's Pipit, Grasshopper Sparrow, Nelson's Sparrow, LeConte's Sparrow, Chestnut-

Collared Longspur, Bobolink, and Western Meadowlark were detected during surveys during the spring and fall and were also noted as incidental detections during eagle use surveys in the summer. Sprague's Pipits were only observed in the late summer and fall, but the remaining other grassland SCP listed above were observed singing on territory and likely nest within the project area. Grasshopper Sparrows, Bobolinks, and Western Meadowlarks were observed throughout the project area, Chestnut-collared Longspurs were most frequently found in grasslands near the northeastern and eastern portions of the project area, and LeConte's and Nelson's Sparrows were found on localized, single occasions in their favored habitats.

Most waterfowl detections consisted of geese flocks migrating through the project area. Locations reporting highest waterfowl species richness were found in the northeastern portion of the study area, at stations 22, 51, 52, and 53. Stations 51, 52, and 53 are beyond the December 2020 project area boundary.

Whooping Cranes are listed as endangered under the ESA. Three Whooping Cranes were observed within the project area over three-day span in April 2020 during the Y1 study period. This is the first recorded observation of Whooping Cranes within the vicinity of the project area. No Whooping Cranes were observed in Y2.

5 REFERENCES

Atwell [Atwell LLC]. 2020a. Pre-construction avian studies: year 1, May 2019 through April 2020. Badger Wind Project, Logan and McIntosh counties, North Dakota. Boulder (CO).

Atwell [Atwell LLC]. 2020b. Memorandum: Badger Wind - year-2 raptor nest and grouse lek survey results, October 2020. Southfield (MI).

Atwell [Atwell LLC]. 2021. Memorandum: 2021 raptor nest supplement.

Bryce SA, Omernik JM, Pater DA, Ulmer M, Schaar J, Freeouf J, Johnson P, Kuck P, Azevedo SH. 1996. Ecoregions of North Dakota and South Dakota. Reston, Virginia: U.S. Geological Survey.

Chesser RT, Billerman SM, Burns KJ, Cicero C, Dunn JL, Hernandez-Baños BE, Kratter AW, Lovette IJ, Mason NA, Rasmussen PC, et al. 2021. Sixty-second supplement to the American Ornithological Society's check-list of North American birds. Ornithology. 138(3). doi:https://doi.org/10.1093/ornithology/ukab037. https://academic.oup.com/auk/article/138/3/ukab037/6309332.

Clayton L. 1962. Glacial Geology of Logan and McIntosh Counties North Dakota. Grand Forks, North Dakota: North Dakota Geological Survey Report No.: Bulletin 37. https://www.dmr.nd.gov/ndgs/documents/outofprint/Bulletins/Bulletin%2037.pdf.

Connelly JW, Gratson MW, Reese KP. 1998. Sharp-tailed Grouse *(Tympanuchus phasianellus)*. Poole A, Gill F, editors. The Birds of North America Online. doi:10.2173/bna.354. http://bna.birds.cornell.edu/bna/species/354/articles/distribution.

Dyke S, Johnson S, Isakson P. 2015. North Dakota State Wildlife Action Plan 2015. Bismarck, ND: North Dakota Game and Fish Department. http://gf.nd.gov/gnf/conservation/swap-2015/docs/swap-2015.pdf.

eBird. 2021. eBird: An online database of bird distribution and abundance [web application]. eBird, Cornell Lab of Ornithology, Ithaca (NY). http://www.ebird.org.

Giudice JH, Ratti JT. 2020. Ring-necked pheasant (*Phasianus colchicus*), version 1.0. In: Billerman SM, editor. The birds of the world. Ithaca (NY): Cornell Lab of Ornithology. https://birdsoftheworld.org/bow/species/rinphe/cur/introduction.

Heisler LM, Somers CM, Poulin RG. 2014. Rodent populations on the northern Great Plains respond to weather variation at a landscape scale. Journal of Mammalogy. 95(1):82–90. doi:10.1644/13-MAMM-A-115.1.

Hutto RL, Pletschet SM, Hendricks P. 1986. A fixed-radius point count method for nonbreeding and breeding season use. The Auk. 103:593–602. doi:10.1093/auk/103.3.593.

MRLC [Multi-Resolution Land Characteristics Consortium]. 2019. National land cover database. https://www.mrlc.gov/data?f%5B0%5D=category%3Aland%20cover&f%5B1%5D=region%3Aconus&f%5B2%5D=year%3A2016.

National Wind Coordinating Committee. 1999. Studying Wind Energy/Bird Interactions: A Guidance Document (Metrics and Methods for Determining or Monitoring Potential Impacts on Birds at Existing and Proposed Wind Energy Sites). National Wind Coordinating Committee.

NOAA [National Oceanic and Atmospheric Administration]. 2021. Advanced Hydrologic Prediction Service. http://water.weather.gov/precip/.

Ralph CJ, Martin TE, Geupel GR, DeSante DF, Pyle P. 1993. Handbook of field methods for monitoring landbirds. Albany (CA): Pacific Southwest Research Station. https://www.birdpop.org/docs/pubs/Ralph_et_al_1993_Handbook_of_Field_Methods_for_Monitoring_Landbirds.pdf.

Ralph CJ, Sauer JR, Droege S. 1995. Monitoring bird populations by point counts. Albany (CA): Pacific Southwest Research Station (General Technical Report).

Reynolds RT, Scott JM, Nussbaum RA. 1980. A variable circular-plot method for estimating bird numbers. Condor.:309–313. http://www.jstor.org/stable/1367399.

Strickland D, Arnett E, Erickson W, Johnson D, Johnson G, Morrison M, Shaffer J, Warren-Kicks W. 2011. Comprehensive guide to studying wind energy/wildlife interactions. National Wind Coordinating Collaborative. https://www.nationalwind.org/wp-content/uploads/assets/publications/Comprehensive_Guide_to_Studying_Wind_Energy_Wildlife_Interactions_2011_Updated.pdf.

Thomas L, Buckland ST, Rexstad EA, Laake JL, Strindberg S, Hedley SL, Bishop JRB, Marques TA, Burnham KP. 2010. Distance software: design and analysis of distance sampling surveys for estimating population size. Journal of Applied Ecology. 47:5–14. doi:doi:10.1111/j.1365-2664.2009.01737.x.

USFWS [U.S. Fish and Wildlife Service]. 2012. U.S. Fish and Wildlife Service land-based wind energy guidelines. U.S. Fish and Wildlife Service. http://www.fws.gov/ecological-services/es-library/pdfs/WEG_final.pdf.

USFWS [U.S. Fish and Wildlife Service]. 2013. Eagle conservation plan guidance: module 1 - land-based wind energy, version 2. April. Washington (DC): Division of Migratory Bird Management. https://www.fws.gov/migratorybirds/pdf/management/eagleconservationplanguidance.pdf.

USFWS [U.S. Fish and Wildlife Service]. 2016. Eagle Permits; Revisions to Regulations for Eagle Incidental Take and Take of Eagle Nests. https://www.federalregister.gov/documents/2016/12/16/2016-29908/eagle-permits-revisions-to-regulations-for-eagle-incidental-take-and-take-of-eagle-nests.

USFWS [U.S. Fish and Wildlife Service]. 2020. Updated eagle nest survey protocol. https://www.fws.gov/migratorybirds/pdf/management/EagleNestSurveyGuidanceUpdated.pdf.

USFWS [U.S. Fish and Wildlife Service]. 2021. U.S. Fish and Wildlife Service (USFWS), Region 6, recommended protocol for conducting pre-construction eagle nest surveys at wind energy projects, version 3.0. https://www.fws.gov/mountain-prairie/migbirds/library/USFWS_R6_recommended_Eagle%20Nest%20Survey%20Protocol_for%20wind%20projects_ver3.pdf.

FIGURES

Badger Wind

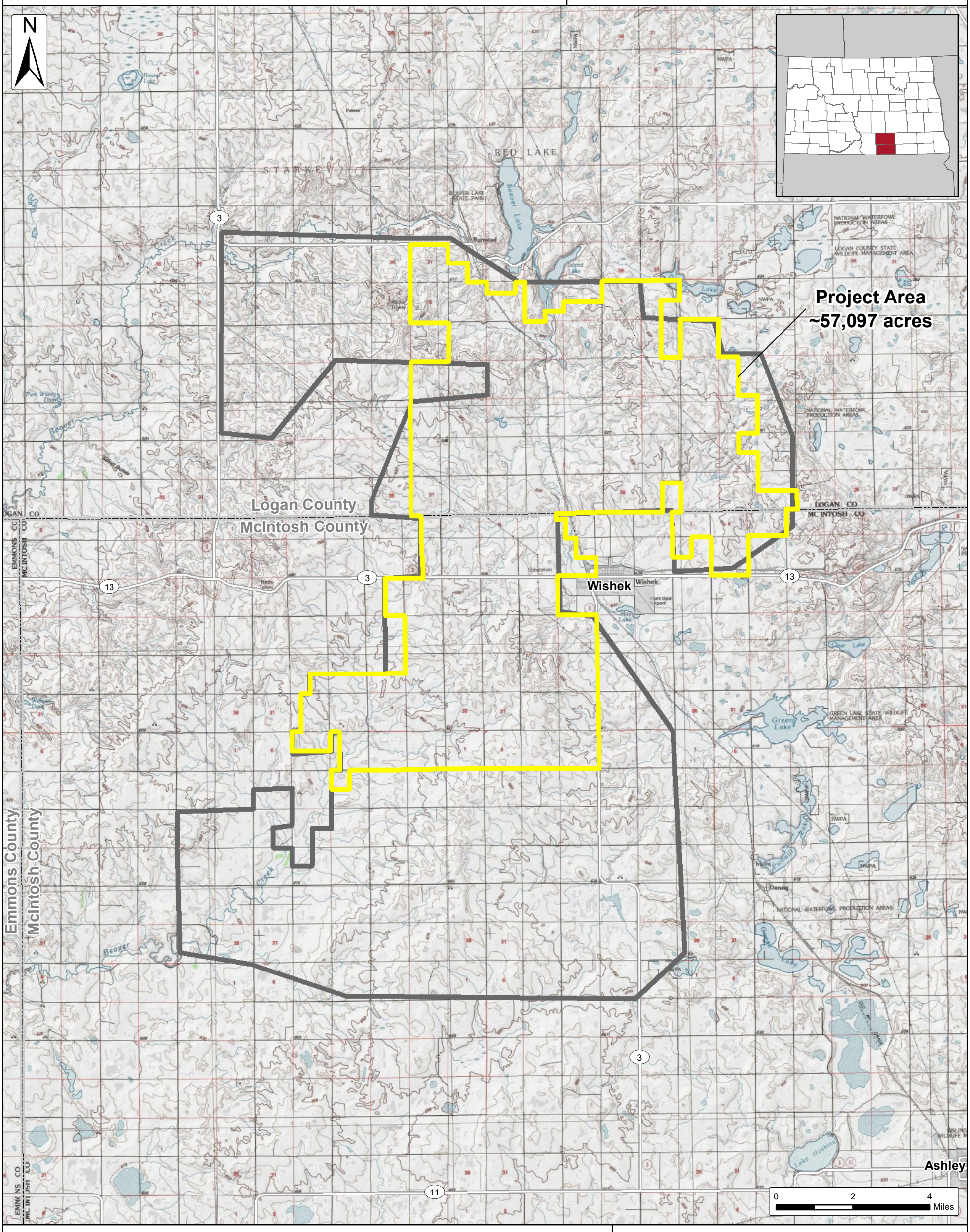
Figure 1. Site Location

Logan and McIntosh Counties, North Dakota

Client:
Badger Wind, LLC

Issue Date:
7/12/2021

Atwell, LLC Project:
19000785



Project Area
12/04/2020 (~57,097 acres)

