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APPENDIX I

Wildlife Conservation Strategy

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Wildlife Conservation Strategy

Walleye Wind Project
Rock County, Minnesota

Walleye Wind Project, LLC
Juno Beach, Florida

June 2020
ECT No. 190497

Document Review

The dual signatory process is an integral part of Environmental Consulting & Technology, Inc.'s (ECT's) Document Review Policy No. 9.03. All ECT documents undergo technical/peer review prior to dispatching these documents to any outside entity.

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5/29/2020	6/15/2020
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List of Acronyms and Abbreviations

AWWI	American Wind and Wildlife Institute
ABPP	Avian and Bat Protection Plan
BBS	Breeding Bird Survey
BCC	Bird of Conservation Concern
BCR	Bird Conservation Region
BGEPA	Bald and Golden Eagle Protection Act
BMP	Best Management Practice
BWSR	Minnesota Board of Water & Soil Resources
CREP	Conservation Reserve Enhancement Program
CRP	Conservation Reserve Program
ECPG	Eagle Conservation Plan Guidance
ECT	Environmental Consulting & Technology, Inc.
ESA	Endangered Species Act of 1973
FAA	Federal Aviation Administration
FSA	Farm Service Agency
GE	General Electric
GIS	geographic information system
IBA	Important Bird Areas
IPaC	Information for Planning and Consultation
LWECS	large wind energy conversion system
MBBA	Minnesota Breeding Bird Atlas
MBS	Minnesota Biological Survey
MBTA	Migratory Bird Treaty Act
MNDNR	Minnesota Department of Natural Resources
MSL	Mean Sea Level
MW	Megawatt
NABCI	North American Bird Conservation Initiative
NHD	National Hydrography Dataset
NHIS	Minnesota Natural Heritage Inventory System
NHNRP	Natural Heritage and Nongame Research Program
NWI	National Wetland Inventory
NWR	National Wildlife Refuge
O&M	Operations and Maintenance
PAD-US	Protected Areas Database of the United States
PCMM	Post-Construction Mortality Monitoring
Project	Walleye Wind Project
PWI	Public Waters Inventory
RES	Renewable Energy Systems, Inc.
RIM	Reinvest in Minnesota
SC	Special Concern
SCS	site characterization study
SD GFP	South Dakota Game, Fish, and Parks
SD NHDB	South Dakota Natural Heritage Database
SGCN	species of greatest conservation need

SNA	Scientific and Natural Area
T&E	threatened and endangered
USACE	US Army Corps of Engineers
USC	United States Code
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WCS	Wildlife Conservation Strategy
WEG	Wind Energy Guidelines
WEST	Western EcoSystems Technology, Inc.
WMA	Wildlife Management Area
WRRS	Wildlife Response Reporting System
WTG	Wind Turbine Generator

Executive Summary

Walleye Wind, LLC (Walleye Wind), contracted Environmental Consulting & Technology, Inc. (ECT), to prepare a Wildlife Conservation Strategy (WCS) for the Walleye Wind Project (Project) in Springwater, Beaver Creek, Luverne, and Martin Townships, Rock County, Minnesota. Project facilities will include turbines, collection lines, an operation and maintenance (O&M) building, a construction laydown yard, crane paths, gravel access roads, a meteorological (MET) tower, a new Project collection substation and a less than 500-ft generation tie in line connecting to an existing substation. The point of interconnection (POI) of the Project to the transmission system will be the existing 161 kilovolt (kV) Rock County Substation (Substation). The Substation is located on the east side of 40th Avenue, north of the City of Beaver Creek in Rock County, Minnesota. The Substation will be modified to accommodate the new 110.8 MW transmission line at the POI on the north side of the Substation. This transmission line will extend approximately 500 feet from the Substation to the Project collection substation (Walleye Wind Substation) planned at the north side of proposed POI.

The purpose of the WCS is to identify and answer questions laid out by the U.S. Fish and Wildlife Service (USFWS) in the Land-based Wind Energy Guidelines (WEG; USFWS 2012), which assists developers in identifying wildlife species of concern and their habitats and minimizing impacts from wind energy development.

This WCS presents the results of a desktop review of publicly available sources, including but not limited to the USFWS Information for Planning and Consultation (IPaC) tool, the Minnesota Natural Heritage Information System (NHIS), and results from various site visits and studies/ surveys.

The Project area spans approximately 31,095 acres (49 square miles) in Martin, Luverne, Springwater, and Beaver Creek Townships in Rock County, Minnesota. The Project area, including the 1-mile buffer is located in a largely rural landscape dominated by cropland and pastures typical of southwestern Minnesota and southeastern South Dakota. Undeveloped natural habitat (e.g., woodlots, wetlands, and grassland) remain in the landscape mostly as isolated features. The few large contiguous tracts of undeveloped natural habitat in the landscape occur on public lands but constitute a matrix of land cover types that provide suitable

habitat for avian resources, bat resources, and potentially, threatened and endangered (T&E) species within the Project area, and surrounding areas (i.e., 1-mile buffer).

One (1) federally endangered species, the Topeka shiner (*Notropis topeka*) has designated critical habitat within the Project area and may inhabit streams on site. Five (5) federally-threatened species have the potential to occur within the Project area: northern long-eared bat (*Myotis septentrionalis*), red knot (*Calidris canutus rufa*), Dakota skipper (*Hesperia dacotae*), prairie bushclover (*Lespedeza leptostachya*), and western prairie fringed orchid (*Platanthera praeclara*). The closest northern long-eared bat hibernacula in Minnesota are located in the eastern portion of Nicollet County and the western portion of Le Sueur County (approximately 130 miles northeast of the Project area).

Native plant communities occur within the Project area in low abundance and are fragmented. There are 39 sites of Minnesota Biological Survey (MBS) biodiversity significance within or abutting the Project area, including 34 sites ranked as "Below" and five (5) sites ranked as "Moderate." There are no MBS biodiversity sites ranked Outstanding or High within or abutting the 1-mile buffer around the Project area.

Based on the previous Tier 3 acoustic studies conducted in 2018 several species of bats were identified, including bats listed as state species of special concern and one federally-listed bat species. However, high-frequency calls were further reviewed by a professional bat biologist in the spring of 2020, including the northern long-eared bat call, and these additional analyses indicated that no acoustic evidence of the northern long-eared bat was observed with the region of the Project area during the 2018 acoustic survey. Northern long-eared bat is rare within the region of the Project and is unlikely to occur within the Project area. Previous Tier 3 avian studies also indicated no federally listed bird species were present within the Project area; however, the bald eagle (*Haliaeetus leucocephalus*) and golden eagle (*Aquila chrysaetos*) were confirmed present within the Project area and the surrounding region as part of these studies.

1.0 Introduction

1.1 Goals and Objectives

Walleye Wind, LLC (Walleye Wind) is developing a 111.5-megawatt (MW) wind energy facility within Rock County, Minnesota. Walleye Wind contracted Environmental Consulting & Technology, Inc. (ECT), to prepare a Wildlife Conservation Strategy (WCS) for the proposed Walleye Wind Project (Project) area in Martin, Luverne, Springwater, and Beaver Creek Townships in Rock County, Minnesota (**Figure 1**). The purpose of the WCS is to identify and answer questions laid out by the U.S. Fish and Wildlife Service (USFWS) in the Land-based Wind Energy Guidelines (WEG; USFWS 2012), the Minnesota Department of Natural Resources (MNDNR), and the *Avian and Bat Survey Protocols for Large Wind Energy Conversion Systems in Minnesota* (Mixon et al. 2014). This WCS aims to:

- Summarize previous steps and planned measures to avoid/minimize potential impacts on sensitive wildlife species on-site of the Project;
- Meet the State of Minnesota's requirement for an Avian and Bat Protection Plan (ABPP);
- Identify further plans and steps to minimize potential impacts to sensitive species through adaptive management strategies that will be implemented, if needed, during Project construction and operation.

1.2 Corporate Policy on Wildlife Conservation

Walleye Wind is committed to siting, constructing, operating, and decommissioning the Project in an environmentally responsible and sustainable manner. This includes minimizing potential impacts to natural resources, including wildlife and the habitats they use. As part of this commitment, Walleye Wind has developed this WCS with the following objectives:

1. Comply with federal and state laws pertaining to wildlife for all Project-related actions;
2. Comply with conditions of existing permits with respect to wildlife for all Project-related actions;
3. Implement measures to avoid and minimize potential impacts from the Project on wildlife;

4. Effectively document bird and bat injuries and mortalities that occur to provide the basis of ongoing adaptive management and development of wildlife protection procedures, as appropriate; and
5. Provide Walleye Wind staff and all relevant subcontractors the appropriate training to implement measures, including avoidance, minimization, monitoring and reporting, as described in this WCS.

This WCS has been developed as part of the due diligence efforts and the adaptive management program that Walleye Wind is implementing for the Project. This WCS documents the studies completed to understand the 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 WCS outlines the progression of the Project from the preliminary due diligence phases of site assessment through the field studies and discusses minimization measures to be implemented by Walleye Wind based on the results of the carefully considered analyses conducted during Tier 1 desktop analysis through Tier 3 field studies. Tier 4 studies (Section 8.0) 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 necessary.

2.0 Project Area Description

The Project area encompasses approximately 31,095 acres (49 square miles) in Springwater (T103N R47W and R46W), Beaver Creek (T102N R47W and R46W), Luverne (T102N R45W), and Martin (T101N R46W) Townships, Rock County, Minnesota. An approximately 500 ft proposed generation tie line is also included within the Project footprint. The Project area is located along the southwestern border of Minnesota with its western boundary along the Minnesota-South Dakota state line, adjoining Minnehaha County, South Dakota. The largest city near the Project area is Sioux Falls, South Dakota, which is located approximately 14 miles southwest of the Project area. The Project area is also located approximately 4 miles west of Luverne, Minnesota and encompasses the city of Beaver Creek, Minnesota (**Figure 1**).

The Project area and 1-mile buffer are in a largely rural area dominated by cultivated cropland (approximately 27,040 acres or 87% of the Project area) and pastures (approximately 1,796 acres or 6% of the Project area). Development in the Project area and 1-mile buffer is low-density and generally concentrated along rural roads and highways. Undeveloped, natural areas within the Project area, such as woodland, wetlands, and grasslands, are not dominant features in the landscape and comprise approximately 731 acres (2%) within the Project area. A notable network of watercourses covers the entire Project area and 1-mile buffer. The topography of the region, including the Project area and generation tie line route, are generally flat but contain undulating terrain characterized by rolling natural slopes typical of Minnesota and eastern South Dakota, with approximate elevations between 1,380-1,620 feet above mean sea level (MSL) (USGS 2017a, b, 2019a, b, c) (**Figure 2**).

3.0 Regulatory Framework

This WCS documents the efforts made by Walleye Wind to comply with federal and state regulations, including the federal Endangered Species Act (ESA), Bald and Golden Eagle Protection Act (BGEPA), Migratory Bird Treaty Act (MBTA), and the Minnesota Endangered Species Statute. Impacts to federal and state endangered and threatened species and bird and bat species of concern has reduced or eliminated Walleye Wind's careful siting, design, construction, and operation of the Project. Further details on these measures are described in this WCS.

3.1 Endangered Species Act

Federally listed species are protected under federal law by the ESA of 1973 (United States Code [U.S.C.], Title 16, Chapter 35, Sections 1531 through 1544). The stated purpose of the ESA is to:

1) provide a means to conserve the ecosystems upon which endangered species and threatened species depend;
2) provide a program for the conservation of endangered and threatened species; and
3) take such steps as necessary to achieve the treaties and conventions set forth in Section 2(a) of the ESA.

Under Section 9 of the ESA, the take of any fish or wildlife species listed under the ESA as endangered is prohibited. Additionally, under Section 4(d) of the ESA, the take of fish or wildlife species listed as threatened is also prohibited unless otherwise specifically authorized by regulation. The "take" of a species is defined by the ESA as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, a listed species, or attempt to engage in such conduct" (ESA § 3[19]). 'Harm' in the definition of "take" in the Act means an act which actually kills or injures wildlife. Such act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering" (50 CFR §17.3). The USFWS further defines harass as "an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering" (50 CFR §17.3).

The USFWS is responsible for the protection and management of federally-listed species, as protected under the ESA. The USFWS' Information for Planning and Consultation Tool (IPaC) is an online tool that provides information regarding federally listed threatened or endangered species, proposed, and candidate that may occur within a determined geo-referenced search area (USFWS 2020). The USFWS also has created a list of bird species that have the potential to become listed in the future without additional conservation actions taken. Information on these species, referred to as Birds of Conservation Concern (BCC), is also included in IPaC reports (USFWS 2008). However, BCC are not afforded any additional regulatory protection under the ESA.

3.2 Migratory Bird Treaty Act

Under the MBTA, it is illegal to "pursue, hunt, capture, kill, attempt to take, capture or kill, possess, offer for sale, offer to purchase, purchase, deliver for shipment, ship, cause to be shipped, deliver for transportation, transport, cause to be transported, carry, or cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export, at any time, or in any manner, any migratory bird, included in the terms of this Convention [...] for the protection of migratory birds [...] or any part, nest, or egg of any such bird" (16 USC §§ 703-712). However, MBTA regulations do not currently provide for the government to issue permits for take of migratory birds killed or injured, either purposefully or by accident. Walleye Wind has developed and will implement this WCS to minimize potential impacts on migratory birds from Project-related construction and operation activities.

3.3 Bald and Golden Eagle Protection Act

The BGEPA prohibits the take, either "knowingly, or with wanton disregard for the consequences of this act," of bald eagles (*Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos*) without a permit from the Secretary of the Interior (16 USC § 668-668c). Specifically, take is defined under BGEPA as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, destroy, molest, or disturb" (50 CFR § 22.3). Further, "disturb" is defined as "to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior."

The USFWS created the Eagle Conservation Plan Guidance: Module 1 – Land-based Wind Energy, V2 (ECPG; USFWS 2013) to provide wind energy project operators criteria for voluntary compliance with the goals of BGEPA. In this guidance, the USFWS recommends:

- Conducting pre-construction assessments to identify eagle-use areas;
- Avoiding, minimizing, and/or compensating for potential adverse effects to eagles; and
- Monitoring for impacts to eagles during construction and operation.

On December 14, 2016, the USFWS published a final rule revising the regulations for permits for incidental take of eagles and take of eagle nests. The final rule addresses criteria for permit issuance, compensatory mitigation requirements, permit duration, and data standards for submitting permit applications (USFWS 2019b).

3.4 Minnesota Endangered Species Statute

Under the Minnesota's Endangered Species Statute (Minnesota Statutes, Section 84.0895), the Minnesota Department of Natural Resources (MNDNR) is required to adopt rules designating species meeting the statutory definitions of endangered, threatened, or species of special concern. The resulting List of Endangered, Threatened, and Special Concern Species is codified as Minnesota Rules, Chapter 6134, with the most recent list dated August 19, 2013. Under Minnesota Rules, Chapter 6134, and the Minnesota Endangered Species Statute as codified in Minnesota Rules, Parts 6212.1800 to 6212.2300, all Minnesota state-listed species are protected by state law. Under these laws, the MNDNR has the authority to adopt rules that regulate the treatment of species designated as state-endangered and threatened. Under Minnesota's Endangered Species Statute, it is illegal to "take, import, transport, or sell any portion of an endangered or threatened species." However, these actions may be allowed special MNDNR issues permits. Species listed as "special concern" and "watchlist" are not afforded the same legal protection under Minnesota's Endangered Species Statute or the associated Rules, however, their designations are usually a reflection of dwindling or declining populations within the state.

The Natural Heritage and Nongame Research Program (NHNRP), under the MNDNR, collects, manages, and interprets information about nongame animals, native plants and plant communities to promote the wise stewardship of these resources. The NHNRP is responsible for

maintaining the Natural Heritage Information System (NHIS) and Biological Traits Information Catalogue's database, which provide information on the location and status of rare plants, rare animals, native plant communities, geologic features, and animal aggregations. Inclusion on the NHIS results does not indicate that the species is present within an analysis area, but rather that the species has the potential to occur in the analysis area.

4.0 Wind Energy Guidelines Description

In March 2012 the USFWS finalized the WEG. Using a tiered approach, the WEG provides a recommended framework for assessing risk to wildlife through a preliminary site evaluation, site characterization, field studies of potentially impacted species and their habitats, and post-construction studies to assess the fatality risk posed by wind energy projects. Each tier of the WEG helps determine the potential environmental risks at both the landscape scale (Tier 1) and the project scale (Tiers 2, 3, and 4).

The purpose of Tier 2 studies, as described in the WEG, is to evaluate potential project scale issues that may need to be considered prior to development, construction, and/or operation of the project. Specifically, Tier 2 assessments evaluate the risk of project development to state or federally sensitive species and characterize the proposed project site. Tier 3 assessments include field studies designed to document site-specific wildlife and habitats, as well as predict impacts resulting from project development. Tier 3 includes an assessment of potential project risk through the post-construction phase in addition to the identification of compensatory mitigation measures to offset significant unavoidable impacts. According to the WEG, Tiers 1 through 3 will determine the level of effort for Tier 4 post-construction monitoring studies. The Tier 4 assessments include post-construction monitoring to determine if the impacts to habitat, species of concern, and mortality predicted for the project in Tiers 1 through 3 are correct, and if additional studies are necessary (Tier 5). Tier 4 studies (Section 8.0) will be used to evaluate the efficacy of avoidance and minimization measures designed to limit potential impacts to birds and bats.

If impacts to habitat and/or wildlife identified within the Tier 4 studies are significant, proposed mitigation measures for project development are inadequate, or if demographic information of local populations of species of concern are important, then Tier 5 studies are employed. Typically, Tier 5 is not necessary for most wind energy projects because the goal of the WEG is to steer projects away from the need for further studies (USFWS 2012). This WCS is intended to meet the requirements of Tiers 1, 2, and 3. This WCS included a desktop review of publicly available information and geospatial data from federal, state, and nongovernmental organizations, as well as various site evaluations and surveys.

The USFWS recommends the development of an ABPP as studies are taken for each Tier (Tiers 1 through 4) under the WEG. An ABPP plan is also a standard permit requirement of Large Wind Energy Conversion System (LWECS) Site Permit within Minnesota. This WCS adheres to recommendations for ABPP/Bird and Bat Conservation Strategies in the WEG and the ECPG, as well as by the state of Minnesota, but is not limited to only avian and bat species within the vicinity of the Project area.

5.0 Site Evaluation and Characterization (Tiers 1 &2)

A site characterization study (SCS) was conducted by ECT for the Project area to identify and evaluate landscape characteristics and biological features occurring within the Project area. Because the Project boundary is ecologically arbitrary, ECT also evaluated a 1-mile buffer of the Project area for biological features within the vicinity of the Project. It should be noted that while the entire Project area is located with Rock County, Minnesota, the 1-mile buffer area utilized in evaluating resources for the SCS extends into South Dakota since the Project boundary is on the Minnesota/South Dakota state line. No Project facilities are located in South Dakota.

As part of this evaluation, ECT assessed the likelihood of federal and state-listed species to occur within the Project area and 1-mile buffer. Publicly available information reviewed as part of both the Tier 1 site evaluation and the Tier 2 SCS, which included, but were not limited to:

- 2016 National Land Use-Land Cover Database
- U.S. Geological Survey (USGS) topographic maps
- USGS North American Breeding Birds Survey (BBS)
- USGS Protected Areas Database of the United States (PAD-US)
- USFWS's National Wetland Inventory (NWI) maps
- USFWS's IPaC
- MNDNR's Endangered Species List
- MNDNR's NHIS
- eBird data
- Minnesota Breeding Bird Atlas (MBBA)
- South Dakota Breeding Bird Atlas (SDBBA)
- South Dakota Game, Fish & Parks (SD GFP) Endangered Species List
- South Dakota Natural Heritage Database (SD NHDB)

The following sections summarize ECT's findings. Additionally, two (2) Site Characterization Studies were also previously completed for preliminary boundaries of the Project area by

Western EcoSystems Technology, Inc (WEST) in 2016 and 2019 (**Figure 3**). Findings from these previous SCS reports are included in this WCS as applicable.

5.1 Land Use/Land Cover Types

The Project area and 1-mile buffer are within a predominantly rural landscape dominated by agriculture (**Figure 1**). According to the 2016 National Land Cover Database (Yang et al. 2018, MRLC Consortium 2019), land cover and land use within the Project area and 1-mile buffer are dominated by agricultural lands. Land cover and land use in the Project area primarily includes cultivated crops (approximately 27,040 acres or 87% of the Project area) and pastures and hay (approximately 1,796 acres or 6%) (**Table 1**, **Figure 4**). Land not developed or under agricultural use, including natural areas, is limited within the Project area. Other land cover types (e.g., deciduous forest, wetlands, grasslands) account for low percentages of the Project area (approximately 2% total, **Table 1**, **Figure 4**). Landcover characteristics within the Project area and the 1-mile buffer are relatively similar.

Table 1. Land Cover Types within Project area and 1-mile Buffer

Land Cover Type	Acres within Project area	% of Project area	Acres within 1-mile buffer	% within one-1 buffer
Cultivated Crops	27,040.7	87.0%	50,317.9	87.4%
Pasture / Hay	1,796.1	5.8%	3,192.3	5.5%
Developed, Open Space	1,121.8	3.6%	2,093.3	3.6%
Grassland / Herbaceous	384.0	1.2%	726.2	1.3%
Developed, Low Intensity	279.00	0.9%	409.9	0.7%
Emergent Herbaceous Wetlands	249.8	0.8%	472.9	0.8%
Deciduous Forest	87.0	0.3%	176.4	0.3%
Developed, Medium Intensity	70.6	0.2%	119.8	0.2%
Barren Land (Rock/Sand/Clay)	32.5	0.1%	47.3	0.1%
Open Water	17.8	0.1%	28.9	<0.01%
Shrub/Scrub	10.2	<0.1%	11.3	<0.01%
Developed, High Intensity	5.6	<0.1%	9.1	<0.01%
Mixed Forest	0.00	0.0%	2.2	<0.01%
Total	31,095.1	100.0%	57,607.5	100.0%

*Data obtained from the 2016 National Land Cover Database. (MRLC Consortium 2019).

5.2 Topography

Topography of the region, including the Project area, is generally flat but contains undulating terrain, characterized by rolling natural slopes, typical of Minnesota, with approximate elevations between 1,380-1,620 ft above mean sea level (MSL, **Figure 2**).

5.3 Wetlands & Streams

A review of aerial imagery and NWI data following the U.S. Army Corps of Engineers (USACE) St. Paul District's *Guidance for Offsite Hydrology/Wetland Determinations* (USACE and MBWSR 2016) was conducted by ECT to preliminary assess the location and size of streams, wetlands, and floodplains within the Project area and 1-mile buffer. Data available from the MNDNR Public Waters Inventory (PWI) were also reviewed for Minnesota mapped water resources within the Project area. The western portions of the 1-mile buffer were only evaluated using NWI data as no state-level water resource mapping is publicly available for South Dakota.

A review of these state and federal data indicated that the Project area contains approximately 1,059 acres of potential wetlands (approximately 3% of land within the Project area, **Figure 5**). The aerial interpretation identified emergent wetland systems to be the dominant wetland type. These potential wetland areas are primarily associated with mapped streams and drainages within the Project area. The aerial review also identified potential seasonal wetland areas within agricultural fields.

Based on aerial interpretation of data available from the National Hydrography Dataset (NHD) and MNDNR PWI, the approximate mileage of mapped streams within the entire Project area and 1-mile buffer as 101.11. Several large named streams are found throughout the Project area and 1-mile buffer, including Beaver Creek and its tributary Little Beaver Creek, Springwater Creek, and Mud Creek.

5.4 Protected Areas

5.4.1 Public Lands & Conservation Easements

Public Lands

There are no federally owned or managed lands located within the Project area or 1-mile buffer (**Figure 6**). According to data available from the PAD-US, the Touch the Sky Prairie, a portion of Northern Tallgrass Prairie National Wildlife Refuge (NWR), is located approximately 2 miles northeast of the Project area and 1-mile buffer (USGS 2020).

One (1) state-managed land is located within the Project area. The Rooster Ridge Wildlife Management Area (WMA) within the southern portion of the Project area southwest of Beaver Creek, Minnesota (**Figure 6**). Additionally, Springwater WMA is located adjacent to the Project area within northern sections of the 1-mile buffer (**Figure 5**). The state of Minnesota owns the WMAs, which were established to protect and manage lands and waters for wildlife production, public hunting, trapping, fishing, and other recreational activities (MNDNR 2020a).

Conservation Areas

The United States Department of Agriculture (USDA) Farm Service Agency (FSA) Conservation Reserve Program (CRP) is a federally funded conservation program that provides farmers with assistance and resources to convert highly erodible lands to resource-conserving vegetative cover to enhance the environmental quality of the surrounding region (USDA-FSA 2020). The Minnesota Conservation Reserve Enhancement Program (CREP) is a partnership between the USDA and the Minnesota Board of Water and Soil Resources (BWSR) that implements programs to improve water quality and habitat within the agricultural areas of Minnesota (BWSR 2020a). The South Dakota CREP is focused on increasing pheasant habitat in addition to improving water quality and flood control within the James River watershed in South Dakota (South Dakota Habitat Pays 2020).

Three (3) Minnesota CREP easement areas are located within the Project area (**Figure 5**). Two (2) easements are located adjacent to each other along Beaver Creek. These CREP easements comprise 7.40 acres and 10.20 acres within the Project area, and both have an expiration year of 2052 (BWSR 2020b). An additional CREP area is also mapped within the eastern Project area along County Road 4. This area comprises 4.7 acres and also has an expiration date of 2052. No South Dakota CREP lands are located within the Project area or surrounding 1-mile buffer.

In addition to CRP/CREP registered easements, the BWSR can acquire conservation easements under the Reinvest in Minnesota (RIM) Reserve Program. The RIM acquires conservation easements to permanently protect and restore natural resources within the state (BWSR 2020b). One (1) approximately 39-acre RIM Reserve easement is located on riparian land along Beaver Creek, in the southern portion of the Project area. This site is perpetually enrolled with the RIM program and does not have an expiration date (**Figure 5**).

5.4.2 Sensitive Habitats

Native Plant Communities & Undisturbed Lands

According to available MNDNR spatial data, two (2) state-classified native plant communities occur within the Project area, and 1-mile buffer (**Figure 7**). **Table 2** summarizes the native plant communities within the Project area and portions of the 1-mile buffer located in Minnesota.

Table 2. Tier 1 Analysis – MNDNR Native Plant Communities Occurrence in the Project area and 1-mile Buffer

Native Plant Communities Within the Project area		
Native Plant Community	**Code**	**Acres**
Dry Hill Prairie (Southern)	UPs13d	1.37
Native Plant Communities Within the 1-mile Buffer		
Native Plant Community	**Code**	**Acres**
Seepage Meadow/Carr, Tussock Sedge Subtype	WMs83a1	0.54

Native plant communities classified by the MNDNR comprise only a small percentage (<0.01%) of the total Project area and 1-mile buffer, and due to their small size, these areas are unlikely to provide suitable habitat for Threatened and Endangered (T&E) species within the vicinity of the Project area.

Areas of Biodiversity Significance

The Minnesota Biological Survey (MBS) is responsible for assigning a biodiversity significance ranking (Outstanding, High, Moderate, and Low) to each site they survey. The MBS rankings are used to communicate the statewide native biological diversity significance of each site to natural resource professionals, state and local government officials, and the public. The biodiversity rankings also help to guide conservation and management efforts (MBS 2020). Sites ranked as Outstanding contain the "best occurrences of the rarest species, the most outstanding examples of the rarest native plant communities, and/or the largest, most ecologically intact or functional

landscapes;" According to the MBS, High ranking sites contain "very good quality occurrences of the rarest species, high-quality examples of rare native plant communities, and/or, important functional landscapes." Moderate ranking sites contain "occurrences of rare species, moderately disturbed native plant communities, and/or landscapes that have strong potential for recovery of native plant communities and characteristic ecological processes." Below ranking sites "lack occurrences of rare species and natural features or do not meet MBS standards for Outstanding, High, or Moderate rankings." Below ranking sites might include areas of conservation value at the local level, such as habitat for native plants and animals, corridors for animal movement, buffers surrounding higher-quality natural areas, areas with high potential for restoration of native habitat, or open space (MBS 2020).

Within the Project area and portions of the 1-mile buffer located in Minnesota, there are 39 sites of MBS biodiversity significance. None (0) of the sites within the Project area or 1-mile buffer are ranked as Outstanding or High. Five (5) sites within the Project area and 1-mile buffer are ranked as Moderate, and 34 sites are ranked as Below. Sites ranked Moderate comprise of approximately 1% of the total Project area acreage, while sites ranked Below comprise of approximately 4% of the total Project area. These sites are largely associated with riparian corridors, wetlands, pastures, and grassland cover types. The Springwater WMA, located adjacent to the northern boundary of the Project area and within the 1-mile buffer, overlaps with an MBS site ranked as Moderate; while, the Rooster Ridge WMA, located within southern Project area overlaps with an MBS site ranked as Below.

Important Bird Areas

The National Audubon Society's Important Bird Areas (IBA) Program identifies, designates, and monitors what is believed to be important places for birds. However, IBAs do not have a legal status and are not reviewed by public entities prior to being established.

The Prairie Coteau Complex IBA is a designated IBA of state importance in Rock County, Minnesota. No IBAs of global or state importance are designated within Minnehaha County, South Dakota. The Prairie Coteau Complex IBA is located within the vicinity of the Project area and 1-mile buffer and is located approximately 2-miles northeast of the Project boundary at its closest point. The Prairie Coteau IBA is recognized for providing grasslands, and prairie habitats for 71 Minnesota identified Species of Greatest Conservation Need (SGCN). This IBA is known to support populations of T&E species, including the Minnesota state-endangered Henslow's sparrow (*Ammodramus henslowii*) and loggerhead shrike (*Lanius ludovivianus*) (Audubon

Minnesota 2015). The Project area and 1-mile buffer are dominated by agricultural lands and are unlikely to provide the same high-quality grassland habitat for avian species as those within the Prairie Coteau Complex.

5.5 Threatened & Endangered Species

5.5.1 Federally-Listed Species

The USFWS IPaC provides information regarding federally threatened, endangered, proposed, and candidate species on a county-by-county basis. The unofficial species lists from IPaC (accessed January 15, 2020) indicate that the Project area and 1-mile buffer are within the range (i.e., contain documented records and/or have the potential to harbor critical habitat) of one (1) federally-endangered and five (5) federally-threatened species (USFWS 2020) (**Table 3**, **Appendix B**).