Project Area
04/15/2019 (~121,695 acres)

City/Village

Counties

Source: USGS Topographic Quadrangle

ATWELL

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Badger Wind

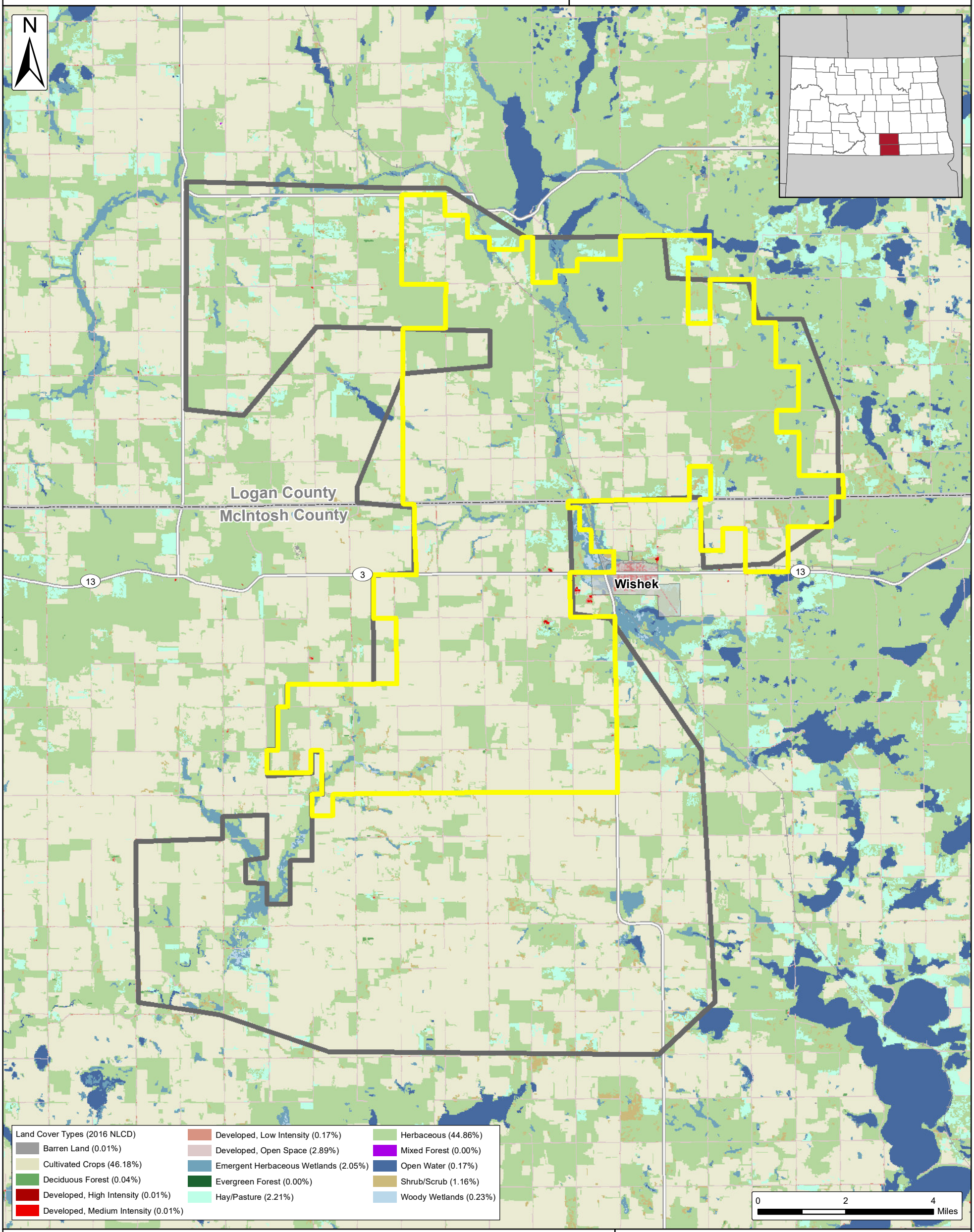
Figure 2. Land Cover Types within the Project Area

Logan and McIntosh Counties, North Dakota

Client:
Badger Wind, LLC

Issue Date:
7/12/2021

Atwell, LLC Project:
19000785



Project Area
12/04/2020 (~57,097 acres)

Project Area
04/15/2019 (~121,695 acres)

City/Village

Counties

Source: National Land Cover Database (USGS, 2016)

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Badger Wind

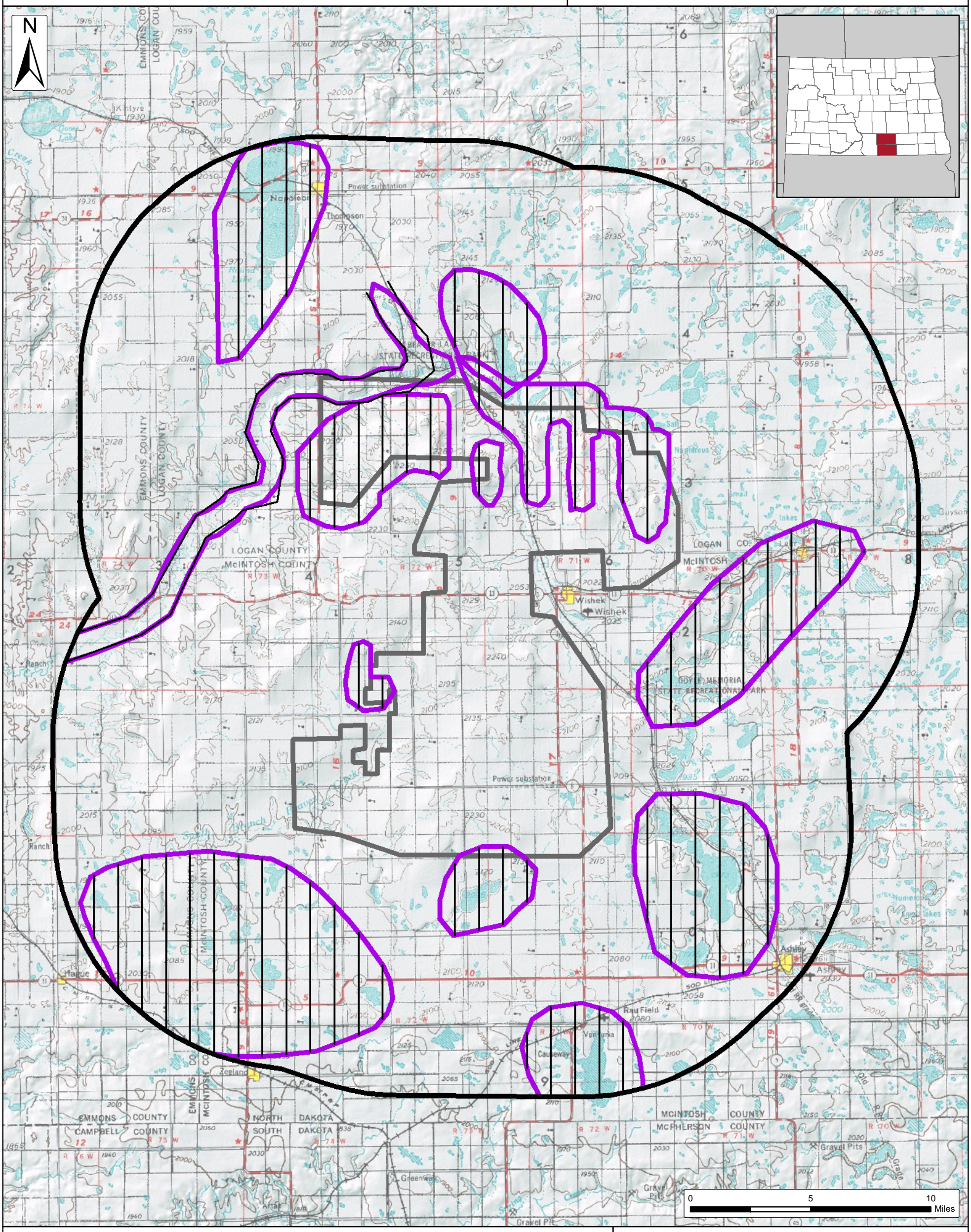
Figure 3. 2020 Raptor Nest Survey Study Plan

Logan and McIntosh Counties, North Dakota

Client: Badger Wind, LLC

Issue Date: 7/12/2021

Atwell, LLC Project: 19000785



1-Mile Aerial Transects

Project Area
04/15/2019 (~121,695 acres)

Raptor Nest Survey Area (2-Mile Buffer)

Targeted Raptor Nest Survey Area

Eagle Nest Survey Area (10-Mile Buffer)