Table 3. USFWS IPaC Results

Common Name	Scientific Name	Status*		Suitable Habitat	Potential to Impact
		Federal	State (MN/SD)		
Northern long-eared bat	*Myotis septentrionalis*	LT	SC/-	Summer roosts within forest systems often associated within riparian areas for foraging. Overwinters within cave systems.	Low
Red knot	*Calidris canutus rufa*	LT	-/-	Shoreland habitats including tidal flats, mudflats, and open sandy beaches	Low
Topeka shiner	*Notropis topeka*	LE	SC/-	Prefer slow-moving waters of midsize prairie streams including oxbows and tributaries outside of the main river channel	Low
Dakota skipper	*Hesperia dacotae*	LT	SE/-	Moist bluestem prairies as well as upland dry prairies	Low
Prairie bush-clover	*Lespedeza leptostachya*	LT	ST/-	Commonly found within mesic to dry-mesic prairies with coarse-textured soils of gravel and sand	Low
Western prairie fringed orchid	*Platanthera praeclara*	LT	SE/-	Remnant prairies and sedge meadow habitats with limited livestock grazing	Low

*LE=federally endangered; SE=state endangered; ST=state threatened; SC=state species of special concern; LT=federally threatened
Source: (MNDNR 2013, USFWS 2020)

Both the northern long-eared bat and the red knot have limited potential to occur in the Project area and 1-mile buffer due to the lack of suitable habitats. Northern long-eared bats roost within forest systems, often associated within riparian areas. Forest cover is scarce in the Project and surrounding area. In April 2020, ECT conducted a thorough aerial review of mapped National

Land Cover Database forested areas to identify additional forested areas within the Project area. The results of this desktop review indicated a total of 362 acres (approximately 1.16% of the Project area) of forest within the Project area. The identified forested areas are present mostly as small isolated woodlots, which are less than 10 acres, limiting suitability for bat species.

Additionally, general acoustic bat surveys were conducted by WEST in the spring, summer, and fall of 2016 at stations within the Project area and 1-mile buffer located in cropland habitat, representing potential turbine locations, and forest edge habitat containing features attractive to bats. Approximately 77% of bat passes at the cropland station were classified by WEST as low-frequency, which potentially includes species such as big brown bats, hoary bats, or silver-haired bats. However, only 23% of the bat passes at the cropland station were identified as high frequency, which potentially includes species such as the eastern red bat, little brown bat, or the northern long-eared bat. WEST's bat biologists reviewed the high-frequency passes and determined that no protected bat species calls (northern long-eared bat) were identified during the 2016 survey (Bishop-Boros, Solick, and Kreger 2017). Additional acoustic bat surveys within the vicinity of the Project area and 1-mile buffer in 2018 indicated peak bat activity during the summer during the middle of July, with 88.7% of the bat passes identified as low frequency and 11.2% of bat passes identified as high frequency (Kreger et al. 2019). WEST's review of high-frequency calls recorded during the 2018 acoustic survey indicated that no acoustic evidence of northern long-eared bat was identified within the Project area. The absence of large tracts of high-quality woodlands and or/floodplain forests within the Project area limit the likelihood of northern long-eared bat roosting areas, and acoustic surveys suggest that the occurrence of northern-long eared bat is rare within the region of the Project. It is unlikely that the northern long-eared bat occurs within the Project area.

The red knot requires wetland habitats, including shorelands, tidal flats, or sandy beaches (**Table 3**). Wetland areas comprise a minimal portion, approximately 3%, of the Project area and surrounding 1-mile area. Additionally, these wetland areas are predominately limited to emergent riparian areas along streams or seasonally flooded agricultural areas. Large lakes containing mudflats that would provide suitable shoreland habitat for the red knot are not present within the Project area. It is unlikely that the red knot would be found within the Project area, and thus the potential to impact the red knot would be low.

Suitable habitat for the Dakota skipper, prairie bush clover, and western prairie fringed orchid is limited to remnant prairies and functional grasslands located within limited portions of the

Project area (**Figure 7**). Given the highly agricultural landscape, it is unlikely these species would be located within the Project area or be adversely impacted by Project activities.

The Topeka shiner has federally designated critical habitat located within the Project area and 1-mile buffer along Springwater Creek, Beaver Creek, Little Beaver Creek, Mud Creek, and their tributaries (USFWS 2004) (**Figure 7**). Additionally, data available from the MN NHIS indicated known occurrences of Topeka shiner throughout the Project area and 1-mile buffer within larger streams and their tributaries with the most recent records within the Project area and 1-mile buffer being from 2017 (MNDNR NHIS 2020). Avoidance of impacts to stream systems to the extent practicable, and particularly critical habitat, will limit impacts to Topeka shiner within the Project area. The potential to impact the Topeka shiner is considered to be low but is dependent upon the extent of avoidance of Topeka shiner critical habitat areas, implementation of Best Management Practices (BMPs), and if the impacts are temporary in nature.

5.5.2 Critical Habitat

Designated critical habitat exists within the Project area for the Topeka shiner. Review of the USFWS's Final Designation of Critical Habitat for the Topeka shiner (USFWS 2004) states critical habitat has been designated for the Split Rock/Pipestone/Beaver Creek Complex within Rock County, Minnesota and includes, Mud Creek, Beaver Creek, Little Beaver Creek, Springwater Creek and their associated tributaries within the Project area and 1-mile buffer (**Figure 7**). Designated critical habitat for the Dakota skipper in Minnesota and South Dakota does not include Rock County, Minnesota or Minnehaha County, South Dakota (USFWS 2019a).

5.5.3 State Listed Species

Under MNDNR license agreement LA-930, on January 8, 2020 and June 30, 2020, ECT accessed the MN NHIS rare features database to review element occurrence records of T&E species known within the Project area and surrounding 1-mile buffer. Data available from NHIS (Rock County, Minnesota), SD GFP, and NHDB (Minnehaha County, South Dakota) identified one (1) state-endangered and one (1) state-threatened species with the potential to occur within or near the Project area and 1-mile buffer (**Table 3**, **Appendix B**). In addition, NHIS data identified three (3) species of special concern, one of which, the Topeka shiner, is also federally listed as endangered. One (1) watch list species, and five (5) mussel species were also listed by MN NHIS. Though mussel species are not listed as state T&E species in Minnesota, MNDNR tracks mussel populations throughout the state through the Minnesota Statewide Mussel Survey

(MNDNR 2020b). Mussel occurrence records documented by NHIS within the Project area and 1-mile buffer may indicate high water quality and suitable aquatic habitat for T&E species. **Table 4** below summarizes state-listed species with known occurrences within the Project area and 1-mile buffer.

Table 4. NHIS and SD NHDB Results

Common Name	Scientific Name	Status* (MN/SD)	Location Detail†	Habitat Requirements	Potential for Impact‡	Element Category
Threeridge	*Amblema plicata*	-/-/-	WRA	Variety of stream habitat including small to streams to large river systems with various currents. Most often prefers areas of sand and gravel substrates.	Moderate	Mussel
Cylindrical papershell	*Anodontoides ferussacianus*	-/-	Project area	Silt substrates of shallow waters	Moderate	Mussel
Short-eared owl	*Asio flammeus*	SC/-	Project area	Found with a variety of open community habitats including prairies, pastures, sedge meadows, and peatlands. Prefers areas with large spaces of habitat.	Moderate	Bird
Western foxsnake	*Elaphe vulpina*	W/-	1-mile buffer	Forest edge habitats. May also use manmade structures such as barns and sheds.	Low	Reptile
White heelsplitter	*Lasmigona complanata*	-/-/-	WRA	Found in medium to large rivers as well as open waters such as lakes and bays. Prefers quiet currents and substrates of mud and fine sand.	Moderate	Mussel
Mudwort	*Limosella aquatica*	SC/-	1-mile buffer	Most commonly occurs along edges of lowland prairie pools and rock outcrops.	Moderate	Plant
Northern river otter	*Lontra canadensis*	-/ST	1-mile buffer	Riparian areas and wetland margins with vegetation for foraging. Commonly den within beaver dens, fall trees, and logjams.	Low	Mammal
Topeka shiner	*Notropis topeka*	SC/ - and LE	Project area & 1-mile buffer	Prefers slow-moving waters of midsize prairie streams including oxbows and tributaries outside of the main river channel.	Low	Fish
Giant floater	*Pyganodon grandis*	-/-	Project area	Mud substrates of pools, creeks, and rivers.	Moderate	Mussel
Lined snake	*Tropidoclonion lineatum*	SC/SE	1-mile buffer	Variety of habitats including prairies/grasslands and residential properties.	Low	Reptile
Lilliput	*Toxolasma parvums*	-/-	Project area	Sands, gravel, and mud of shallow lakes, ponds, and rivers.	Moderate	Mussel

* SE = state endangered; ST = state threatened; SC = state special concern; W =state watch list, state monitored but no legal protection; LE= federally endangered; LT= federally threatened

†Indicates whether the element occurrence overlaps the Project area boundary or 1-mile buffer boundary.
‡Potential for impact based on preliminary review and does not preclude the need for further review of potential impacts if suitable habitat is targeted for development or during focused Tier 3 surveys.

Source: (South Dakota Department of Game, Fish & Parks 2016, MNDNR NHIS 2020)

Many of the state-listed species included in the NHIS are restricted to undisturbed grasslands, prairies, and various aquatic habitats (e.g., wetlands, streams/creeks, and open water). The Project Area and 1-mile buffer is dominated by land under agricultural use such as row crops and open pastures, not undisturbed grasslands and prairies and various aquatic habitats, such as wetlands, streams, and open water, which are more suitable habitats for these species. Walleye Wind has utilized data from Tier 1 and Tier 2 studies to implement appropriate planning and strategic siting of turbines, roads, and infrastructure to avoid, to the extent practicable, disturbing undeveloped habitats (e.g., grasslands or wetland pockets) or constructing new crossings across large ditches. Such micrositing would likely reduce or eliminate the potential risks to state-listed species if found within these remnant habitats.

The Project area contains limited prairie habitat for both the short-eared owl and lined snake. Frequent disturbance from grazing of functional grasslands (i.e., pastureland) also limits these species from occurring within the Project area and 1-mile buffer. Streams within the Project area and 1-mile buffer are also likely impacted by agricultural activity, limiting potential habitat for the northern river-otter. Impacts to the Topeka shiner are discussed previously in Section 5.5.1.

5.5.4 Avian Species

The Project area and 1-mile buffer are located in the Eastern Tallgrass Prairie Bird Conservation Region (BCR) and are close to the boundary of the Prairie Potholes BCR (Birds Studies Canada 2014). Each BCR is an ecologically distinct region in North America with similar bird communities, habitats, and natural resource management issues (Birds Studies Canada 2014). Historically, the Eastern Tallgrass Prairie BCR was part of the tallest and lushest grasslands of the Great Plains (NABCI 2000). Presently, the Eastern Tallgrass Prairie BCR is dominated by agriculture, with agricultural expansion, recreational development, and urbanization threatening upland and wetland habitats (NABCI 2000). The Eastern Tallgrass Prairie BCR is part of the larger Prairie Avifaunal Biome. Similar to BCRs, avifaunal biomes represent aggregations of BCRs that encompass more similar avian fauna than other biomes (AWWI 2019).

Eagles

Although potential habitat for bald eagles within the Project area and 1-mile buffer is limited, bald eagles are known to occur within the Project area Two (2) public occurrence records have been reported from within the Project area. These observation records for bald eagles within the

Project area occurred along Interstate 90 (eBird 2020). One (1) record from 2011 reports two (2) birds, approximately 0.50 miles east of the intersection of Interstate 90 and 60th Avenue. The other record from 2014, occurred approximately 1.50 miles west of the intersection of Interstate 90 and 60th Avenue (eBird 2020).

Based on ECT's aerial review, forested areas in which bald eagles could use for nesting only account for approximately 1% of the Project area. Additionally, waterbodies and riparian areas in which bald eagles use for feeding, also comprise only a small portion of the Project area and 1-mile buffer. Bald eagles will nest in non-forested areas if there are trees sufficiently large to hold their nest (Buehler 2000). Previous studies conducted by WEST in 2016 identified two (2) known active bald eagle nests within 10-miles of the current Project area, southwest of the Project area and located along the Big Sioux River (Pickle et al. 2016). WEST also conducted additional raptor nest surveys in 2018. Both eagle nests identified during the 2016 surveys along the Big Sioux River were included in the survey and considered active during the 2018 survey period. There were also five (5) unidentified raptor nests that WEST deemed to be consistent in size and structure of a bald eagle nest that were more than 6.5 miles away from the Project area. Three (3) of these potential bald eagle nests were located east, and southeast of the reviewed Project area along the Rock River, and the remaining two (2) nests were located to the southwest along the Big Sioux River. One (1) nest was classified by WEST as occupied, inactive, and the other four (4) nests were classified by WEST as inactive (Kreger and Suehring 2018).

Additional avian surveys conducted by ECT in the spring of 2020 reviewed a preliminary Project boundary and an associated 10-mile buffer. During the 2020 surveys, ECT identified 10 active bald eagle nests within 10-miles of the current Project area. Six (6) of these identified active nests were previously identified by WEST in the previous 2016 and 2018 surveys. One (1) historic eagle nest structure identified by WEST in 2018, approximately 8.5 miles southwest of the current Project area boundary, was not relocated during surveys in 2020. ECT also identified one (1) alternate eagle nest within 1-mile of the Project area. However, further site visits in May 2020 showed that this nest had failed. Further discussion on the bald eagle nests within the vicinity of the Project area is discussed further in Section 6.2.

Golden eagle, a federally protected species, has one (1) public occurrence record within Blue Mounds State Park in 2019 (eBird 2020). The Blue Mounds State Park is located within the vicinity of the Project but is not located within the Project area or 1-mile buffer. No public records of golden eagles breeding in Minnesota or South Dakota exist, and they infrequently

occur during the winter and migratory periods (Kochert et al. 2002). Limited areas of grassland habitat, as identified in the NLCD, comprise approximately 1% of the Project area (Yang et al. 2018, MRLC Consortium 2019). Some golden eagles in the eastern extent of their range will nest in forested landcover. However, forested areas only comprise approximately 1% of the Project area. Given the rarity of the golden eagle within the region and the lack of suitable habitat, it is unlikely that the golden eagle would use the Project area and 1-mile buffer for nesting.

Migratory Birds

The Project area and 1-mile buffer is located between the Mississippi and Central flyways (Hyzy et al. 2019). The IPaC tool identified select migratory birds, protected under the Migratory Bird Treaty Act (MBTA 1918), which may seasonally migrate within the Project area and 1-mile buffer. Natural landcover within the Project and 1-mile buffer is limited, of low quality, and highly fragmented, large migration stopover events are unlikely. Waterfowl are likely to migrate through the area; however, more favorable habitats for congregations of migratory waterbirds are located 15 and 5 miles to the west and east, respectively, of the Project and 1-mile buffer within the Big Sioux River and Rock River corridors (Hyzy et al. 2019).

A review of publicly available eBird data revealed occurrences of several species listed as BCC within BCR #22, the Eastern Tallgrass Prairie, including the American golden-plover (eBird 2020). These observations are within the Touch the Sky Prairie located approximately 2 miles northeast the Project area and 1-mile buffer. Blue Mounds State Park, approximately 3 miles northeast Project area and 1-mile buffer, may also attract large numbers of migratory species (eBird 2020). However, suitable grassland habitat within the boundary of the Project area and 1-mile buffer is limited.

State-listed Avian Species

Publicly available data from eBird indicates that 258 species have been recorded in Rock County, Minnesota, and 282 species have been recorded within Minnehaha County, South Dakota (eBird 2020). These data also show that many state T&E avian species, as well as bald and golden eagles, have been documented within the vicinity of the Project area and 1-mile buffer. Touch the Sky Prairie, Blue Mounds State Park, and Palisades State Park are located approximately 2 and 3 miles northeast and 3 miles west of the Project area and 1-mile buffer, respectively. These natural areas attract a wide variety of avian species, and nearly 220 species have been observed within Blue Mounds State Park alone (eBird 2020). Minnesota T&E avian species with known occurrences within the Project area and 1-mile buffer include the horned

grebe (*Podiceps auritis*) and Wilson's phalarope (*Phalaropus tricolor*). No South Dakota T&E species had records within the Project area and 1-mile buffer. Wetlands and open water in which the horned grebe and Wilson's phalarope are likely to use as stopover habitat comprise only 3% of the Project area.

Multiple Minnesota species of special concern have occurrence records from Touch the Sky Prairie NWR and Blue Mounds State Park: Nelson's sparrow (*Ammodramus nelsoni)*, short-eared owl (*Asio flammeus*), lark sparrow (*Chondestes grammacus*), trumpeter swan (*Cygnus buccinator*), peregrine falcon (*Falco peregrinus*), Franklin's gull (*Leucophaeus pipixcan*), marbled godwit (*Limosa fedoa*), American white pelican (*Pelicanus erythrorhynchos*), purple martin (*Progne subis*), Forster's tern (*Sterna forsteri*), and Bell's vireo (*Vireo belli*). Species of special concern observed within Palisades State park include the lark sparrow, Franklin's gull, purple martin, and Forester's tern (eBird 2020). Of these species, only lark sparrow, American white pelican, and Forster's tern have public records within the Project area and 1-mile buffer.

Habitat for species of birds of concern is limited within the Project area. Cropland and developed space comprise approximately 97% of the Project area (Yang et al. 2018, MRLC Consortium 2019) and likely limits the attractiveness of the Project area and 1-mile buffer for species of birds of concern given the limited amount and connectivity of natural landcover types. Franklin's gull uses cropland for foraging; however, Tier 3 site-specific studies are currently ongoing in order to more accurately assess avian species that use the Project area and 1-mile buffer throughout the year.

5.5.5 Bats

The Project area and 1-mile buffer is within the range of seven (7) bat species: hoary bat (*Lasiurus cinerius*), big brown bat (*Eptesicus fuscus* [state listed SC in MN]), little brown bat (*Myotis lucifugus* [state listed SC in MN]), eastern red bat (*Lasiurus borealis*) silver-haired bat (*Lasionycteris noctivagans*), northern long-eared bat (federally-listed as threatened), tri-colored bat (*Perimyotis subflavus* [state listed SC in MN]), and the evening bat (*Nycticeius humeralis*) (BCI 2020). Currently, the big brown bat, little brown bat, and tri-colored bat are listed as special concern species within Minnesota. Federal status of these species is now under review.

For the federally-threatened northern long-eared bat, there is no suitable forested habitat within the Project area that is connected to known roosting areas. The closest northern long-eared bat

roost trees in Minnesota are located in the northwestern portion of Scott County and the southeastern portion of Carver County (approximately 160 miles northeast of the Project area)(MNDNR and USFWS 2019). The closest northern long-eared bat hibernacula in Minnesota are located in the eastern portion of Nicollet County and the western portion of Le Sueur County (approximately 130 miles northeast of the Project area) (MNDNR and USFWS 2019). Given the low likelihood of this species to potentially occur within the Project area it is very unlikely that this species would be impacted by this Project.

Publicly available information did not reveal the presence of known bat maternity roosts or hibernacula within the Project area and 1-mile buffer. However, the absence of records does not preclude the potential presence of T&E species at a specific site. Further discussion on the potential for bat species to occur within the Project area are discussed in Section 6.3.

5.5.6 Species of Fragmentation Concern

A "species of habitat fragmentation concern" is defined within the USFWS WEG as "Species of concern for which a relevant federal, state, tribal and/or local agency has found that separation of their habitats into smaller blocks reduces connectivity such that the individuals in the remaining habitat segments may suffer from effects such as decreased survival, reproduction, distribution, or use of the areas. Habitat fragmentation from a wind energy project may create significant barriers for such species."

The USFWS does not maintain an official list of species of habitat fragmentation concern for the nation. Likewise, MNDNR and SD GFP do not maintain an official list of species of habitat fragmentation concern for their respective states. The Minnesota and South Dakota Wildlife Action plans identify a combined total of 447 SGCN, which represent species whose populations are rare, declining, or vulnerable within the state including federally listed species, state-listed species, and species of special concern within Minnesota and South Dakota (South Dakota Department of Game, Fish and Parks 2014, MNDNR 2016). The Minnesota Wildlife Action Plan designates habitat fragmentation as one of the main stressors currently facing SGCN in Minnesota and is one of the many criteria considered when designating SGCN status for a species.

There is potential for species susceptible to habitat fragmentation to occur within the Project. However, habitat within the Project is already highly fragmented by current land use and would not be appreciably fragmented further because of the Project.

5.6 Tiers 1 & 2 Question Summary

1. ***Are there species of concern present on the potential site(s), or is habitat (including designated critical habitat) present for these species?***

The Tier 1 site evaluation and Tier 2 site characterization analyses results indicate that six (6) federally-listed species and two (2) state-listed T&E species have been documented nearby and within the Project area and 1-mile buffer (**Tables 3 and 4**). Land within the Project area and 1-mile buffer is currently dominated by agricultural fields and provides limited wetland, grassland, and forested habitats for the red knot, northern long-eared bat, Dakota skipper, prairie bush clover, western prairie fringed orchid, and lined snake. The northern river otter may occur within stream systems of the site, though it is likely limited by the surrounding agricultural use.

The critical habitat for the Topeka shiner has been designated within streams within the Project area and 1-mile buffer (**Figure 7**). Avoiding these designated areas or employing recommended BMPs will avoid impacts to this species.

One (1) alternate bald eagle nest was identified within the 1-mile buffer to the east of the Project area during avian surveys in Spring 2020 (**Figure 8**). An additional 10 active nests were also identified within 4-10 miles of the Project area during previous nest surveys in 2016, 2018, and 2020.

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

Protected areas occur within the Project area and 1-mile buffer. The Rooster Ridge WMA, three (3) conservation easements, including CREP and RIM enrolled properties, are found within the Project area (**Figure 6**). Additionally, the Springwater WMA is also located within the 1-mile buffer adjacent to the Project area boundary. These managed lands are protected under state and/or federal laws.

3. ***Are there plant communities of concern present or likely to be present at the site(s)?***

The Project area and 1-mile buffer contain two (2) MNDNR designated native community types (**Figure 7**). However, NHIS did not indicate high-quality natural areas in the Project area and 1-mile buffer. Sites designated by the MBS of Moderate and Below ranking for Biodiversity Significance occur within the Project area and 1-mile buffer and are associated with the Springwater WMA and Rooster Ridge WMA, respectively (**Figures 6 & 7**). The Project area and 1-mile buffer offer limited suitable habitat for all federally and state-listed plant species in areas of managed lands, idle fields, and remnant prairies.

4. ***Are there known critical areas of wildlife congregation, including, but not limited to: maternity roosts, hibernacula, staging areas, winter ranges, nesting sites, migration stopovers, corridors, leks, or other areas of seasonal importance?***

No areas within the Project area and 1-mile buffer are known for large concentrations of wildlife. The Project area and 1-mile buffer itself offers limited suitable prairie and grassland habitat compared to other areas within the region such as the Touch the Sky Prairie and Blue Mounds State Park. Additionally, previously identified maternity roosts and hibernacula for the northern long-eared bat are not known to occur within the Project area and 1-mile buffer or Rock County.

One (1) alternate bald eagle nest is located within the 1-mile buffer, and 10 active bald eagle nests are located within 10-miles of the Project area. However, suitable nesting and foraging sites for bald eagles are likely limited within the Project area itself. Bald eagles are less likely to use the Project area than the surrounding region.

5. ***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?***

The Project area is in a region where much of the contiguous tallgrass prairie has been replaced with agriculture or by smaller patches of remnant prairie and functional grassland. Much of the Project contains cultivated cropland (87%). The remaining natural land cover includes pockets of streams, wetlands, and riparian areas already highly fragmented by existing agriculture to the point where it is unlikely that proposed wind-related infrastructure will adversely impact species of fragmentation concern.

6. ***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?***

Tier 3 site-specific field studies are needed to accurately assess avian and bat species that use the Project area and 1-mile buffer during breeding, migratory, or winter seasons and their frequency of occurrence. These studies are currently ongoing. Various avian species that use tilled agricultural fields, as well as forest edges, isolated woodlots, hedgerows, pockets of emergent wetlands, vegetated ditches, and/or flooded agricultural fields, are expected to use available habitats throughout the Project area and 1-mile buffer. Bald eagles may also occur within the Project area and 1-mile buffer. Bald eagles are likely to occur within the region and have been documented nesting to the east of the Project area, within the 1-mile buffer. Golden eagles are not likely regular residents but have been reported in the region and may be present in or near the Project area and 1-mile buffer during winter or migration periods.

Suitable summer roosting habitat for bat species is limited within the Project area and 1-mile buffer. Analysis of high-frequency bat calls from previous site-specific surveys did not indicate occurrences of northern long-eared bat within the Project area. Given the rarity of northern long-eared bat within the region and the lack of suitable habitat, northern long-eared bat is not likely to occur within the Project area.

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

The Project area and 1-mile buffer is comprised of approximately 87% cultivated agriculture with only small pockets of natural land cover remaining. Given the relatively small geographic footprint of the remaining natural land cover, it is unlikely that significant population-level impacts will occur to species of concern as a result of the proposed Project. Additional Tier 3 studies are currently ongoing to further evaluate the Project area in terms of avian use and potential presence of T&E species. Previous Tier 3 studies evaluating the Project area in terms of bat use indicated that protected bats species are rare within the region of the Project and are not likely to be adversely impacted by the Project. Further information regarding the results of Tier 3 surveys are discussed below in Section 6.0.

6.0 Field Studies to Document Site Wildlife and Habitat and Predict Project Impacts (Tier 3)

The following sections summarize the previous Tier 3 field studies for avian use, raptor nests, and bat use that have been conducted by WEST for preliminary Project boundaries. Previous study reports are included in **Appendix C**.

6.1 Avian Use Surveys

6.1.1 2018 Avian Use Surveys (WEST)

WEST conducted a pre-construction baseline survey from January 29, 2018, through December 17, 2018, monthly to estimate temporal and spatial avian use of a preliminary 39,424-acre Project area in Rock County, Minnesota. The preliminary boundary overlaps southern portions of the current Project boundary (**Figure 3**).

Over the course of the yearlong (163 hours) study, a total of 673 large bird observations and 935 small bird observations were recorded. No federally listed threatened or endangered species were observed during surveys or incidentally. However, WEST documented 16 sensitive avian species. Twelve (12) of these species were designated as SGCN (MNDNR 2016), while three (3) of these species (American white pelican, Franklin's gull, and short-eared owl) were also designated as species of special concern (MNDNR 2013). The bald eagle, a species protected by the BGEPA, was also documented but only six (6) risk minutes of bald eagles within the rotor sweep zone were recorded (Kreger and Suehring 2019).

6.1.2 2019 Avian Use Surveys (ECT)

In addition to the 2018 avian use surveys completed by WEST and pursuant to the USFWS 2012 WEGs, a study plan was developed by ECT to provide an ornithological baseline dataset for the Project area. This one-year study includes eagle use surveys conducted across all ecological seasons/survey periods (i.e., spring, summer, fall, and winter) and general avian migration surveys conducted during the spring and fall migration periods. The study plan commenced in

late August 2019 and will continue through mid-August 2020. Due to Project siting changes, the study plan was adjusted in November 2019 to ensure that adequate survey coverage is provided in keeping with agency guidelines.

Preliminary results from the August 2019-March 2020 survey period indicated occurrences of both bald and golden eagles within the Project area as well as one (1) state- threatened species, loggerhead strike, and five (5) Minnesota SC avian species: greater prairie-chicken (*Tympanuchus cupido*), American white pelican, Franklin's gull, peregrine falcon, and lark sparrow.

A total of 27 bald eagles were recorded within the Project area during the August 2019-March 2020 survey period. A total of 32 bald eagle risk minutes were also recorded during this survey period (357.3 hours of survey effort to date). A single juvenile golden eagle was also observed with the Project area on October 24, 2019. The timing of this observation is consistent with the migratory window for this species. However, this individual was observed at a 200-meter flight height, and therefore no golden eagle risk minutes were recorded.

A single individual loggerhead shrike was observed within the study area in May 2020. However, this individual was only observed once and was likely a migrant. Loggerhead shrike is unlikely to breed within the Project area. Observations of the Franklin's gull, peregrine falcon, and lark sparrow within the Project area were all consistent with the migratory window for these species, and these species are unlikely to breed within the regional vicinity of the Project area. Further avian surveys of the Project area are still on-going.

6.2 Raptor Nest Surveys

6.2.1 2016 Raptor Nest Surveys (WEST)

On March 24-25, 2016, WEST conducted an aerial-based raptor nest survey to help evaluate the potential impacts of construction on nesting raptors within a 29,747-acre preliminary Project area. Surveys within the Project area (**Figure 3**) and 1-mile buffer documented all potential raptor nests, including bald eagles. In contrast, the surveys up to the 10-mile buffer focused only on identifying potential bald eagle nests. A WEST biologist detected a total of 38 raptor nests representing three (3) raptor species during aerial surveys. These included two (2) occupied red-tailed hawk (*Buteo jamaicensis*) nests, one (1) occupied great-horned owl (*Bubo virginianus)* nest, and 33 unoccupied, inactive raptor nests of unknown species. No federal or state-listed T&E raptor species were identified nesting within the preliminary Project area or 1-mile buffer

(Pickle et al. 2016). Additionally, no occupied or potential bald eagle nests were located within the preliminary Project boundary and 1-mile buffer, but two (2) occupied active bald eagle nests were documented in this survey, within the reviewed 10-mile buffer along the Big Sioux River in South Dakota.

6.2.2 2018 Raptor Nest Surveys (WEST)

On April 17-19, 2018, WEST conducted a raptor nest survey within a preliminary Project area encompassing 18,890 acres in Rock County, Minnesota (**Figure 3**). Raptor surveys were conducted from a helicopter along transects throughout the preliminary Project boundary and a 1-mile buffer for raptor nests and out to a 10-mile buffer for eagle nests. To determine the status of a nest, the biologist evaluated the behavior of adults on or near the nest, and the presence of eggs, young, whitewash, or fresh building materials. Attempts were made to identify the species of raptor associated with each active nest (Kreger and Suehring 2018).

The survey identified a total of 22 stick nests, including American crow (*Corvus brachyrhynchos*), great blue heron (*Ardea Herodias*), and two (2) identified raptor species nests. Identified raptor nests included four (4) occupied active and one (1) inactive red-tailed hawk nests; one (1) within the Project area and three (3) within 1-mile of the reviewed Project area, and seven (7) inactive nests of unidentified raptor species, six (6) within the Project boundary and one (1) within 1-mile of the boundary. No federal or state-listed T&E raptor species were identified nesting within the reviewed Project area or 1-mile buffer (Kreger and Suehring 2018).