Source: USGS Topographic Quadrangle

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Badger Wind

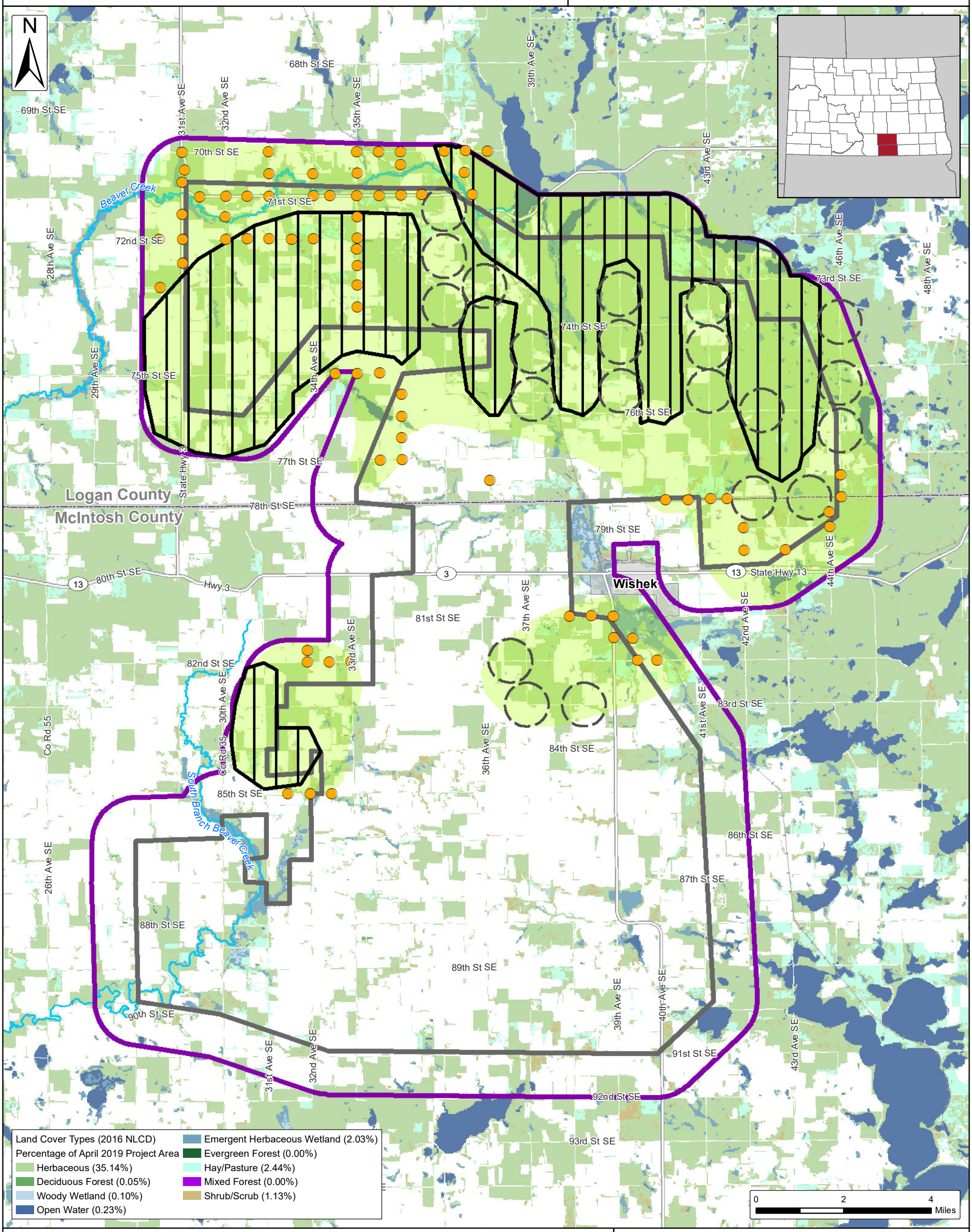
Figure 4. 2020 Sharp-tailed Grouse Lek Survey Study Plan

Logan and McIntosh Counties, North Dakota

Client:
Badger Wind, LLC

Issue Date:
7/12/2021

Atwell, LLC Project:
19000785



- Standardized Ground-based Lek Survey Points
- Opportunistic Ground-based Lek Survey Points
- Standardized Aerial Survey Transects
- 2020 Aerial Lek Survey Area
- Sharp-tailed Grouse Priority Areas
- Major Watercourse (National Hydrography Dataset)
- Project Area 04/15/2019 (~121,695 acres)
- Grouse Survey Area (1-Mile Buffer)
- City/Village
- County

Source: National Land Cover Database (USGS, 2016)

ATWELL

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Badger Wind

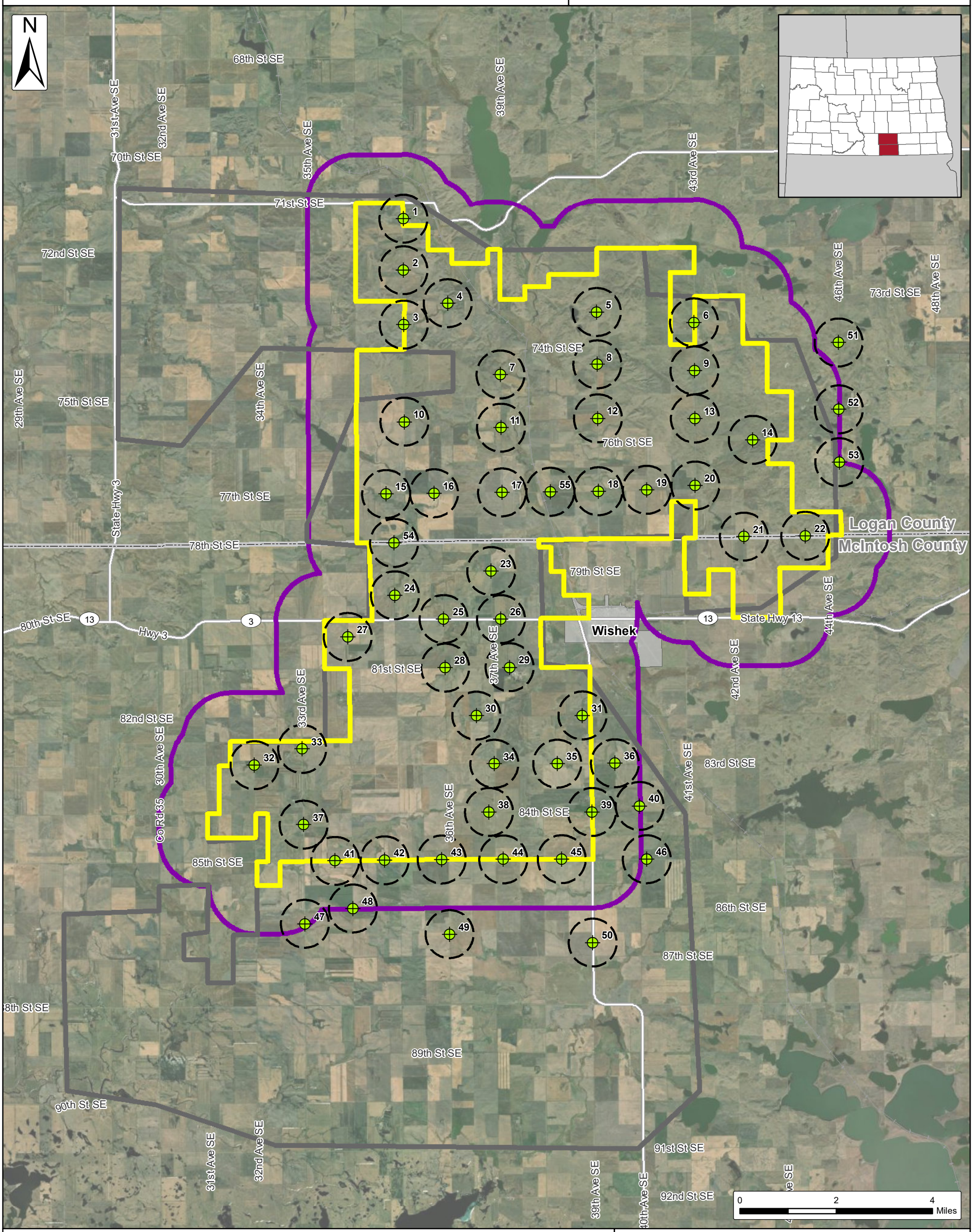
Figure 5. Avian Point Count Stations

Logan and McIntosh Counties, North Dakota

Client:
Badger Wind, LLC

Issue Date:
7/12/2021

Atwell, LLC Project:
19000785



Avian Study Point
800 m-radius Avian Sample Plot
Project Area 12/04/2020 (~57,097 acres)
Project Area 04/15/2019 (~121,695 acres)
1-mile Buffer
City/Village
Counties

Source: Esri World Imagery

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Badger Wind

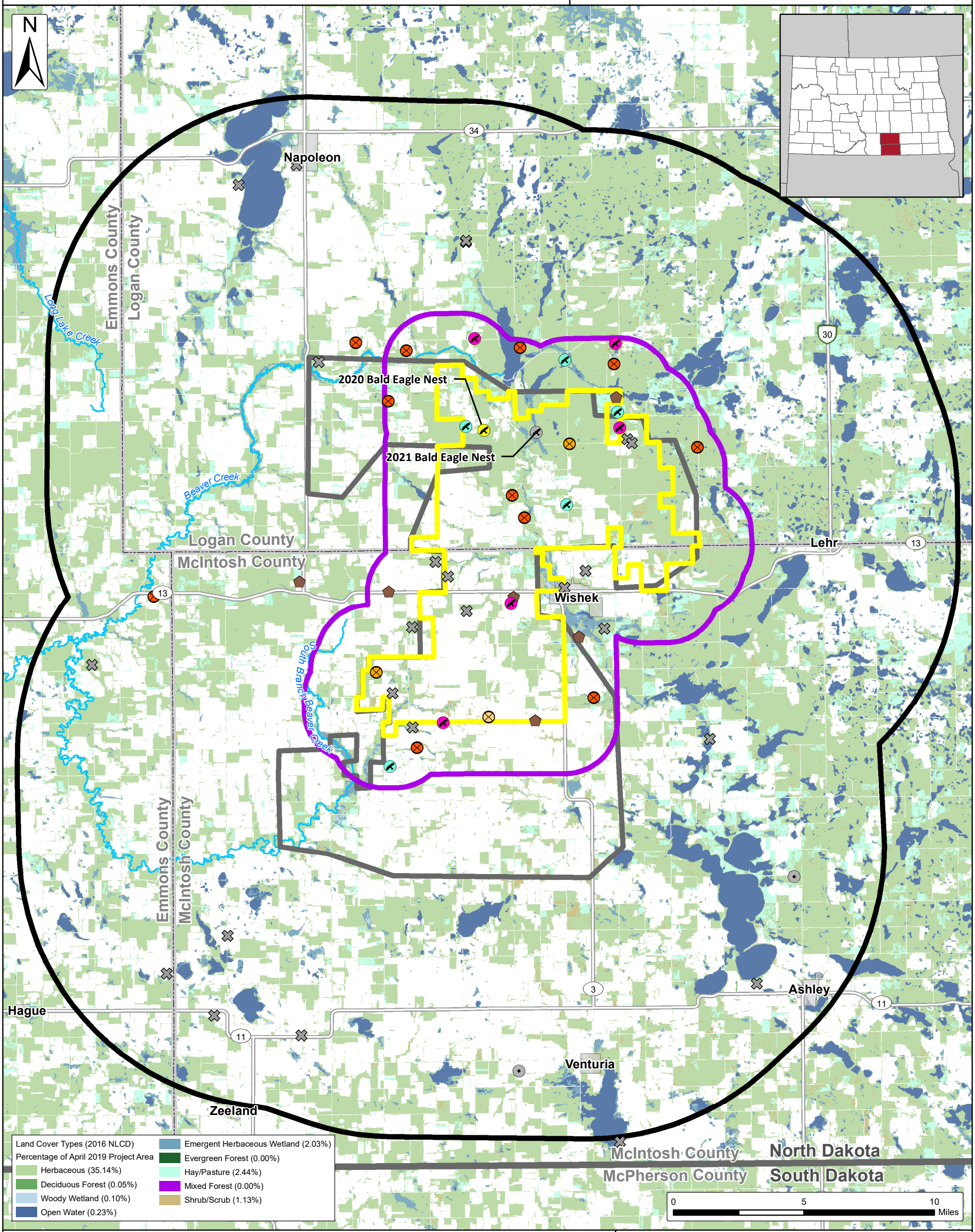
Figure 6. Eagle and Raptor Nest Survey Results