The 2018 nest survey also identified three (3) occupied active, and one (1) occupied inactive bald eagle nests within the 10-mile buffer of the reviewed Project area (**Figure 8**). The identified occupied active nests included the same two (2) eagle nests identified during the 2016 surveys along the Big Sioux River to the southwest of the current Project area. WEST also identified five (5) unidentified raptor nests that appeared consistent in the size and structure of a bald eagle nests. Three (3) of these potential bald eagle nests were documented more than 6.5 miles east and southeast of the reviewed Project area along the Rock River. The other two (2) identified nests were also located over 6.5 miles from the Project area but were documented to the southwest along the Big Sioux River. One (1) unidentified raptor nest was classified by WEST as occupied, inactive, and the other four (4) nests were classified by WEST as inactive (Kreger and Suehring 2018).

6.2.3 2020 Raptor Nest Surveys (ECT)

Following revision of the Project area, ECT conducted aerial nest surveys of the current Project boundary (**Figure 3**) between February 26-29, 2020. These aerial helicopter surveys evaluated 0.5-mile transects within the revised Project area as well as 1-mile transects within a 10-mile buffer of the 12/30/19 Project area boundary. A follow-up ground-based survey was also conducted on April 1, 2020 to ascertain species of unknown nests identified within the Project area during the aerial survey.

The surveys indicated a total of 88 nest structures within the Project area including red-tailed hawk, great horned owl, and bald eagle nests. This total includes nests identified in during both the 2016 and 2018 aerial surveys conducted by WEST and represents the currently available raptor nest structures within the vicinity of the Project area. No federally or state-listed threatened or endangered raptor species were observed nesting within the Project area or the associated buffers during this survey.

A total of 10 active bald eagle nests were observed during the Spring 2020 surveys within 10-miles of the current Project area, five (5) of which were newly identified nests not previously observed in 2016 or 2018. One (1) alternate nest was also identified within the 1-mile buffer to the east of the Project area (**Figure 8**). This nest was considered previously active but was determined failed by an ECT avian biologist in follow up surveys in May 2020. One (1) historic potential bald eagle nest was also identified by WEST in 2018 approximately 8.5 miles southwest of the current Project area boundary (**Figure 8**). However, this nest was not relocated during surveys in 2020. No bald eagle nests were observed within the Project area.

The following section provides more details on each active and potential eagle nests documented during the 2016, 2018, and 2020 aerial nest surveys and are organized by activity (active, occupied, alternate) and then by distance to the Project area.

Nest Little Beaver Creek – This nest is located approximately 0.8 miles from the Project area. The nest was in excellent condition at the time of the survey with an adult bald eagle in the nest in an incubating position and a second adult bald eagle approximately 65 ft away. This alternate nest was previously active, failed May 2020. (**Figure 8**).

Nest 3099 – This nest is located approximately 4.4 miles east of the Project area. The nest was in excellent condition at the time of the survey with an adult bald eagle in an incubating position

and another adult bald eagle perched nearby. This nest was considered active in 2020 (**Figure 8**). This nest was originally documented during previous surveys and considered inactive by WEST in 2018 (Kreger and Suehring 2018).

Nest 3100 – This nest is located approximately 4.4 miles east of the Project area. The nest was in fair condition at the time of the survey, with one (1) bald eagle in the nest. This nest was considered active in 2020 (**Figure 8**). This nest was originally documented in previous aerial surveys and was considered inactive by WEST in 2018 (Kreger and Suehring 2018).

Nest 3101 - This nest is located approximately 5.8 miles southeast of the Project area. The nest was in fair condition at the time of the survey with an adult bald eagle in an incubating position. This nest was considered active in 2020 (**Figure 8**). This nest was originally documented in previous surveys and considered inactive by WEST in 2018 (Kreger and Suehring 2018).

Nest Garretson – This nest is located approximately 5.9 miles northwest of the Project area. The nest was in good condition at the time of the survey, with one (1) bald eagle in the nest. This nest was considered active in 2020 (**Figure 8**).

Nest Jasper-Sherman – This nest is located approximately 7.7 miles north of the Project area. The nest was in excellent condition at the time of the survey with an adult bald eagle in an incubating position. This nest was considered active in 2020 (**Figure 8**).

Nest 16132 – This nest is located approximately 7.8 miles southwest of the Project area. This nest was in excellent condition at the time of the survey with an adult bald eagle in an incubating position. This nest was considered active in 2020 (**Figure 8**). This nest was originally documented in previous surveys and considered active by WEST in 2016 (Pickle et al. 2016).

Nest Kenneth-Luverne – This nest is located approximately 8.6 miles east of the Project area. The nest was in excellent condition at the time of the survey with an adult bald eagle in an incubating position and another adult bald eagle perched nearby. This nest was considered active in 2020 (**Figure 8**).

Nest 16138 – This nest is located approximately 8.8 miles west of the Project area. The nest was in good condition at the time of the survey, with an adult bald eagle in an incubating position and a second adult bald eagle perched nearby. This nest was considered active in 2020 (**Figure**

8). This nest was originally documented in previous surveys and considered active by WEST in 2016 and in 2018 (Pickle et al. 2016, Kreger and Suehring 2018).

Nest 16134 – This nest is located approximately 9.4 miles southwest of the Project area. The nest was in good condition at the time of the survey, with an adult bald eagle in an incubating position. This nest was considered active in 2020 (**Figure 8**). This nest was originally documented in previous surveys and considered occupied, inactive by WEST in 2018 (**Appendix B**) (Kreger and Suehring 2018).

Nest RocRap – This nest is located approximately 8.5 miles south-southeast of the Project area. The nest was in fair condition at the time of the survey with two (2) adult bald eagles close to the nest. This nest was considered occupied in 2020 (**Figure 8**).

Nest 16133 – A possible historic eagle nest structure was located approximately 8.3 miles southwest of the Project area. This nest was last observed in 2018 survey effort, and it was classified by WEST as occupied, inactive (Kreger and Suehring 2018). This nest was not detected during aerial surveys in 2020.

6.3 Bat Surveys

6.3.1 2016 Acoustic Surveys (WEST)

WEST conducted an acoustic survey from April 14 to November 3, 2016, within a preliminary Project area encompassing properties in Rock County, Minnesota, and Minnehaha County, South Dakota (**Figure 3**). General acoustic bat surveys were conducted in the spring, summer, and fall at stations within the Project area and 1-mile buffer located in cropland habitat, representing potential turbine locations, and forest edge habitat containing features attractive to bats. Approximately 77% of bat passes at the cropland station were classified by WEST as low-frequency, which potentially includes species such as big brown bats, hoary bats, or silver-haired bats. However, only 23% of the bat passes at the cropland station were identified as high frequency, which potentially includes species such as the eastern red bat, little brown bat, or the northern long-eared bat. WEST's bat biologists reviewed the high-frequency passes and determined that no protected bat species calls (northern long-eared bat) were identified during the 2016 survey (Bishop-Boros, Solick, and Kreger 2017).

6.3.2 2019 Acoustic Surveys (WEST)

WEST conducted an additional ground bat acoustic survey from June 28 to October 29, 2019, within a preliminary Project area (**Figure 3**). Acoustic detector stations were located along forest edges and croplands within the vicinity of the current Project area. Within the cropland stations, peak bat activity was recorded during the summer during the middle of July, with 88.7% of the bat passes identified as low frequency and 11.2% of bat passes identified as high frequency (Kreger, Hyzy, and Solick 2019). In March 2020, WEST conducted further analysis on the high frequency passes recorded to determine the potential for northern long-eared bat to occur within the Project area and 1-mile buffer. A qualified bat biologist reviewed a potential northern long eared-bat call recorded during the 2018 survey period. The biologist determined that the call did not have the diagnostic features of a standard northern long-eared bat call and was most likely a feeding buzz emitted by an eastern red bat or an evening bat. No acoustic evidence of northern long-eared bats was observed during the 2018 surveys within the study area.

Most bat fatalities at wind energy facilities in North America are composed of tree-roosting bats such as hoary bat, eastern red bat, and silver-haired bat (Arnett et al. 2008). Most bat fatalities at wind energy facilities in the Midwest are documented to be higher during the fall migratory period (late August through October), when bats travel through the landscape between summer roosts and winter hibernacula (Arnett et al. 2008; Johnson 2004). Reported estimates of bat mortality at wind energy facilities through North America average 17.20 fatalities/MW/year (Smallwood 2013). Among these studies, bat fatality rates at wind farms located specifically in the Midwest have ranged from 0.40 to 32.0 bat fatalities/MW/year (Taber D. Allison and Ryan Butryn 2019). Bat fatality rates reported for Minnesota-specific wind energy facilities range from 0.41 to 8.56 bats/MW/year (**Table 5**), which are lower when compared to these averages listed above.

Table 5. Bat Fatality at Minnesota Wind Farms

Project	Bat Fatality Rate	Year of Study	Study Citation
Lakefield	0.87 bats/MW/year	2016	(Chodachek et al. 2017)
Prairie Rose	0.41 bats/ MW/ study period	2014	(Chodachek et al. 2015a)
Big Blue	2.25 bats/ MW/ study period	2014	(Chodachek et al. 2015b)
Grand Meadow	1.05 bats/ MW/ study period	2014	(Chodachek et al. 2015b)
Oak Glen	2.03 bats/ MW/ study period	2014	(Chodachek et al. 2015b)
Odell	8.56 bats/ MW/ study period	2016-2017	(Chodachek and Gustafson 2018)
Buffalo Ridge	0.76-2.72 bats/MW/year	1996-1999	(Johnson et al. 2000)

The Prairie Rose Wind Farm (Prairie Rose), located approximately 9.2 miles north of the Project area, has a similar landscape to the proposed Project. Publicly available post-construction data indicate that the Prairie Rose facility has casualty rates of 0.41 bat/MW/study period (Chodachek et al. 2015a). The fatality rates for Walleye Wind are expected to be comparable to other wind energy facilities within Minnesota.

6.4 Tier 3 Question Summary

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

One (1) state threatened avian species, the loggerhead strike, was observed within the Project area during Tier 3 studies. However, this occurrence was of a single individual who was likely migrating through the region. Loggerhead shrikes are not likely to breed within the Project area. No federally-endangered or threatened or state endangered avian species were observed during Tier 3 surveys.

Tier 3 field studies indicated that special concern species (SC) and Minnesota SGCN may be likely to use the proposed site. Twelve (12) avian SGCN and five (5) avian Minnesota SC species were observed within the Project area during avian studies. Additionally, bald eagles have been observed within the Project area, and surrounding 1-mile buffer during Tier 3 avian surveys and occurrences in the area have been noted within public eBird data. One (1) alternate bald eagle nest was documented within the 1-mile buffer to the east of the Project area during raptor nest surveys in April 2020, but subsequent surveys of this nest in May 2020 suggest that it has failed. A single juvenile golden eagle has been observed within the Project area during the 2019 avian survey period. Both bald and golden eagles are protected under the BGEPA.

High-frequency calls, which include *Myotis* species, were detected during the 2018 bat surveys; however, further analysis of these calls did not indicate northern long-eared bats within the region of the Project area. Based on Tier 3 studies, the northern long-eared bat and little brown bat have limited potential to occur within the Project area.

2. ***Do field studies indicate the potential for significant adverse impacts on affected population of species of habitat fragmentation concern?***

The majority of the landcover within the Project area is cultivated cropland (87%). The remaining natural land cover pockets of streams, wetlands, and riparian areas are already highly fragmented by existing agriculture to such an extent that additional proposed wind-related infrastructure is unlikely to adversely impact species of fragmentation concern.

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 project?***

Species of concern identified in Tier 2 and documented within the Project area as part of Tier 3 studies are summarized below (**Table 6)**. Discussion of avian and bat T&E species afforded protection under the ESA, BGEPA, and the Minnesota Endangered Species Statute are also discussed below.

Table 6. Seasonal Occurrence of Federal and State Protected Bird and Bat Species Detected during Field Studies within the Walleye Wind Project (2016-2019)

Common Name	Scientific Name	Federal Status	State Status	Seasonal Occurrence	Seasons Detected	Preferred Habitat	Previous Tier 3 and Public Data Studies Where Species Was Detected
Little brown bat†	*Myotis lucifugus*	Under Review	SC	Possible migrant or summer resident	Spring, Summer, Fall	Winter roosts in caves and mines, summer roosts in buildings, bridges, hollow trees, crevices, loose bark, or cavities. Limited summer roosting habitat exists on site of the Project area. No known hibernacula are located within or near the Project area.	Previous Walleye Wind Tier 3 Survey (Bishop-Boros et al. 2017)
Northern long-eared bat†	*Myotis septentrionalis*	T	SC	Possible migrant or summer resident	Not observed as part of Tier 3 Studies,	Winter roosts in caves and mines, summer roosts in buildings, bridges, hollow trees, crevices, loose bark, or cavities. Limited summer roosting habitat exists on site of the Project area. No known maternity roosts or hibernacula are located within or near the Project area.	Previous Walleye Wind Tier 3 Survey (Kreger et al. 2019)
Tri-colored bat	*Perimyotis subflavus*	Under Review	SC	Migrant or summer resident	Spring, Summer, Fall	Winter roosts in caves and mines, summer roosts in buildings, bridges, hollow trees, crevices, loose bark or cavities. Limited summer roosting habitat exists on site of the Project area. No known hibernacula are located within or near the Project area.	Previous Walleye Wind Tier 3 Survey (Bishop-Boros et al. 2017)
Bald eagle	*Haliaeetus leucocephalus*	BGEPA	-	Possible migrant and alternate nest within 1-mile buffer	Spring, Fall, Winter	Nest in large forested areas feed near areas with large open water. In winter can be seen in dry, open uplands with access to open water.	Previous Walleye Wind Tier 3 Survey (Pickle et al. 2016, Kreger and Suehring 2018, Hyzy et al. 2019)
Burrowing owl	*Athene cunicularia*	-	E	Possible migrant	Not observed as part of Tier 3 Studies	Open treeless areas in grassland, steppe, and desert, usually select burrows in areas with a high density of prairie dog burrows. The Project area is dominated by agricultural areas. Suitable remnant prairies are unlikely to be on-site of the Project.	Publicly available data reviewed during Tier 2 surveys (Hyzy et al. 2019)
Golden eagle	*Aquila chrysaetos*	BGEPA	-	Possible migrant	Fall	Woodlands and prairies. Suitable habitat is not located within the Project area and surrounding 1-mile buffer.	ECT 2020 Raptor Nest Survey Publicly available data (eBird 2020)

Common Name	Scientific Name	Federal Status	State Status	Seasonal Occurrence	Seasons Detected	Preferred Habitat	Previous Tier 3 and Public Data Studies Where Species Was Detected
Henslow's sparrow	*Centronyx henslowii*	-	E	Possible migrant or summer resident	Not observed as part of Tier 3 Studies	Large, flat, overgrown moist fields with scattered low shrubs or saplings, some standing dead vegetation from the previous season and a deep litter layer. Also found in native warm-season grass fields and unmowed hayfields. The Project area is frequently disturbed through mowing and tilling for agricultural production. Large tracts of suitable shrublands and grasslands are not located within the Project area.	Publicly available data reviewed during Tier 2 surveys (Hyzy et al. 2019)
Horned grebe	*Podiceps auritus*	-	E	Possible migrant	Not observed as part of Tier 3 Studies	Small to moderately sized wetlands and open water. Wetlands comprise only a small portion of the Project area and the surrounding region and are likely frequently disturbed from the surrounding agricultural land use. Open water communities are not found within the Project area.	Publicly available data (eBird 2020)
Wilson's phalarope	*Phalaropus tricolor*	-	E	Possible migrant	Not observed as part of Tier 3 Studies	Breeds in wetlands, use saline lakes for stopover during migration. Wetland areas are limited within the footprint of the Project area and are comprised of freshwater, not saline, habitats.	Publicly available data (eBird 2020)
Topeka shiner	*Notropis topeka*	E	SC	Presumed Present	Not observed as part of Tier 3 Studies	Small to mid-sized slow-moving prairie streams with sand, gravel or rubble bottoms. Some streams within the Project area have been designated as critical habitat for this species by USFWS. This species, though not observed during Tier 3 studies, may be present within the Project area.	Licensed MNDNR NHIS data and publicly available USFWS data (Hyzy et al. 2019)
Prairie bushclover	*Lespedeza leptostachya*	T	T	N/A	Not observed as part of Tier 3 Studies	Tallgrass prairies on well-drained soils. Native prairie communities within the Project area are limited, given the dominant agricultural landscape of the Project.	Licensed MNDNR NHIS data (Hyzy et al. 2019)

Common Name	Scientific Name	Federal Status	State Status	Seasonal Occurrence	Seasons Detected	Preferred Habitat	Previous Tier 3 and Public Data Studies Where Species Was Detected
Western prairie fringed orchid	*Platanthera praeclara*	T	E	1 mi E of project	Not observed as part of Tier 3 Studies	Tallgrass prairies, wet prairies and sedge meadows. Native prairie communities within the Project area are limited, given the dominant agricultural landscape of the Project.	Licensed MNDNR NHIS data (Hyzy et al. 2019)

† The little brown bat and northern long-eared bat were not definitively confirmed within the Project Area during the course of bat acoustical monitoring field seasons.
E-Endangered; T-Threatened; N/A – No federal and/or state status

BGEPA-Bald and Golden Eagle Protection Act

4. What are the potential risks of adverse impacts of the proposed wind energy project to individuals and local populations of species of concern and their habitats? (In the case of rare or endangered species, what are the possible impacts to such species and their habitats?)

Tier 3 studies indicate the tri-colored bat (federal status under review; State SC), and the little brown bat (status under federal review) have the potential to occur within the Project area. Further, bat monitoring survey results at the Project area show that low-frequency tree-roosting bat species such as hoary and silver-haired bats accounted for 77% and 88.7% of bats detected throughout the 2016 and 2018 monitoring periods respectively (Bishop-Boros et al. 2017, Kreger et al. 2019). Most bat fatalities within the Project area will likely consist of low-bat frequency tree-roosting species, of which none that commonly range within Minnesota are listed as federally T&E. Turbines will be sited in cropland, away from forested corridors, thus limiting the exposure risk of bats to operational turbines. Additionally, in portions of the Project area not covered during previous acoustic monitoring surveys, Walleye Wind has agreed to follow tree clearing restrictions from June 1 to July 31 to avoid bat pup season. Impacts to bats as a result of Project construction and operation are not expected to differ markedly from those reported by other previous studies in agricultural settings within Minnesota detailed above in **Table 5**.

Some federal and state-listed avian species were identified as having the potential to occur in the Project area; however, no federal or state-listed avian species were detected during previous Tier 3 field studies (Pickle et al. 2016, Kreger and Suehring 2018, 2019).

Bald eagle fatalities caused by wind turbine collisions have increased over the past few years but remain relatively low. There were 45 bald eagle fatalities, including three (3) in Minnesota, from wind farms, reported to the USFWS between 2013-2018 (Kritz et al. 2018). For a thorough discussion of the potential effects of wind energy development on eagles, please refer to the ECPG (USFWS 2013). Tier 3 field assessments found zero (0) bald eagle nests within the Project area but did identify one (1) alternate nest within the 1-mile buffer east of the Project area and 10 active nests within 10- miles of the Project boundary. However, the Project area lacks high-quality forested habitat for eagle nests and large river systems and open lakes for eagle foraging. It is unlikely that bald eagles would use the Project area as frequently as the surrounding region along the Big Sioux River and the Rock River. In addition, all turbines will be sited at least 1.6 miles from all known nests within the vicinity of the Project area, reducing potential adverse impacts to bald eagles within the region.

5. How can developers mitigate identified significant adverse impacts?

Significant adverse impacts are not anticipated for the Project. Natural habitats and protected areas precluded from development by law make up a small portion of the landscape within the Project area and its immediate vicinity (**Figure 6**). Tier 2 site characterization studies and Tier 3 field studies were used to inform the placement of turbines and associated infrastructure. Riparian areas within the Project area serve as designated critical habitat for the Topeka shiner, connect more natural areas of habitat to each other, allowing potential use by species of birds and bats, serve as areas of biodiversity significance, and are likely under the jurisdiction of the USACE and MNDNR. The Project will attempt to avoid impacts to these riparian areas to the extent practicable. Although Topeka shiner has the potential to occur within the Project area, Walleye Wind has sited facility infrastructure such as turbine pads and access roads to avoid stream crossings. Additionally, collection lines will be bored underneath stream systems within the Project Area to avoid direct impacts to Topeka shiner. Development will also avoid public lands as they represent biodiversity concentration points and have the potential to harbor T&E species.

In areas where avoidance is not optional, minimization and mitigation measures will be developed and undertaken. If crane walks are to occur close to or within waterways that may have Topeka shiner occurrences, Walleye Wind will employ BMPs, where practicable, to ensure that impacts to any potential Topeka shiner populations are minimized. Open dialogue with wildlife management agencies, adherence to applicable federal and state guidance with respect to mitigation, incorporation of pre-construction studies into micrositing of Project infrastructure, and implementation of BMPs will be incorporated during Project development. Post-construction monitoring will also be conducted to further assess potential impacts and validate the efficacy of avoidance, minimization, and mitigation measures.

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

No, the Project is adhering to the WEG. Additionally, Walleye Wind has commissioned an ongoing second year-long avian point count survey of the Project area (starting August 2019 and concluding in August 2020) to provide further Tier 3 field study results. Given the rarity of bat species within the region of the Project area, further Tier 3 bat studies are not recommended at this time. Walleye Wind will conduct post-construction avian and bat mortality monitoring adhering to the WEGs.

Table 7 below summarizes preliminary Tier 3 results and Walleye Wind 's decision to continue with further Tier 4 studies and analysis.

Table 7. WEG Tier 3 Decision Analysis per Ecological Constraint

Species/Resource	Resource Constraints within the Project area	Status of Constraint within Project area	Tier 3 Decision Point	Direct Impact Avoidance	Tier 4 Analysis Procedure
Bat Resources					
Deciduous woodland	Presence of some deciduous woodland (~0.3% of total acreage)	Present as isolated woodlots and riparian habitat within the Project area. Project infrastructure has avoided deciduous woodland habitat to extent feasible.	Deciduous woodland habitat has been avoided and the Project infrastructure has been sited away from other deciduous woodland located outside the Project Area. There is no need to conduct additional Tier 3 studies for deciduous woodland.	Avoid removal of forested habitat to the greatest extent possible; Project Area infrastructure sited to be located away from areas of woodland habitat located outside.	Incorporate avoidance and minimization measures for deciduous woodland into WCS. In cases where tree removal cannot be avoided, 4(d) rule would inform tree removal.
Northern long-eared bat	Potential migration through Project area; summer roosting habitat may be present but is limited in extent within Project area	Rare to Uncommon - species may occur in Project area, but potential for occurrence is low based on lack of roosting, foraging and hibernacula habitat and results of Tier 3 surveys	Further studies for bats are not recommended at this time due to low potential to impact bats. The 4(d) rule would apply in this development scenario.	Adhere to 4(d) guidance for northern long-eared bat for any tree removal in Project Area. Follow MNDNR/USFWS guidelines for avoiding tree clearing during the pup season (June 1- July 30).	Preliminary PCMM; Revision of WCS, as needed; adherence to corporate Wildlife Response and Reporting System (WRRS).
Little brown bat	Potential migration through Project area; summer roosting habitat may be present	Uncommon to Common - species may occur in the Project area, but potential for occurrence is low based on lack of roosting, foraging and hibernacula habitat.	Further studies for bats are not recommended at this time due to low potential to impact bats.	Tree and forested habitat removal have generally been avoided through infrastructure micrositing.	Preliminary PCMM; Revision of WCS, as needed; adherence to WRRS.

Tri-colored bat	Potential migration through Project area; summer roosting habitat may be present	Rare to Uncommon -- species may occur in Project area, but potential for occurrence is low based on lack of roosting, foraging and hibernacula habitat.	Further studies for bats are not recommended at this time due to low potential to impact bats.	Tree and forested habitat removal have generally been avoided through infrastructure micrositing.	Preliminary PCMM; Revision of WCS, as needed; adherence to WRRS.
Avian Resources					
Herbaceous grassland	Presence of some Herbaceous grassland/pasture (~1.3% of total acreage)	Present as isolated grassland parcels, particularly within Rock County. Project infrastructure has avoided deciduous herbaceous grassland habitat to extent feasible.	Conduct grassland breeding bird surveys and confirm isolated occurrence of sensitive grassland species.	Avoid operational infrastructure development within grassland habitat and/or initiate pre-construction clearance surveys or nest monitoring protocols during nesting period for ground-disturbing and construction activities.	Incorporate avoidance and minimization measures for herbaceous grassland into WCS. Preliminary PCMM; Revision of WCS, as needed; adherence to WRRS.
Bald eagle	Resident, wintering and migrant eagle population	Common and widespread	Conducted one year of pre-construction eagle use study. Currently conducting a second year of pre-construction studies. Proceed to Tier 4a to validate impacts to the species.	Sited project infrastructure so it does not surround (within 1.6 miles) known concentrating resources for Bald Eagles.	Preliminary PCMM; Revision of WCS, as needed; adherence to WRRS particularly animal carcass management protocol.
Bald eagle nest sites	One (1) alternate nest within 1-mile buffer east of the Project area. Ten active nests within 10-miles of Project.	Somewhat common within regional vicinity	Conducted nesting resources survey in Spring 2020. Proceed to Tier 4a to validate impacts to the species.	Set-back Project operational infrastructure 1.6 miles from known nest sites	**See above

Bald eagle communal roosts	None occur within Project area boundary.	Not present in Project area	Currently conducting second year of pre-construction eagle use studies. The first-year study did not reveal any patterns of known winter communal roosts within the Project Area	Project area infrastructure was sited away from known communal roosts located outside the Project Area	**See above
Other nesting raptors	Great horned owl and red-tailed hawk nests observed within Project area	Common	Conducted raptor nest survey in Spring 2020	MNDNR has not published official wind turbine and/or construction activity setback guidelines for raptor nests, but direct impacts to nests located within the Project area will be avoided. Project infrastructure has avoided deciduous habitat to extent practicable	Preliminary PCMM; Revision of WCS Plan, as needed; adherence to WRRS

6.5 Agency Coordination

Walleye Wind began coordination with the USFWS, MNDNR, and SD GFP in May of 2016. Periodic coordination with the wildlife agencies has continued throughout the development of the Project, particularly through the process of assessing and analyzing bird and bat data collected. **Table 8** includes a timeline of communications and coordination with federal and state wildlife agencies. Objectives for agency coordination included requesting specific resource data applicable to the Project area, seeking concurrence on the proposed avian and bat pre-construction study methodologies, and soliciting feedback on the Project as the design evolved and as baseline studies were completed and the results were shared with agencies.

Walleye Wind continues to coordinate with agencies to assess risk and to develop the PCMM appropriate for the Project.

Table 8. Agency Correspondence Summary for the Walleye Project.

Date	Parties Involved	Correspondence Type	Action Items	Outcome/Response
5/18/2016	WEST, RES, USFWS, SD GFP	Conference call	Topics discussed included general project background, Tier 2 Site Characterization Assessment, proposed Tier 3 Wildlife Studies, avian use surveys, wetland and grassland avian use, and general bat activity.	Habitat was limited for special status species. Two (2) bald eagle nests were within ten (10) miles of the project boundary. Avian point count surveys started in March 2016 and would continue for a year. Because no large wetlands or lakes were present at the site, no wetland avian surveys were proposed. Because grassland habitat was assessed as very limited, no grassland avian use surveys were proposed. Acoustic surveys occurred April through October 2016. No grassland easements were present within the South Dakota portion of the site.
5/3/2018	USFWS, MNDNR, RES WEST	Conference call	Discussed the new project location, planned surveys, and reviewed development plans and survey protocols for birds and bats.	Project was moved approximately six (6) miles south of the original location and was commended by MNDNR. At the new site, two eagle nest surveys had been completed. Topeka shiner was assessed to be on site by NHIS, but impacts could be avoided. Regal Fritillary was assessed to be on site by NHIS but is on USFWS list for review for a few years. Bat surveys would begin as soon as possible. It was stated that if temporary MET towers are not installed data can be collected by remote sensing.
1/27/2020	ECT, MNDNR	Email	MN NHIS Data Request Form with project boundary	Automatic reply.
2/6/2020	ECT, NEER, MN DNR, USFWS	Meeting	Discussed project overview, MN DNR Natural Heritage inventory System records, IPaC results, Tier ½ studies, analysis of site and regional studies to date, and project correspondence to date.	Project introduction.
2/07/2020	ECT, USFWS	Coordination Letter	Submitted letter to USFWS for unofficial coordination regarding federally listed species within the vicinity of the Project area.	USFWS responded on 2/28/2020. Due to the lack of suitable habitat in the Project area, USFWS has deemed the Project unlikely to impact red knot, Dakota skipper, and listed plant species. USFWS also recommended further surveys of the Project area for potential eagle nests and the guidelines for reducing impacts to bats, eagles, migratory birds, and Topeka shiner that may be on-site of the Project area.
2/07/2020	ECT, USFWS	Email	Email requesting any records of bald eagle nests within the proposed project boundary, or within 10 miles of the proposed project.	Awaiting response from USFWS.
2/12/2020	ECT, USFWS	Email	Email requesting GIS Shapefiles for critical habitat areas for the	Awaiting response from USFWS.

Date	Parties Involved	Correspondence Type	Action Items	Outcome/Response
			Topeka shiner.	
2/13/2020	ECT, USFWS	Coordination Letter	Submitted Avian Study Plan with request for comments.	Awaiting response from USFWS.
2/17/2020	ECT MNDNR	Email	Email requesting information on DNR Native Prairie Protection Plan template.	Awaiting response from MNDNR
2/21/2020	ECT USFWS	Call	Phone call requesting GIS Shapefiles for critical habitat areas for the Topeka shiner and determination if an incidental take permit would be required for impacts to these areas.	USFWS is not recommending the need for an incidental take permit for impacts to Topeka shiner critical habitat as these areas can be avoided through site design and planning.
2/28/2020	ECT, NEER MNDNR	Email	Request feedback on MN NHIS records search and any known occurrence of sensitive species.	Awaiting response from MNDNR
4/15/2020	ECT, NEER, USFWS, MNDNR	Conference Call	Discuss project schedule, biological context, outstanding data requests, and bat and avian survey findings to date.	Follow-up with Margaret Rheude, USFWS regarding proximity of bald eagle nest and proposed array, and provide bat acoustic studies completed for the project.
4/22/2020	ECT MNDNR	Email	Email providing previous bat acoustic studies completed within the Project area.	MNDNR is not recommending additional acoustic surveys.
5/27/2020	ECT MNDNR	Email	Email summarizing potential bat habitat within the Project area.	MNDNR responded with concerns regarding special concern bat species within the vicinity of the Project area.
6/4/2020	ECT, NEER, MNDNR	Email	Request feedback on 2/28/2020 MN NHIS submittal and provided overview of project boundary change.	Awaiting response from MNDNR
6/10/2020	ECT, NEER, USFWS	Email	Request for comments from USFWS regarding the proposed site layout and potential bald eagle impacts.	Awaiting response from USFWS

7.0 Facility Design to Reduce Wildlife Conflict

7.1 Walleye Wind Facilities Design Consideration

Turbine Locations and Design

Once completed, the Project will have a generating capacity of 111.5 megawatts (MW). The total capacity will be generated using 36 General Electric (GE) 2.82 MW wind turbine generators (WTGs) and four (4) GE 2.5 MW (WTG)s. The final array and turbine locations will be selected from 40 primary turbine locations and up to 15 alternate turbine locations. Turbine locations were reviewed to ensure the most efficient, optimized project possible and include considerations to environmental impacts.