Logan and McIntosh Counties, North Dakota

Client:
Badger Wind, LLC

Issue Date:
1/13/2022

Atwell, LLC Project:
19000785



Raptor Nests Identified_DEF_QUERY during 2020 Surveys
- Bald Eagle, In-Use
- Bald Eagle, Unoccupied
- Ferruginous Hawk, In-Use
- Great Horned Owl, In-Use
- Red-tailed Hawk, Missing
- Red-tailed Hawk, In-Use
- Red-tailed Hawk, Status Unknown
- Swainson's Hawk, In-Use
- Unknown raptor, In-Use
- Unknown raptor, Status Unknown
- Major Watercourse (NHD)
- Project Area 12/04/2020 (~57,097 acres)
- Project Area 04/15/2019 (~121,695 acres)
- 2-mile Buffer (12/04/2020)
- Eagle Nest Survey Area (4/15/2019 10-mile Buffer)
- City/Village
- County
- State Boundary

Source: National Land Cover Database (USGS, 2016)

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Badger Wind

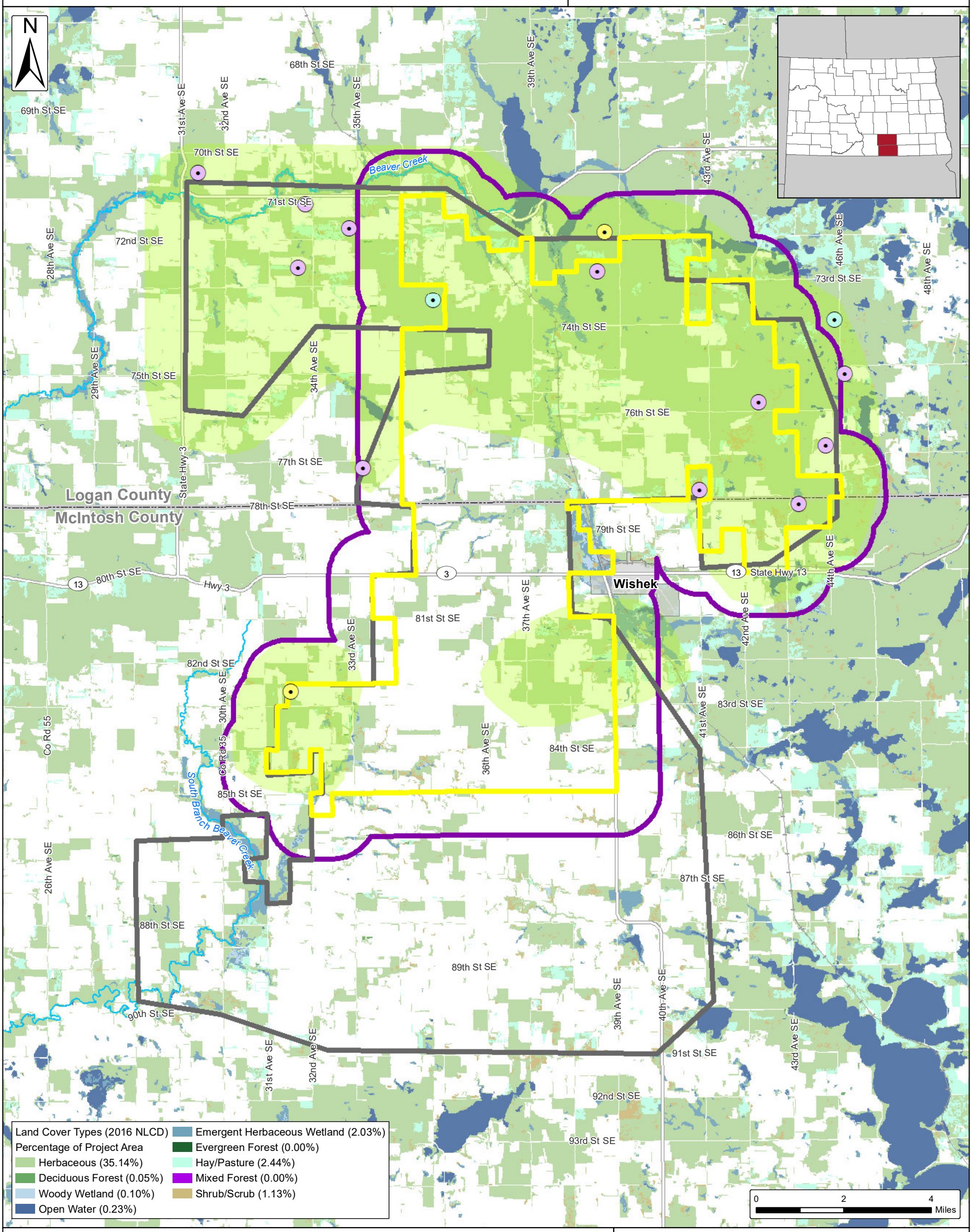
Figure 7. 2020 Sharp-tailed Grouse Lek Survey Results

Logan and McIntosh Counties, North Dakota

Client: Badger Wind, LLC

Issue Date: 7/12/2021

Atwell, LLC Project: 19000785



Grouse Leks
- Confirmed, Aerial
- Confirmed, Ground
- Possible, Ground

Major Watercourse (NHD)

Project Area 12/04/2020 (~57,097 acres)

Project Area 04/15/2019 (~121,695 acres)

Sharp-tailed Grouse Priority Areas

Grouse Survey Area (1-Mile Buffer)

City/Village

County

Source: National Land Cover Database (USGS, 2016)

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Badger Wind

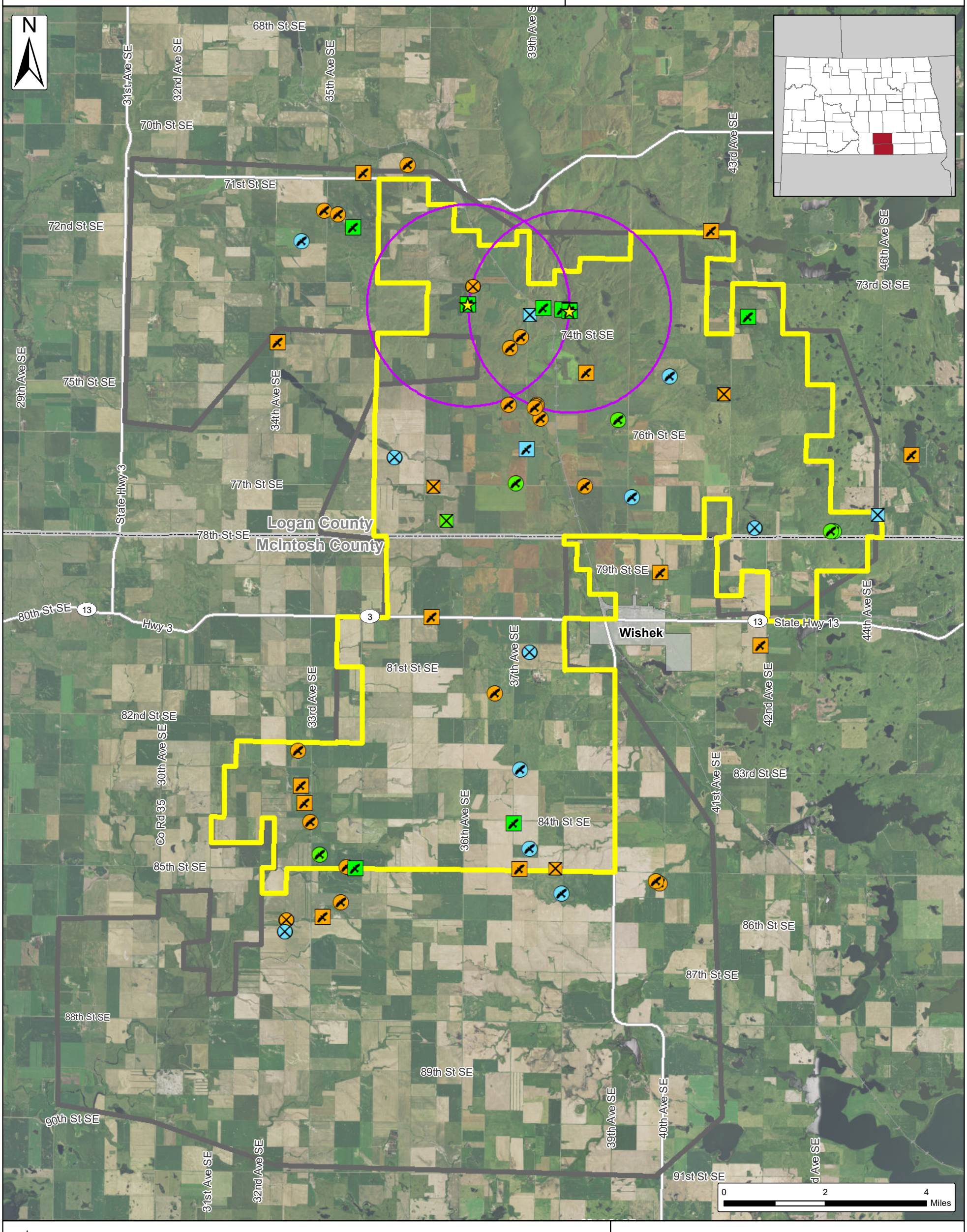
Figure 8. Bald Eagle and Golden Eagle Observations

Logan and McIntosh Counties, North Dakota

Client:
Badger Wind, LLC

Issue Date:
7/12/2021

Atwell, LLC Project:
19000785



In-Use Bald Eagle Nest

Nest-Associated Observations (2-mile buffer)*

Species

Bald Eagle - Standardized

Bald Eagle - Incidental

Golden Eagle - Standardized

Golden Eagle - Incidental

Season

Fall

Spring

Summer

Winter

Project Area 12/04/2020 (~57,097 acres)

Project Area 04/15/2019 (~121,695 acres)

City/Village

County

*Six standardized and six incidental eagle observations associated with the in-use Bald Eagle nest were recorded within this buffer during spring, summer, and fall surveys.

Source: USDA NAIP 2019 Imagery

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APPENDICES

APPENDIX A

POINT COUNT STATION LOCATIONS

Appendix A. Point Count Station Locations

Point Count Station[a]	Latitude	Longitude
1	46.380	-99.644
2	46.365	-99.644
3	46.348	-99.645
4	46.354	-99.625
5	46.351	-99.561
6	46.348	-99.519
7	46.333	-99.603
8	46.336	-99.561
9	46.333	-99.519
10	46.319	-99.645
11	46.317	-99.603
12	46.319	-99.561
13	46.319	-99.519
14	46.312	-99.494
15	46.297	-99.653
16	46.297	-99.632
17	46.297	-99.603
18	46.297	-99.561
19	46.298	-99.540
20	46.299	-99.519
21	46.283	-99.498
22	46.283	-99.472
23	46.274	-99.608
24	46.267	-99.650
25	46.260	-99.629
26	46.259	-99.604

Point Count Station[a]	Latitude	Longitude
30	46.230	-99.615
31	46.230	-99.569
32	46.216	-99.711
33	46.221	-99.691
34	46.216	-99.607
37	46.198	-99.690
38	46.201	-99.610
39	46.201	-99.565
40	46.203	-99.545
41	46.187	-99.677
42	46.187	-99.655
43	46.187	-99.631
44	46.187	-99.604
45	46.187	-99.579
46	46.187	-99.542
47	46.168	-99.690
48	46.173	-99.669
49	46.165	-99.628
50	46.162	-99.566
51	46.341	-99.456
52	46.321	-99.456
53	46.305	-99.456
54	46.283	-99.650
55	46.297	-99.582
56	46.370	-99.686
57	46.371	-99.707

[a] Point count stations 27, 28, 35, and 36 were dropped for year 2 avian surveys due to land owner concerns and are therefore excluded from this list. Point count stations 54 and 55 were added as replacements for 27 and 28 during year 1 avian surveys, whereas point count stations 56 and 57 were added as replacements for 35 and 36 prior to the start of year 2 surveys.

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APPENDIX B

SEASONAL SPECIES GROUP MEAN USE STATISTICS

Appendix B-1. Seasonal Large-bodied Corvids, Large-bodied Non-Passerines, and Upland Gamebirds Use Statistics within the Project Area (Diurnal Avian Use Surveys)

	Spring					Fall				
Common Name	Total Std. Detections[a]	% Comp.[b]	Mean Use (birds/10 min. survey/survey plot)[c]	SD[d]	Occur. Freq.[e]	Total Std. Detections[a]	% Comp.[b]	Mean Use (birds/10 min. survey/survey plot)[c]	SD[d]	Occur. Freq.[e]
	LARGE-BODIED CORVIDS									
American Crow	6	1.000	0.038	0.476	0.006	27	0.964	0.127	1.719	0.014
Common Raven	0	-	-	-	-	1	0.036	0.005	0.069	0.005
ALL LARGE-BODIED CORVIDS	**6**	**1.000**	**0.038**	**0.476**	**0.006**	**28**	1.000	**0.132**	**1.720**	**0.019**
	LARGE-BODIED NON-PASSERINES									
Eurasian Collared Dove	4	0.087	0.025	0.193	0.019	5	0.068	0.024	0.343	0.005
Rock Pigeon	42	0.913	0.264	1.473	0.057	69	0.932	0.325	1.712	0.071
ALL LARGE-BODIED NON-PASSERINES	**46**	1.000	**0.289**	**1.544**	**0.069**	**74**	1.000	**0.349**	**1.742**	**0.075**
	UPLAND GAMEBIRDS									
Gray Partridge	1	0.023	0.006	0.079	0.006	2	0.100	0.009	0.137	0.005
Ring-necked Pheasant	33	0.767	0.208	0.529	0.164	9	0.450	0.042	0.281	0.028
Sharp-tailed Grouse[II]	9	0.209	0.057	0.467	0.019	9	0.450	0.042	0.490	0.014
ALL UPLAND GAMEBIRDS	**43**	**1.000**	**0.270**	**0.744**	**0.176**	**20**	**1.000**	**0.094**	**0.576**	**0.047**

[a] Total Std. Detections is the total number of standardized individuals detected within a 800-m radius of the point count station during standardized use surveys. Because

[b] % Comp. is the proportion of a particular species group that a particular species comprises during the season using total standardized detections.

[c] Mean Use is the total standardized detections divided by the total number of 10-minute point count surveys conducted within the season.

[d] SD is the standard deviation of Mean Use.

[e] Occur. Freq. (i.e., Occurrence Frequency) is the proportion of point count surveys at which a particular species was detected during the season.

- North Dakota State Wildlife Action Plan (Dyke et al. 2015) Species of Conservation Priortiy (SCP) are denoted with a superscript I or II following the species name to indicate that it is Level I or Level II SCP, respectively.

Appendix B-2. Seasonal Small-Bodied Non-Passerine, and Passerine, and Unknown Species Group Use Statistics within the Project Area (Diurnal Avian Use Surveys)

	Spring					Fall				
Common Name	Total Std. Detections[a]	% Comp.[b]	Mean Use (birds/10 min. survey/survey plot)[c]	SD[d]	Occur. Freq.[e]	Total Std. Detections[a]	% Comp.[b]	Mean Use (birds/10 min. survey/survey plot)[c]	SD[d]	Occur. Freq.[e]
	SMALL-BODIED NON-PASSERINES									
Downy Woodpecker	2	0.057	0.013	0.112	0.013	1	0.012	0.005	0.069	0.005
Hairy Woodpecker	1	0.029	0.006	0.079	0.006	2	0.024	0.009	0.097	0.009
Mourning Dove	30	0.857	0.189	0.773	0.088	78	0.918	0.368	1.087	0.165
Northern Flicker	2	0.057	0.013	0.159	0.006	3	0.035	0.014	0.118	0.014
Red-headed Woodpecker[I]	0	-	-	-	-	1	0.012	0.005	0.069	0.005
ALL SMALL-BODIED NON-PASSERINES	**35**	**1.000**	**0.220**	**0.801**	**0.107**	**85**	**1.000**	**0.401**	**1.108**	**0.189**
	PASSERINES									
Alder Flycatcher	1	0.000	0.006	0.079	0.006	0	-	-	-	-
American Goldfinch	12	0.003	0.075	0.414	0.044	113	0.008	0.533	1.322	0.231
American Pipit	0	-	-	-	-	17	0.001	0.080	0.714	0.033
American Robin	19	0.004	0.119	0.650	0.063	49	0.004	0.231	1.492	0.052
American Tree Sparrow	7	0.001	0.044	0.482	0.013	3	0.000	0.014	0.153	0.009
Bank Swallow	13	0.003	0.082	0.886	0.013	3	0.000	0.014	0.153	0.009
Barn Swallow	13	0.003	0.082	0.405	0.050	274	0.020	1.292	6.697	0.222
Black-billed Magpie	0	-	-	-	-	1	0.000	0.005	0.069	0.005
Blue Jay	0	-	-	-	-	6	0.000	0.028	0.256	0.014
Bobolink[II]	22	0.005	0.138	0.521	0.075	30	0.002	0.142	0.607	0.075
Brewer's Blackbird	18	0.004	0.113	0.779	0.031	686	0.050	3.236	41.262	0.066
Brown Thrasher	4	0.001	0.025	0.193	0.019	1	0.000	0.005	0.069	0.005
Brown-headed Cowbird	141	0.030	0.887	2.264	0.214	16	0.001	0.075	0.656	0.024
Cedar Waxwing	0	-	-	-	-	2	0.000	0.009	0.097	0.009
Chestnut-collared Longspur[I]	55	0.012	0.346	1.079	0.151	92	0.007	0.434	1.777	0.108
Chipping Sparrow	2	0.000	0.013	0.112	0.013	9	0.001	0.042	0.368	0.024

Appendix B-2. Seasonal Small-Bodied Non-Passerine, and Passerine, and Unknown Species Group Use Statistics within the Project Area (Diurnal Avian Use Surveys)

	Spring					Fall				
Common Name	Total Std. Detections[a]	% Comp.[b]	Mean Use (birds/10 min. survey/survey plot)[c]	SD[d]	Occur. Freq.[e]	Total Std. Detections[a]	% Comp.[b]	Mean Use (birds/10 min. survey/survey plot)[c]	SD[d]	Occur. Freq.[e]
Clay-colored Sparrow	19	0.004	0.119	0.441	0.094	13	0.001	0.061	0.294	0.047
Cliff Swallow	9	0.002	0.057	0.377	0.031	13	0.001	0.061	0.458	0.028
Common Grackle	317	0.067	1.994	6.963	0.277	3968	0.291	18.717	212.562	0.071
Common Redpoll	25	0.005	0.157	1.315	0.031	9	0.001	0.042	0.263	0.028
Common Yellowthroat	0	-	-	-	-	1	0.000	0.005	0.069	0.005
Dark-eyed Junco	0	-	-	-	-	20	0.001	0.094	1.374	0.005
Eastern Bluebird	0	-	-	-	-	2	0.000	0.009	0.137	0.005
Eastern Kingbird	6	0.001	0.038	0.249	0.025	47	0.003	0.222	0.697	0.118
European Starling	49	0.010	0.308	1.587	0.094	79	0.006	0.373	2.364	0.061
Grasshopper Sparrow[l]	4	0.001	0.025	0.157	0.025	0	-	-	-	-
Harris's Sparrow	0	-	-	-	-	12	0.001	0.057	0.824	0.005
Horned Lark	258	0.055	1.623	2.757	0.579	218	0.016	1.028	2.168	0.335
House Sparrow	69	0.015	0.434	1.632	0.082	133	0.010	0.627	2.137	0.142
House Wren	1	0.000	0.006	0.079	0.006	1	0.000	0.005	0.069	0.005
Lapland Longspur	2294	0.486	14.428	51.960	0.346	1238	0.091	5.840	29.771	0.184
Least Flycatcher	1	0.000	0.006	0.079	0.006	1	0.000	0.005	0.069	0.005
Lincoln's Sparrow	0	-	-	-	-	1	0.000	0.005	0.069	0.005
Marsh Wren	0	-	-	-	-	1	0.000	0.005	0.069	0.005
Orchard Oriole	3	0.001	0.019	0.177	0.013	14	0.001	0.066	0.580	0.028
Palm Warbler	0	-	-	-	-	3	0.000	0.014	0.153	0.009
Pine Siskin	10	0.002	0.063	0.385	0.031	90	0.007	0.425	2.798	0.071
Purple Martin	1	0.000	0.006	0.079	0.006	0	-	-	-	-
Red-breasted Nuthatch	0	-	-	-	-	1	0.000	0.005	0.069	0.005
Red-winged Blackbird	1011	0.214	6.358	27.801	0.384	5906	0.434	27.858	238.760	0.203
Savannah Sparrow	14	0.003	0.088	0.380	0.063	17	0.001	0.080	0.362	0.057

Appendix B-2. Seasonal Small-Bodied Non-Passerine, and Passerine, and Unknown Species Group Use Statistics within the Project Area (Diurnal Avian Use Surveys)

	Spring					Fall				
Common Name	Total Std. Detections[a]	% Comp.[b]	Mean Use (birds/10 min. survey/survey plot)[c]	SD[d]	Occur. Freq.[e]	Total Std. Detections[a]	% Comp.[b]	Mean Use (birds/10 min. survey/survey plot)[c]	SD[d]	Occur. Freq.[e]
Say's Phoebe	1	0.000	0.006	0.079	0.006	0	-	-	-	-
Sedge Wren	11	0.002	0.069	0.517	0.025	9	0.001	0.042	0.313	0.019
Snow Bunting	0	-	-	-	-	16	0.001	0.075	0.684	0.019
Song Sparrow	10	0.002	0.063	0.268	0.057	22	0.002	0.104	0.400	0.075
Sprague's Pipit[I]	0	-	-	-	-	2	0.000	0.009	0.097	0.009
Tree Swallow	7	0.001	0.044	0.235	0.038	7	0.001	0.033	0.343	0.009
Unknown Blackbird	13	0.003	0.082	0.477	0.044	24	0.002	0.113	0.812	0.038
Unknown Finch	1	0.000	0.006	0.079	0.006	42	0.003	0.198	2.113	0.019
Unknown Passerine	34	0.007	0.214	0.749	0.119	132	0.010	0.623	2.072	0.189
Unknown Sparrow	6	0.001	0.038	0.273	0.025	33	0.002	0.156	0.645	0.080
Unknown Swallow	5	0.001	0.031	0.237	0.019	11	0.001	0.052	0.340	0.028
Unknown Warbler	0	-	-	-	-	3	0.000	0.014	0.153	0.009
Vesper Sparrow	33	0.007	0.208	0.540	0.145	17	0.001	0.080	0.387	0.052
Warbling Vireo	2	0.000	0.013	0.112	0.013	1	0.000	0.005	0.069	0.005
Western Kingbird	10	0.002	0.063	0.368	0.038	27	0.002	0.127	0.531	0.071
Western Meadowlark[II]	171	0.036	1.075	1.394	0.497	114	0.008	0.538	1.282	0.241
White-crowned Sparrow	0	-	-	-	-	1	0.000	0.005	0.069	0.005
White-throated Sparrow	0	-	-	-	-	3	0.000	0.014	0.206	0.005
Yellow Warbler	4	0.001	0.025	0.193	0.019	2	0.000	0.009	0.137	0.005
Yellow-headed Blackbird	19	0.004	0.119	0.741	0.044	39	0.003	0.184	1.614	0.033
Yellow-rumped Warbler	0	-	-	-	-	22	0.002	0.104	0.637	0.033
ALL PASSERINES	**4725**	**1.000**	**29.717**	**59.438**	**0.943**	**13617**	**1.000**	**64.231**	**438.807**	**0.849**
	UNKNOWN SPECIES GROUP									
Unknown Species	6	0.001	0.038	0.354	0.013	6	0.000	0.028	0.216	0.019