Facilities

The Project's facilities (e.g., Turbines, O&M building) were sited to avoid and minimize potential impacts to birds, bats, and the Topeka shiner. All turbines have been sited to at least 1.6 miles from all known bald eagle nests, to avoid adverse impacts to bald eagles. Additionally, the Project area is a largely rural landscape dominated by agricultural and pasture lands typical of southwestern Minnesota and southeastern South Dakota, thereby minimizing Project-related land disturbance of habitat for sensitive species. Project infrastructure has been designed to avoid areas identified through desktop reviews as having higher quality as wildlife habitat such as mapped native plant communities, USFWS designated critical habitat, outstanding or high-ranking MBS sites of biodiversity significance, or MNDNR wildlife management areas. Project disturbance has been limited to the extent feasible. The power collection and communication system are planned to be buried underground in accordance with industry standards. The impacts of these systems on bird and bats were eliminated since they are underground. Potential temporary impacts to waterways containing the Topeka shiner may be unavoidable during Project construction (e.g., crane walks). Walleye Wind will employ BMPs, where practicable, to ensure that impacts to any potential Topeka shiner populations are minimized. Walleye Wind will coordinate with MNDNR & USFWS regarding further minimization measured for the Topeka shiner on-site of the Project area.

7.2 Specific Avoidance and Minimization Measures

The following measures will be implemented to avoid and minimize potential impacts to sensitive species on-site of the Project.

- Construction avoidance, minimization, and mitigation

  The following avoidance measures will be implemented to avoid and minimize potential impacts to birds and bats:
  - Transformers will be pad-mounted.
  - Collection lines will be buried.
  - Tubular towers will be utilized.
  - The 500 ft generation tie line will be marked with avian flight diverters.
  - Met towers will be un-guyed, self-supporting structures.
  - All lighting will comply with FAA requirements.
  - Other exterior lighting will be limited to the extent feasible.
  - A 1.6-mile setback from all known bald eagle nests has been implemented.
  - If tree removal is unavoidable, tree removal will be conducted in accordance with agency guidance to avoid impacts to listed bat species.
  - Direct and indirect impacts to bird nests will be avoided to the extent practicable.
  - Roads, parking, and layout areas will be located in previously disturbed areas to the extent practicable.
  - Temporary disturbances will be revegetated upon completion of the activity.
  - BMPs will be used to avoid potential impact to potentially Topeka shiner populations
  - All contractors, sub-contractors, and operation staff 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 (collection and disposal of trash, debris, graffiti, and carrion).
  - Any 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.
  - Noxious weeds will be managed in accordance with applicable regulations.

- 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 Plan will be developed to outline spill response/containment and clean up procedures.

8.0 Post Construction Studies to Estimate Impacts (Tier 4)

The major goal of Tier 4 in the WEG is to assess if actions taken during previous tiers to avoid and/or minimize potential impacts to habitat and special concern species are successful. Tier 4 studies assess both direct (Tier 4a, fatality studies) and indirect (Tier 4b, habitat studies) impacts. Below is the list of Tier 4a and Tier 4b questions to be answered upon completion of Post construction and Tier 4 studies.

8.1 Tier 4a Questions

1) What are the bird and bat fatality rates for the project?
2) What are the fatality rates of species of concern?
3) How do the estimated fatality rates compare to the predicted fatality rates?
4) Do bird and bat fatalities vary within the project site in relation to site characteristics?
5) How do the fatality rates compare to the fatality rates from existing projects in similar landscapes with similar species composition and use?
6) What is the composition of fatalities in relation to migrating and resident birds and bats at the site?
7) Do fatality data suggest the need for measures to reduce impacts?

8.2 Tier 4b Questions

1) How do post-construction habitat quality and spatial configuration of the study area compare to predictions for species of concern identified in Tier 3 studies?
2) Were any behavioral modifications or indirect impacts noted as they pertain to species of concern?
3) If significant adverse impacts were predicted for species of concern, and the project was altered to mitigate for adverse impacts, were those efforts successful?
4) If significant adverse impacts were predicted for species of concern, and the project was altered to mitigate for adverse impacts, were those efforts successful?

8.3 Monitoring Methods

Walleye Wind will develop an avian and bat mortality monitoring study protocol. The Post Construction Mortality Monitoring (PCMM) program (to be included as **Appendix D** once finalized) will begin the first year following completion of Project construction and will be conducted for one year. Walleye Wind will continue coordination with the agencies to assess risk and to develop a PCMM appropriate for the Project. The frequency and duration of monitoring, number of monitored turbines, and fatality monitoring procedures will be based on risk and follow agency recommendations and guidelines established in the *Avian and Bat Survey Protocols for Large Wind Energy Conversion Systems in Minnesota* (Mixon et al. 2014). Monitoring may involve mortality surveys of both road and pads and full plots; and will include calculation of avian and bat mortality rates on a per megawatt and per wind turbine basis, accounting for potential searcher efficiency, carcass removal biases, and area searched.

The proposed Tier 4, post-construction avian, and bat mortality monitoring study will be utilized to evaluate whether further studies and/or mitigation is warranted. Should the results of Tier 4 studies indicate significant adverse impacts to birds and/or bats, Walleye Wind will communicate and coordinate with the USFWS and the MNDNR regarding the need for further studies (e.g., Tier 5 *Other Post-Construction Studies*) and/or applicable mitigation options, as appropriate. Additional reporting requirements dictated by the large wind energy conversion system (LWECS) site permit conditions are discussed below in Section 9.0.

Continued monitoring through the Project's voluntary in-house WRRS will also be implemented for the life of the Project (NextEra Energy Resources 2020, **Appendix E**). This system is designed to standardize actions in response to wildlife mortalities and/or injuries within facilities operated by Walleye Wind (NextEra Energy Resources 2020). This operational procedure will identify mortality concerns, particularly if federal or state endangered and threatened species or species of concern mortalities occur within the Project area. Key contacts for reporting avian and bat wildlife incidents, if applicable, are included in **Appendix F**.

8.4 Adaptive Management

This WCS has outlined a comprehensive plan by which Walleye Wind has taken a multi-tiered approach towards reducing potential direct and indirect impacts to species of special concern within the Project. Walleye Wind has designed the Project to avoid and minimize potential

significant adverse impacts to wildlife resources identified during previous Tiers 1-3 surveys. Should significant adverse impacts from Project operations occur, the WRRS (NextEra Energy Resources 2020) establishes channels for communicating impacts internally and externally.

A certain level of avian-bat mortality is expected at any modern wind energy generation facility (Arnett et al. 2008, Loss et al. 2013), and residual mortality events do not necessarily equate to significant adverse impacts, as described by USFWS (USFWS 2012). Scenarios that likely would qualify as a significant adverse impact include confirmed mortality/mortalities of a bird or bat species listed under the federal ESA or a mass avian or bat mortality event.

All monitoring data will be reviewed to assess whether conservation goals of this WCS are being achieved. If minimization measures are not yielding desirable conservation goals, particularly for federal and state endangered and threatened species and species of concern, Walleye Wind and the wind site manager will coordinate to determine appropriate agency biologists to begin communications for exploring possible solutions. Minimization and other conservation measures may also be scaled back if adaptive management review indicates that these measures are not needed to reduce risk to avian or bat species.

9.0 Implementation of the Walleye Wind WCS

9.1 Document Availability

This WCS was developed to fulfill application requirements for a LWECS site permit issued through the Minnesota PUC. Aspects of this WCS have been implemented or are in the process of being implemented/defined. Subsequent stages of implementation of this WCS may vary depending on the final Walleye Wind design and development needs and eventual operation of facility infrastructure. This WCS is subject to future revisions, as needed, and will be maintained by Walleye Wind environmental staff. Revisions will include any updates needed to reflect the final construction plans, specifically, any updates to Section 7.2 to identify and mitigate impacts to avian/bat species during the construction and operational phases of the Project.

This WCS will be housed on-site per the Commission's Site order for the Project. An initial update to this document will be filed with the Commission 14 days before the preconstruction meeting with PUC staff.

9.2 Reporting

Various types of reporting throughout the life of the Project are required as part of the LWECS site permit process, including annual reports, quarterly reports, and immediate incident reports. These reports will be submitted to the MN PUC with copies to the USFWS and MNDNR.

- *Annual Reports:* An annual avian and bat report will be submitted by March 15 to the Commission each year the Project is in operation.
- *Quarterly Reports:* Quarterly reports will be submitted each year during the operation of the Project.
- *Immediate Incident Reports:* Immediate notification of the Commission, USFWS and MNDNR should occur within 24 hours of any of the following mortality events as outlined in the *Avian and Bat Survey Protocols for Large Wind Energy Conversion Systems in Minnesota* (Mixon et al. 2014) :
  - Five (5) or more dead or injured birds or bats with a five-day reporting period

- One (1) or more dead or injured state threatened, endangered, or species of special concern
- One (1) or more dead or injured federally listed species, including species proposed for listing
- One (1) or more dead or injured bald or golden eagles

Walleye Wind must file a compliance report with the Commission within seven (7) days of one of the above occurrences. This report will detail the discovery, including what was discovered, the specific turbine where the discovery was made, a detailed log of agencies/individuals contacted, and current plans being undertaken to address the issue.

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Appendix A—Figures

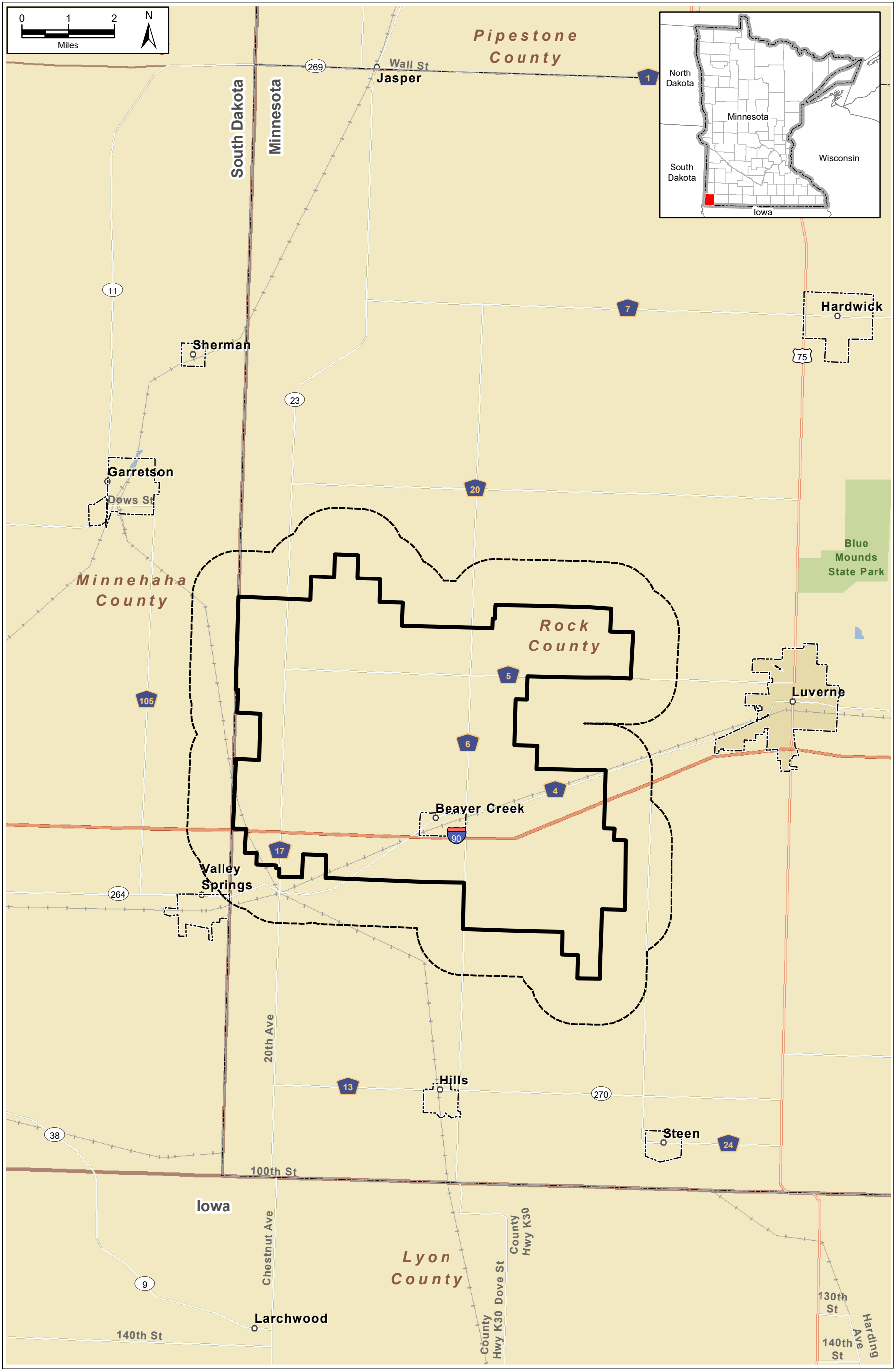


FIGURE 1.
SITE LOCATION MAP
WALLEYE WIND PROJECT
WALLEYE WIND, LLC

Project Boundary (±31,095 Ac.)
1 Mile Buffer
City Boundary

Sources: ESRI StreetMap, 2018; ECT, 2020.