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Appendix B-2. Seasonal Small-Bodied Non-Passerine, and Passerine, and Unknown Species Group Use Statistics within the Project Area (Diurnal Avian Use Surveys)

	Spring					Fall				
Common Name	Total Std. Detections[a]	% Comp.[b]	Mean Use (birds/10 min. survey/survey plot)[c]	SD[d]	Occur. Freq.[e]	Total Std. Detections[a]	% Comp.[b]	Mean Use (birds/10 min. survey/survey plot)[c]	SD[d]	Occur. Freq.[e]
ALL UNKNOWN SPECIES GROUP	6	0.001	0.038	0.354	0.013	6	0.000	0.028	0.216	0.019

[a] Total Std. Detections is the total number of standardized individuals detected within a 300-m radius of the point count station during standardized use surveys. Because small-bodied birds species are the primary focus of diurnal avian use surveys, birds detected at all flight heights were recorded, analyzed, and presented in this table.

[b] % Comp. (i.e., percent composition) is the proportion of a particular species group that a particular species comprises during the season using total standardized detections.

[c] Mean Use is the total standardized detections divided by the total number of 10-minute point count surveys conducted within the season.

[d] SD is the standard deviation of Mean Use.

[e] Occur. Freq. (i.e., Occurrence Frequency) is the proportion of point count surveys at which a particular species was detected during the season.

- North Dakota State Wildlife Action Plan (Dyke et al. 2015) Species of Conservation Priortiy (SCP) are denoted with a superscript I or II following the species name to indicate that it is Level I or Level II SCP, respectively.

Appendix B-3. Seasonal Raptor Use Statistics within the Project Area (Diurnal Avian Use Surveys)

	Spring					Fall				
Common Name	Total Std. Detections[a]	% Comp.[b]	Mean Use (birds/10 min. survey/survey plot)[c]	SD[d]	Occur. Freq.[e]	Total Std. Detections[a]	% Comp.[b]	Mean Use (birds/10 min. survey/survey plot)[c]	SD[d]	Occur. Freq.[e]
American Kestrel[II]	3	0.073	0.019	0.136	0.019	6	0.055	0.028	0.193	0.024
Bald Eagle[II]	4	0.098	0.025	0.157	0.025	3	0.027	0.014	0.118	0.014
Cooper's Hawk	0	-	-	-	-	1	0.009	0.005	0.069	0.005
Ferruginous Hawk[I]	2	0.049	0.013	0.112	0.013	0	-	-	-	-
Great Horned Owl	0	-	-	-	-	4	0.036	0.019	0.194	0.009
Merlin	0	-	-	-	-	1	0.009	0.005	0.069	0.005
Northern Harrier[II]	8	0.195	0.050	0.219	0.050	15	0.136	0.071	0.275	0.066
Red-tailed Hawk	17	0.415	0.107	0.348	0.094	30	0.273	0.142	0.423	0.118
Rough-legged Hawk	0	-	-	-	-	7	0.064	0.033	0.226	0.024
Swainson's Hawk[I]	2	0.049	0.013	0.112	0.013	27	0.245	0.127	0.531	0.075
Turkey Vulture	3	0.073	0.019	0.136	0.019	7	0.064	0.033	0.417	0.009
Unknown Buteo	2	0.049	0.013	0.112	0.013	5	0.045	0.024	0.181	0.019
Unknown Raptor	0	-	-	-	-	4	0.036	0.019	0.136	0.019
ALL RAPTORS	**41**	**1.000**	**0.258**	**0.565**	**0.208**	**110**	**1.000**	**0.519**	**1.009**	**0.311**

[a] Total Std. Detections is the total number of standardized individuals detected within a 800-m radius of the point count station during standardized use surveys. Because small-bodied birds species are the primary focus of diurnal avian use surveys, birds detected at all flight heights were recorded, analyzed, and presented in this table.

[b] % Comp. (i.e., percent composition) is the proportion of a particular species group that a particular species comprises during the season using total standardized detections.

[c] Mean Use is the total standardized detections divided by the total number of 10-minute point count surveys conducted within the season.

[d] SD is the standard deviation of Mean Use.

[e] Occur. Freq. (i.e., Occurrence Frequency) is the proportion of point count surveys at which a particular species was detected during the season.

- North Dakota State Wildlife Action Plan (Dyke et al. 2015) Species of Conservation Priortiy (SCP) are denoted with a superscript I or II following the species name to indicate that it is Level I or Level II SCP, respectively.

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Appendix B-4. Seasonal Shorebirds, Waders, and Waterbirds Use Statistics within the Project Area (Diurnal Avian Use Surveys)

	Spring					Fall				
Common Name	Total Std. Detections[a]	% Comp.[b]	Mean Use (birds/10 min. survey/survey plot)[c]	SD[d]	Occur. Freq.[e]	Total Std. Detections[a]	% Comp.[b]	Mean Use (birds/10 min. survey/survey plot)[c]	SD[d]	Occur. Freq.[e]
	SHOREBIRDS									
American Golden-Plover	0	-	-	-	-	1	0.011	0.005	0.069	0.005
Killdeer	58	0.513	0.365	0.733	0.245	72	0.774	0.340	1.207	0.170
Lesser Yellowlegs	2	0.018	0.013	0.159	0.006	2	0.022	0.009	0.137	0.005
Marbled Godwit[I]	9	0.080	0.057	0.281	0.044	0	-	-	-	-
Solitary Sandpiper	0	-	-	-	-	1	0.011	0.005	0.069	0.005
Spotted Sandpiper	1	0.009	0.006	0.079	0.006	0	-	-	-	-
Upland Sandpiper	20	0.177	0.126	0.682	0.082	14	0.151	0.066	0.538	0.024
Willet[II]	1	0.009	0.006	0.079	0.006	0	-	-	-	-
Wilson's Phalarope[I]	4	0.035	0.025	0.193	0.019	0	-	-	-	-
Wilson's Snipe	18	0.159	0.113	0.421	0.082	0	-	-	-	-
Unknown Shorebird	0	-	-	-	-	3	0.032	0.014	0.153	0.009
ALL SHOREBIRDS	**113**	**1.000**	**0.711**	**1.420**	**0.352**	**93**	**1.000**	**0.439**	**1.467**	**0.179**
	WADERS									
American Bittern[I]	1	0.002	0.006	0.079	0.006	0	-	-	-	-
Great Blue Heron	2	0.005	0.013	0.159	0.006	11	0.104	0.052	0.392	0.028
Great Egret	0	0.000	0.000	0.000	0.000	2	0.019	0.009	0.137	0.005
Sandhill Crane	417	0.993	2.623	14.196	0.063	93	0.877	0.439	3.545	0.028
ALL WADERS	**420**	**1.000**	**2.642**	**14.194**	**0.075**	**106**	**1.000**	**0.500**	**3.562**	**0.061**
	WATERBIRDS									
American Coot	10	0.024	0.063	0.368	0.031	59	0.142	0.278	1.783	0.038
American White Pelican[II]	62	0.150	0.390	4.022	0.019	2	0.005	0.009	0.137	0.005
Black Tern[I]	5	0.012	0.031	0.208	0.025	1	0.002	0.005	0.069	0.005
California Gull	8	0.019	0.050	0.488	0.019	0	-	-	-	-
Double-crested Cormorant	29	0.070	0.182	1.349	0.019	2	0.005	0.009	0.097	0.009

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Appendix B-4. Seasonal Shorebirds, Waders, and Waterbirds Use Statistics within the Project Area (Diurnal Avian Use Surveys)

	Spring					Fall				
Common Name	Total Std. Detections[a]	% Comp.[b]	Mean Use (birds/10 min. survey/survey plot)[c]	SD[d]	Occur. Freq.[e]	Total Std. Detections[a]	% Comp.[b]	Mean Use (birds/10 min. survey/survey plot)[c]	SD[d]	Occur. Freq.[e]
Franklin's Gull[I]	199	0.483	1.252	8.866	0.063	342	0.822	1.613	8.800	0.071
Pied-billed Grebe	2	0.005	0.013	0.112	0.013	7	0.017	0.033	0.356	0.014
Ring-billed Gull	45	0.109	0.283	1.137	0.113	2	0.005	0.009	0.097	0.009
Unknown Gull	52	0.126	0.327	2.356	0.050	1	0.002	0.005	0.069	0.005
ALL WATERBIRDS	**412**	**1.000**	**2.591**	**10.219**	**0.226**	**416**	**1.000**	**1.962**	**9.091**	**0.108**

[a] Total Std. Detections is the total number of standardized individuals detected within a 800-m radius of the point count station during standardized use surveys. Because small-bodied birds species are the primary focus of diurnal avian use surveys, birds detected at all flight heights were recorded, analyzed, and presented in this table.

[b] % Comp. (i.e., percent composition) is the proportion of a particular species group that a particular species comprises during the season using total standardized detections.

[c] Mean Use is the total standardized detections divided by the total number of 10-minute point count surveys conducted within the season.

[d] SD is the standard deviation of Mean Use.

[e] Occur. Freq. (i.e., Occurrence Frequency) is the proportion of point count surveys at which a particular species was detected during the season.

- North Dakota State Wildlife Action Plan (Dyke et al. 2015) Species of Conservation Priortiy (SCP) are denoted with a superscript I or II following the species name to indicate that it is Level I or Level II SCP, respectively.

Appendix B-5. Seasonal Waterfowl Use Statistics within the Project Area (Diurnal Avian Use Surveys)

	Spring					Fall				
Common Name	Total Std. Detections[a]	% Comp.[b]	Mean Use (birds/10 min. survey/survey plot)[c]	SD[d]	Occur. Freq.[e]	Total Std. Detections[a]	% Comp.[b]	Mean Use (birds/10 min. survey/survey plot)[c]	SD[d]	Occur. Freq.[e]
American Wigeon	3	0.000	0.019	0.177	0.013	1	0.001	0.005	0.069	0.005
Blue-winged Teal	29	0.005	0.182	0.980	0.050	16	0.011	0.075	0.500	0.028
Cackling Goose	157	0.025	0.987	8.654	0.019	0	-	-	-	-
Canada Goose	195	0.031	1.226	6.900	0.170	267	0.187	1.259	7.627	0.047
Canvasback[II]	2	0.000	0.013	0.112	0.013	0	-	-	-	-
Common Merganser	8	0.001	0.050	0.501	0.013	0	-	-	-	-
Gadwall	36	0.006	0.226	1.079	0.069	19	0.013	0.090	0.932	0.009
Greater White-fronted Goose	345	0.056	2.170	21.403	0.013	205	0.143	0.967	14.079	0.005
Green-winged Teal	5	0.001	0.031	0.237	0.019	1	0.001	0.005	0.069	0.005
Mallard	57	0.009	0.358	1.711	0.113	223	0.156	1.052	10.200	0.019
Northern Pintail[II]	31	0.005	0.195	0.924	0.082	5	0.003	0.024	0.343	0.005
Northern Shoveler	13	0.002	0.082	0.435	0.044	12	0.008	0.057	0.373	0.024
Redhead	6	0.001	0.038	0.354	0.013	0	-	-	-	-
Ring-necked Duck	2	0.000	0.013	0.159	0.006	0	-	-	-	-
Ross's Goose	5	0.001	0.031	0.237	0.019	9	0.006	0.042	0.553	0.009
Snow Goose	5224	0.843	32.855	243.694	0.057	653	0.457	3.080	25.804	0.019
Tundra Swan	0	-	-	-	-	13	0.009	0.061	0.893	0.005
Unknown Duck	78	0.013	0.491	4.055	0.075	5	0.003	0.024	0.343	0.005
ALL WATERFOWL	**6196**	**1.000**	**38.969**	**250.351**	**0.346**	**1429**	**1.000**	**6.741**	**32.012**	**0.118**

[a] Total Std. Detections is the total number of standardized individuals detected within a 800-m radius of the point count station during standardized use surveys. Because small-bodied birds species are the primary focus of diurnal avian use surveys, birds detected at all flight heights were recorded, analyzed, and presented in this table.

[b] % Comp. (i.e., percent composition) is the proportion of a particular species group that a particular species comprises during the season using total standardized detections.

[c] Mean Use is the total standardized detections divided by the total number of 10-minute point count surveys conducted within the season.

[d] SD is the standard deviation of Mean Use.

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Appendix B-5. Seasonal Waterfowl Use Statistics within the Project Area (Diurnal Avian Use Surveys)

	Spring					Fall				
Common Name	Total Std. Detections[a]	% Comp.[b]	Mean Use (birds/10 min. survey/survey plot)[c]	SD[d]	Occur. Freq.[e]	Total Std. Detections[a]	% Comp.[b]	Mean Use (birds/10 min. survey/survey plot)[c]	SD[d]	Occur. Freq.[e]

[e] Occur. Freq. (i.e., Occurrence Frequency) is the proportion of point count surveys at which a particular species was detected during the season.

- North Dakota State Wildlife Action Plan (Dyke et al. 2015) Species of Conservation Priortiy (SCP) are denoted with a superscript I or II following the species name to indicate that it is Level I or Level II SCP, respectively.

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APPENDIX C

SPECIES OBSERVED DURING EAGLE USE AND AVIAN USE SURVEYS

Appendix C. Species Observed during Eagle Use and Diurnal Avian Activity Surveys

Common Name	Scientific Name	Season[a]				Conservation Listing Status	
		Spring	Summer	Fall	Winter	State Status[b]	Federal Status[c]
Alder Flycatcher	*Empidonax alnorum*	X	N/A	-	N/A	-	-
American Avocet	*Recurvirostra americana*	-	N/A	Incidental	N/A	SCP II	-
American Bittern	*Botaurus lentiginosus*	X	Incidental	Incidental	N/A	SCP I	-
American Coot	*Fulica americana*	X	Incidental	X	N/A	-	-
American Crow	*Corvus brachyrhynchos*	X	N/A	X	N/A	-	-
American Golden-Plover	*Pluvialis dominica*	Incidental	N/A	X	N/A	-	-
American Goldfinch	*Spinus tristis*	X	Incidental	X	N/A	-	-
American Kestrel	*Falco sparverius*	X	Incidental	X	N/A	SCP II	-
American Pipit	*Anthus rubescens*	Incidental	N/A	X	N/A	-	-
American Robin	*Turdus migratorius*	X	Incidental	X	N/A	-	-
American Tree Sparrow	*Spizelloides arborea*	X	N/A	X	N/A	-	-
American White Pelican	*Pelecanus erythrorhynchos*	X	Incidental	X	N/A	SCP II	-
American Wigeon	*Mareca americana*	X	Incidental	X	N/A	-	-
Baird's Sandpiper	*Calidris bairdii*	-	Incidental	Incidental	N/A	-	-
Bald Eagle	*Haliaeetus leucocephalus*	X	X	X	X	SCP II	BGEPA
Baltimore Oriole	*Icterus galbula*	-	N/A	Incidental	N/A	-	-
Bank Swallow	*Riparia riparia*	X	Incidental	X	N/A	-	-
Barn Swallow	*Hirundo rustica*	X	Incidental	X	N/A	-	-
Black Tern	*Chlidonias niger*	X	Incidental	X	N/A	SCP I	-
Black-billed Magpie	*Pica hudsonia*	Incidental	N/A	X	N/A	-	-
Black-crowned Night-Heron	*Nycticorax nycticorax*	-	N/A	Incidental	N/A	-	-
Blue Jay	*Cyanocitta cristata*	X	N/A	X	Incidental	-	-
Blue-winged Teal	*Spatula discors*	X	Incidental	X	N/A	-	-
Bobolink	*Dolichonyx oryzivorus*	X	Incidental	X	N/A	SCP II	-
Bonaparte's Gull	*Chroicocephalus philadelphia*	Incidental	N/A	-	N/A	-	-

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Appendix C. Species Observed during Eagle Use and Diurnal Avian Activity Surveys

Common Name	Scientific Name	Season[a]				Conservation Listing Status	
		Spring	Summer	Fall	Winter	State Status[b]	Federal Status[c]
Brewer's Blackbird	*Euphagus cyanocephalus*	X	Incidental	X	N/A	-	-
Brown Thrasher	*Toxostoma rufum*	X	Incidental	X	N/A	-	-
Brown-headed Cowbird	*Molothrus ater*	X	Incidental	X	N/A	-	-
Bufflehead	*Bucephala albeola*	Incidental	N/A	-	N/A	-	-
Cackling Goose	*Branta hutchinsii*	X	N/A	-	N/A	-	-
California Gull	*Larus californicus*	X	Incidental	-	N/A	-	-
Canada Goose	*Branta canadensis*	X	Incidental	X	N/A	-	-
Canvasback	*Aythya valisineria*	X	Incidental	-	N/A	SCP II	-
Cattle Egret	*Bubulcus ibis*	Incidental	Incidental	-	N/A	-	-
Cedar Waxwing	*Bombycilla cedrorum*	-	Incidental	X	N/A	-	-
Chestnut-collared Longspur	*Calcarius ornatus*	X	Incidental	X	N/A	SCP I	-
Chipping Sparrow	*Spizella passerina*	X	Incidental	X	N/A	-	-
Clay-colored Sparrow	*Spizella pallida*	X	Incidental	X	N/A	-	-
Cliff Swallow	*Petrochelidon pyrrhonota*	X	Incidental	X	N/A	-	-
Common Goldeneye	*Bucephala clangula*	Incidental	N/A	-	N/A	-	-
Common Grackle	*Quiscalus quiscula*	X	N/A	X	N/A	-	-
Common Merganser	*Mergus merganser*	X	N/A	X	N/A	-	-
Common Raven	*Corvus corax*	-	N/A	X	N/A	-	-
Common Redpoll	*Acanthis flammea*	X	N/A	X	Incidental	-	-
Common Yellowthroat	*Geothlypis trichas*	X	Incidental	X	N/A	-	-
Cooper's Hawk	*Accipiter cooperii*	Incidental	N/A	X	N/A	-	-
Dark-eyed Junco	*Junco hyemalis*	Incidental	N/A	X	N/A	-	-
Dickcissel	*Spiza americana*	-	Incidental	Incidental	N/A	SCP II	-
Double-crested Cormorant	*Phalacrocorax auritus*	X	Incidental	X	N/A	-	-
Downy Woodpecker	*Dryobates pubescens*	X	N/A	X	Incidental	-	-

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Appendix C. Species Observed during Eagle Use and Diurnal Avian Activity Surveys

Common Name	Scientific Name	Season[a]				Conservation Listing Status	
		Spring	Summer	Fall	Winter	State Status[b]	Federal Status[c]
Eastern Bluebird	*Sialia sialis*	Incidental	Incidental	X	N/A	-	-
Eastern Kingbird	*Tyrannus tyrannus*	X	Incidental	X	N/A	-	-
Eurasian Collared Dove	*Streptopelia decaocto*	X	Incidental	X	Incidental	-	-
European Starling	*Sturnus vulgaris*	X	N/A	X	Incidental	-	-
Ferruginous Hawk	*Buteo regalis*	X	Incidental	X	N/A	SCP I	-
Forster's Tern	*Sterna forsteri*	Incidental	N/A	-	N/A	-	-
Franklin's Gull	*Leucophaeus pipixcan*	X	Incidental	X	N/A	SCP I	-
Gadwall	*Mareca strepera*	X	Incidental	X	N/A	-	-
Golden Eagle	*Aquila chrysaetos*	Incidental	-	X	X	SCP II	BGEPA
Grasshopper Sparrow	*Ammodramus savannarum*	X	Incidental	Incidental	N/A	SCP I	-
Gray Partridge	*Perdix perdix*	X	Incidental	X	N/A	-	-
Great Blue Heron	*Ardea herodias*	X	Incidental	X	N/A	-	-
Great Egret	*Ardea alba*	Incidental	N/A	X	N/A	-	-
Great Horned Owl	*Bubo virginianus*	Incidental	Incidental	X	Incidental	-	-
Greater White-fronted Goose	*Anser albifrons*	X	N/A	X	N/A	-	-
Greater Yellowlegs	*Tringa melanoleuca*	Incidental	Incidental	Incidental	N/A	-	-
Green-winged Teal	*Anas crecca*	X	Incidental	X	N/A	-	-
Hairy Woodpecker	*Dryobates villosus*	X	N/A	X	Incidental	-	-
Harris's Sparrow	*Zonotrichia querula*	Incidental	N/A	X	N/A	-	-
Hooded Merganser	*Lophodytes cucullatus*	Incidental	N/A	-	N/A	-	-
Horned Grebe	*Podiceps auritus*	Incidental	Incidental	-	N/A	SCP I	-
Horned Lark	*Eremophila alpestris*	X	Incidental	X	N/A	-	-
House Sparrow	*Passer domesticus*	X	Incidental	X	N/A	-	-
House Wren	*Troglodytes aedon*	X	Incidental	X	N/A	-	-
Killdeer	*Charadrius vociferus*	X	Incidental	X	N/A	-	-

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Appendix C. Species Observed during Eagle Use and Diurnal Avian Activity Surveys

Common Name	Scientific Name	Season[a]				Conservation Listing Status	
		Spring	Summer	Fall	Winter	State Status[b]	Federal Status[c]
Lapland Longspur	*Calcarius lapponicus*	X	N/A	X	Incidental	-	-
Lark Sparrow	*Chondestes grammacus*	Incidental	N/A	-	N/A	-	-
LeConte's Sparrow	*Ammospiza leconteii*	-	Incidental	Incidental	N/A	SCP II	-
Least Flycatcher	*Empidonax minimus*	X	Incidental	X	N/A	-	-
Least Sandpiper	*Calidris minutilla*	-	Incidental	Incidental	N/A	-	-
Lesser Scaup	*Aythya affinis*	Incidental	Incidental	-	N/A	SCP II	-
Lesser Yellowlegs	*Tringa flavipes*	X	Incidental	X	N/A	-	-
Lincoln's Sparrow	*Melospiza lincolnii*	Incidental	N/A	X	N/A	-	-
Loggerhead Shrike	*Lanius ludovicianus*	Incidental	Incidental	-	N/A	SCP II	-
Long-billed Dowitcher	*Limnodromus scolopaceus*	-	Incidental	-	N/A	-	-
Mallard	*Anas platyrhynchos*	X	Incidental	X	Incidental	-	-
Marbled Godwit	*Limosa fedoa*	X	Incidental	-	N/A	SCP I	-
Marsh Wren	*Cistothorus palustris*	-	N/A	X	N/A	-	-
Merlin	*Falco columbarius*	Incidental	N/A	X	Incidental	-	-
Mourning Dove	*Zenaida macroura*	X	Incidental	X	N/A	-	-
Nelson's Sparrow	*Ammospiza nelsoni*	-	Incidental	-	N/A	SCP I	-
Northern Flicker	*Colaptes auratus*	X	Incidental	X	N/A	-	-
Northern Harrier	*Circus hudsonius*	X	Incidental	X	N/A	SCP II	-
Northern Pintail	*Anas acuta*	X	Incidental	X	N/A	SCP II	-
Northern Shoveler	*Spatula clypeata*	X	Incidental	X	N/A	-	-
Orange-crowned Warbler	*Oreothlypis celata*	Incidental	N/A	-	N/A	-	-
Orchard Oriole	*Icterus spurius*	X	Incidental	X	N/A	-	-
Osprey	*Pandion haliaetus*	-	N/A	Incidental	N/A	-	-
Palm Warbler	*Setophaga palmarum*	Incidental	N/A	X	N/A	-	-
Pectoral Sandpiper	*Calidris melanotos*	-	Incidental	Incidental	N/A	-	-

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Appendix C. Species Observed during Eagle Use and Diurnal Avian Activity Surveys

Common Name	Scientific Name	Season[a]				Conservation Listing Status	
		Spring	Summer	Fall	Winter	State Status[b]	Federal Status[c]
Peregrine Falcon	*Falco peregrinus*	Incidental	N/A	-	N/A	SCP III	-
Pied-billed Grebe	*Podilymbus podiceps*	X	Incidental	X	N/A	-	-
Pine Siskin	*Setophaga palmarum*	X	N/A	X	N/A	-	-
Prairie Falcon	*Falco mexicanus*	-	Incidental	Incidental	Incidental	SCP II	-
Purple Martin	*Falco peregrinus*	X	Incidental	-	N/A	-	-
Red-breasted Nuthatch	*Sitta canadensis*	-	N/A	X	N/A	-	-
Redhead	*Aythya americana*	X	Incidental	-	N/A	-	-
Red-headed Woodpecker	*Melanerpes erythrocephalus*	-	Incidental	X	N/A	SCP I	-
Red-tailed Hawk	*Buteo jamaicensis*	X	Incidental	X	N/A	-	-
Red-winged Blackbird	*Agelaius phoeniceus*	X	Incidental	X	N/A	-	-
Ring-billed Gull	*Larus delawarensis*	X	Incidental	X	N/A	-	-
Ring-necked Duck	*Aythya collaris*	X	N/A	-	N/A	-	-
Ring-necked Pheasant	*Phasianus colchicus*	X	Incidental	X	Incidental	-	-
Rock Pigeon	*Columba livia*	X	Incidental	X	Incidental	-	-
Ross's Goose	*Anser rossii*	X	N/A	X	N/A	-	-
Rough-legged Hawk	*Buteo lagopus*	Incidental	N/A	X	Incidental	-	-
Ruddy Duck	*Oxyura jamaicensis*	Incidental	Incidental	-	N/A	-	-
Sandhill Crane	*Antigone canadensis*	X	N/A	X	N/A	-	-
Savannah Sparrow	*Passerculus sandwichensis*	X	Incidental	X	N/A	-	-
Say's Phoebe	*Sayornis saya*	X	N/A	Incidental	N/A	-	-
Sedge Wren	*Cistothorus platensis*	X	Incidental	X	N/A	-	-
Semipalmated Plover	*Charadrius semipalmatus*	-	N/A	Incidental	N/A	-	-
Semipalmated Sandpiper	*Calidris pusilla*	-	N/A	Incidental	N/A	-	-
Sharp-shinned Hawk	*Accipiter striatus*	Incidental	N/A	Incidental	N/A	-	-
Sharp-tailed Grouse	*Tympanuchus phasianellus*	X	Incidental	X	Incidental	SCP II	-

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Appendix C. Species Observed during Eagle Use and Diurnal Avian Activity Surveys

Common Name	Scientific Name	Season[a]				Conservation Listing Status	
		Spring	Summer	Fall	Winter	State Status[b]	Federal Status[c]
Smith's Longspur	*Calcarius pictus*	Incidental	N/A	Incidental	N/A	-	-
Snow Bunting	*Plectrophenax nivalis*	-	N/A	X	Incidental	-	-
Snow Goose	*Anser caerulescens*	X	N/A	X	N/A	-	-
Snowy Owl	*Bubo scandiacus*	-	N/A	-	Incidental	-	-
Solitary Sandpiper	*Tringa solitaria*	-	Incidental	X	N/A	-	-
Song Sparrow	*Melospiza melodia*	X	Incidental	X	N/A	-	-
Sora	*Porzana carolina*	Incidental	Incidental	Incidental	N/A	-	-
Spotted Sandpiper	*Actitis macularius*	X	Incidental	Incidental	N/A	-	-
Sprague's Pipit	*Anthus spragueii*	-	Incidental	X	N/A	SCP I	-
Swainson's Hawk	*Buteo swainsoni*	X	Incidental	X	N/A	SCP I	-
Swainson's Thrush	*Catharus ustulatus*	Incidental	N/A	-	N/A	-	-
Swamp Sparrow	*Melospiza georgiana*	Incidental	N/A	-	N/A	-	-
Tree Swallow	*Tachycineta bicolor*	X	Incidental	X	N/A	-	-
Tundra Swan	*Cygnus columbianus*	-	N/A	X	N/A	-	-
Turkey Vulture	*Cathartes aura*	X	Incidental	X	N/A	-	-
Upland Sandpiper	*Bartramia longicauda*	X	Incidental	X	N/A	SCP II	-
Vesper Sparrow	*Pooecetes gramineus*	X	Incidental	X	N/A	-	-
Warbling Vireo	*Vireo gilvus*	X	Incidental	X	N/A	-	-
Western Kingbird	*Tyrannus verticalis*	X	Incidental	X	N/A	-	-
Western Meadowlark	*Sturnella neglecta*	X	Incidental	X	N/A	SCP II	-
White-crowned Sparrow	*Zonotrichia leucophrys*	Incidental	N/A	X	N/A	-	-
White-faced Ibis	*Plegadis chihi*	Incidental	Incidental	X	N/A	-	-
White-throated Sparrow	*Zonotrichia albicollis*	-	N/A	X	N/A	-	-
Willet	*Tringa semipalmata*	X	Incidental	Incidental	N/A	SCP II	-
Willow Flycatcher	*Empidonax traillii*	-	Incidental	-	N/A	-	-

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Appendix C. Species Observed during Eagle Use and Diurnal Avian Activity Surveys

Common Name	Scientific Name	Season[a]				Conservation Listing Status	
		Spring	Summer	Fall	Winter	State Status[b]	Federal Status[c]
Wilson's Phalarope	*Phalaropus tricolor*	X	Incidental	-	N/A	SCP I	-
Wilson's Snipe	*Gallinago delicata*	X	Incidental	Incidental	N/A	-	-
Wood Duck	*Aix sponsa*	Incidental	N/A	Incidental	N/A	-	-
Yellow Warbler	*Setophaga petechia*	X	N/A	X	N/A	-	-
Yellow-headed Blackbird	*Xanthocephalus xanthocephalus*	X	Incidental	X	N/A	-	-
Yellow-rumped Warbler	*Setophaga coronata*	Incidental	N/A	X	N/A	-	-

[a] An "X" within a particular seasonal column indicates that species has been detected at least once within the project area over the course of standardized field studies (i.e., eagle use or diurnal avian activity surveys). Species marked with "Incidental" indicate that the species was observed incidentally within the project area during the season. Diurnal avian activity surveys were only conducted in the spring and fall. Therefore, unless detected incidentally, non-eagle species receive an "N/A" in summer and winter as standardized surveys were only conducted for eagles during these seasons. While diurnal avian use survey data were truncated at a distance of 300 m and 800 m for small and large bird analysis, respectively, all birds were recorded as standardized during these surveys and are therefore given an "X" if detected at any distance during spring or fall. As a result, some species may receive an "X" in the table above and be excluded from tables in Appendix B since the species was only detected beyond the 300 m or 800 m cut-offs.

[b] State conservation listing status indicates North Dakota State Wildlife Action Plan (Dyke et al. 2015) Species of Conservation Priority (SCP) Level I, II, or III.

[c] Federal Status Codes: BGEPA = Bald and Golden Eagle Protection Act; No federally threatened or endangered species were detected within the project area over the course of Year 2 avian studies.

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APPENDIX C

KEY CONTACTS

Key Contacts

Company	Name	Title	Email	Phone
Badger Wind Environmental Operations Support	Sarah Aftergood	Director of Environmental Permitting	SARAF@orsted.com	(512) 230-2148
	Charles Smith	Senior Director, Development	CHASM@orsted.com	(402) 290-6500
	Francessca Martella	Project Developer	FRKEH@orsted.com	(347) 522-0931
Badger Wind Operations and Maintence	To Be Determined	To Be Determined	To Be Determined	To Be Determined
U.S. Fish and Wildlife Service (USFWS)	Heidi Riddle	Fish and Wildlife Biologist	heidi_riddle@fws.gov	(701) 355-8545
North Dakota Department of Game and Fish (NDGFD)	Elisha Mueller	Conservation Biologist	ekmueller@nd.gov	(701) 328-6348
	Sandra Johnson	Conservation Biologist	sajohnson@nd.gov	(701) 328-6382
Environmental Incident Reporting	North Dakota Department of Environmental Quality (DEQ)	N/A	N/A	(701) 328-5210
	Federal National Response Center (NRC) for the U.S. Environmental Protection Agency (USEPA) and the United States Coast Guard (USCG)	N/A	N/A	(800) 424-8802

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