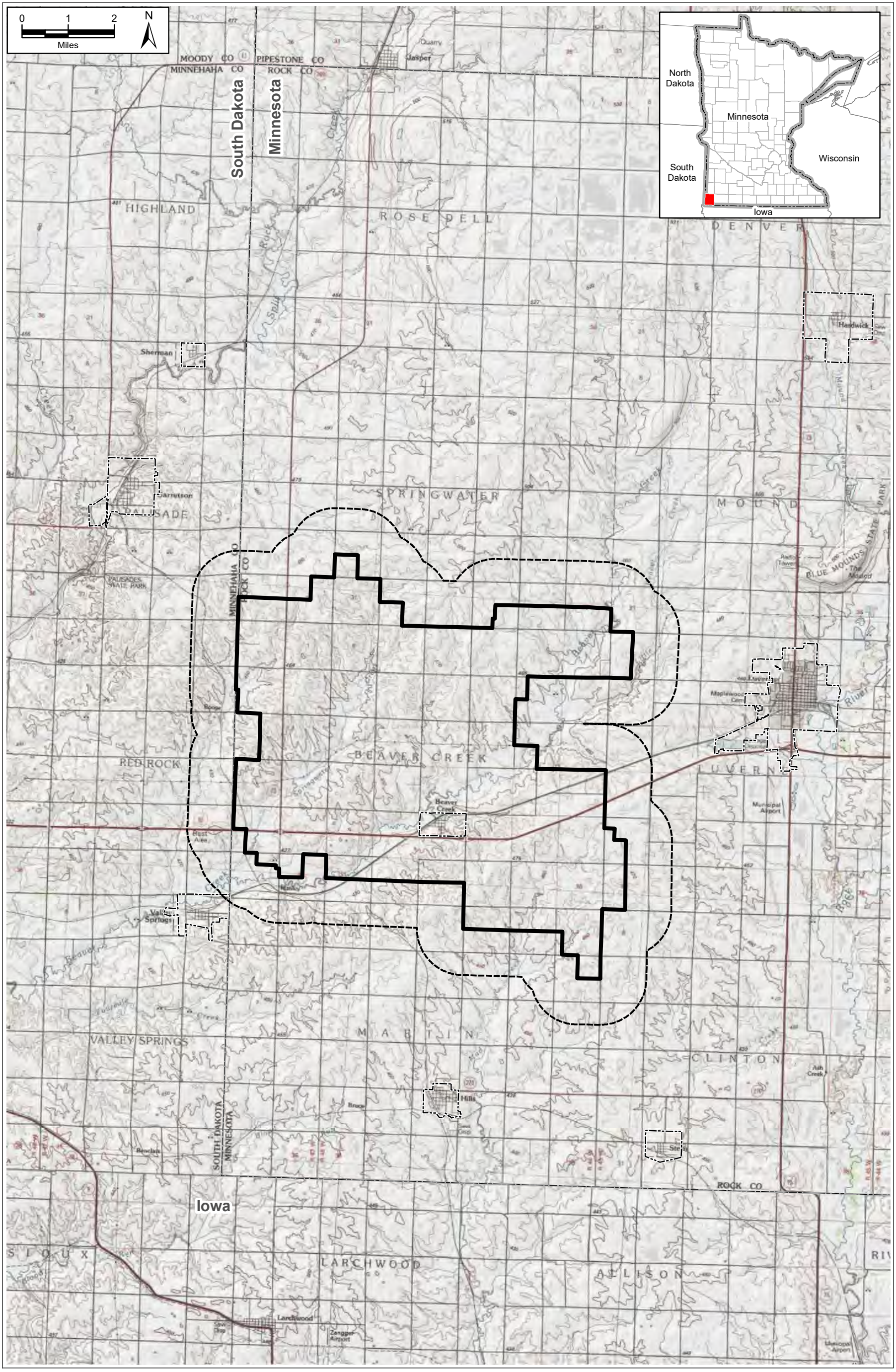


FIGURE 2.
TOPOGRAPHIC MAP
WALLEYE WIND PROJECT
WALLEYE WIND, LLC

Project Boundary (±31,095 Ac.)
1 Mile Buffer
City Boundary

Sources: USGS; ECT, 2020.

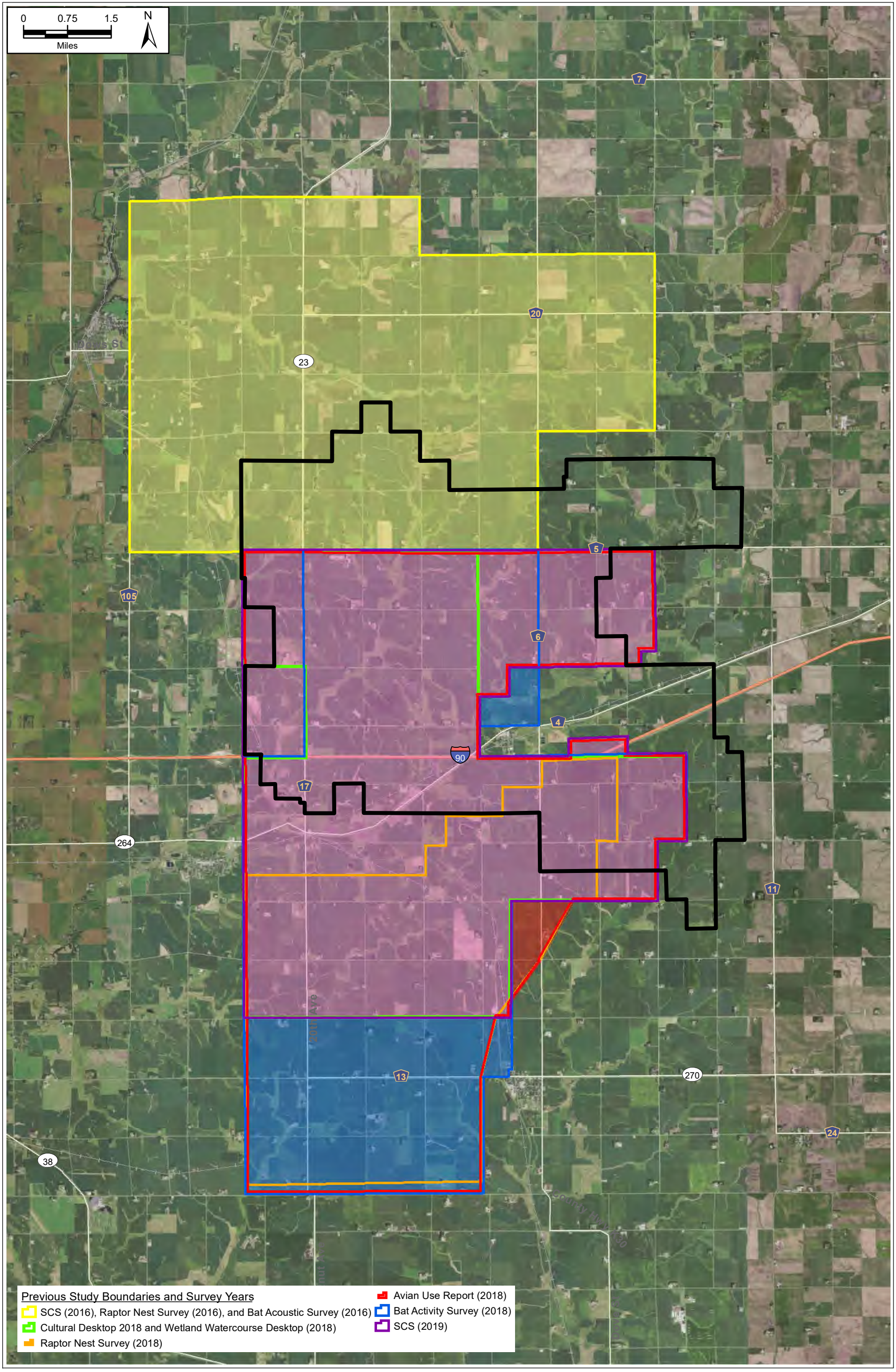


FIGURE 3. PREVIOUS STUDIES
WALLEYE WIND PROJECT
WALLEYE WIND, LLC

Current Project Boundary

Sources: NAIP Imagery, 2019; ECT, 2020.

ECT Environmental Consulting & Technology, Inc.

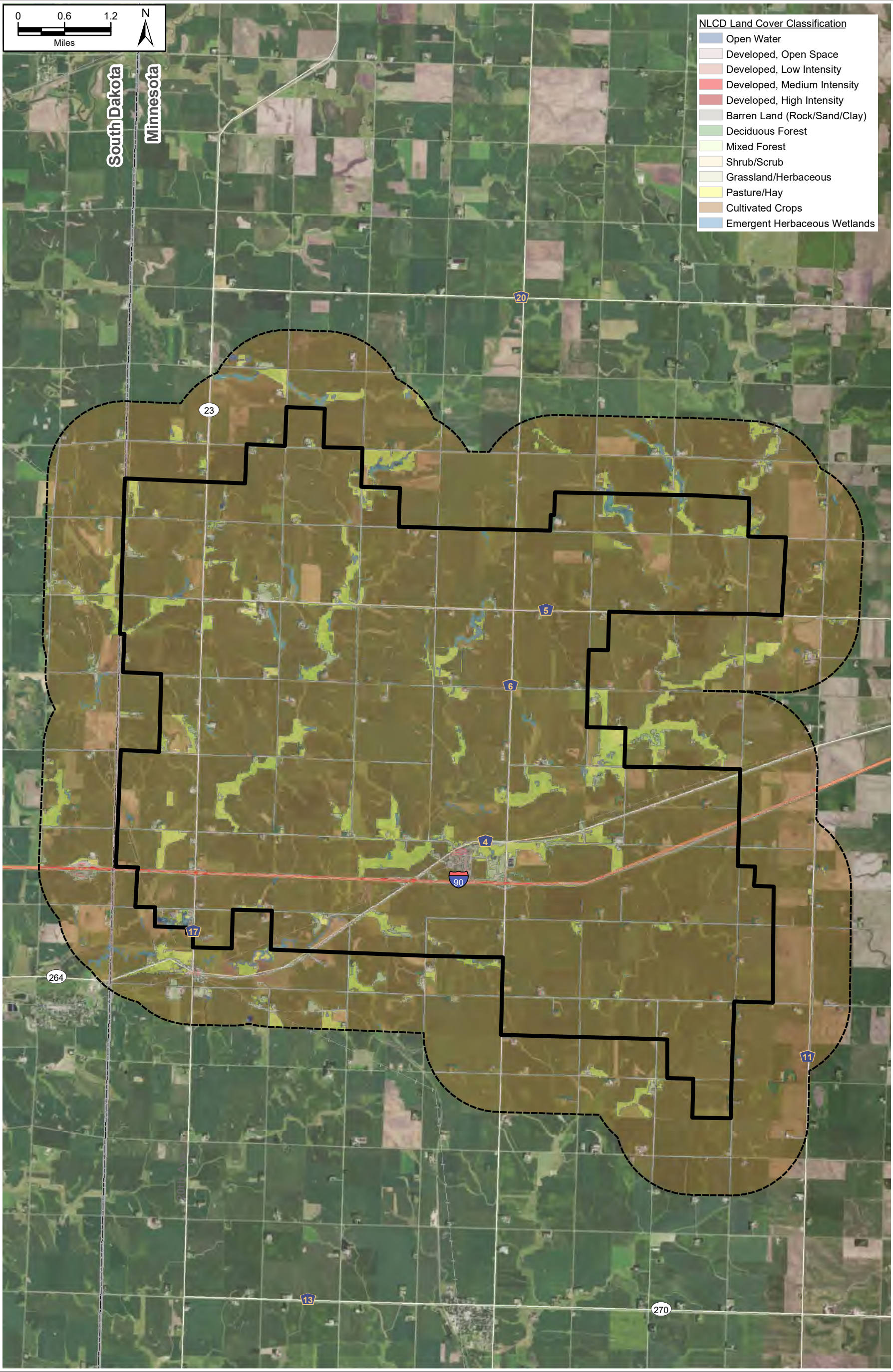


FIGURE 4.
LAND USE / LAND COVER MAP
WALLEYE WIND PROJECT
WALLEYE WIND, LLC

Project Boundary
1 Mile Buffer

Sources: USGS NLCD, 2016; ECT, 2020.

ECT Environmental Consulting & Technology, Inc.

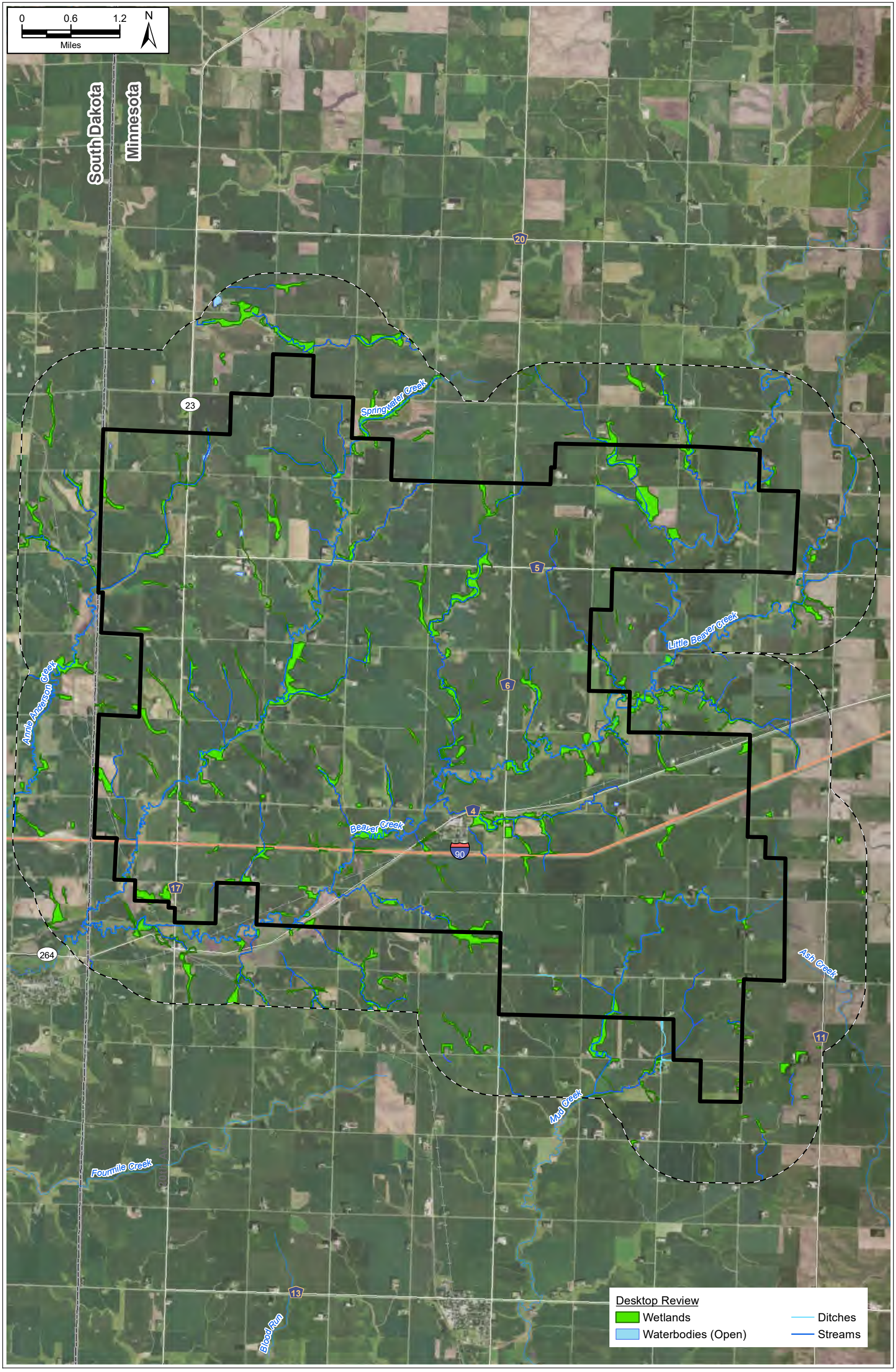


FIGURE 5.
WETLANDS REVIEW MAP
WALLEYE WIND PROJECT
WALLEYE WIND, LLC

Project Boundary (±31,095 Ac.)
1 Mile Buffer

Sources: USDA Imagery, 2019; ECT, 2020.

ECT Environmental Consulting & Technology, Inc.

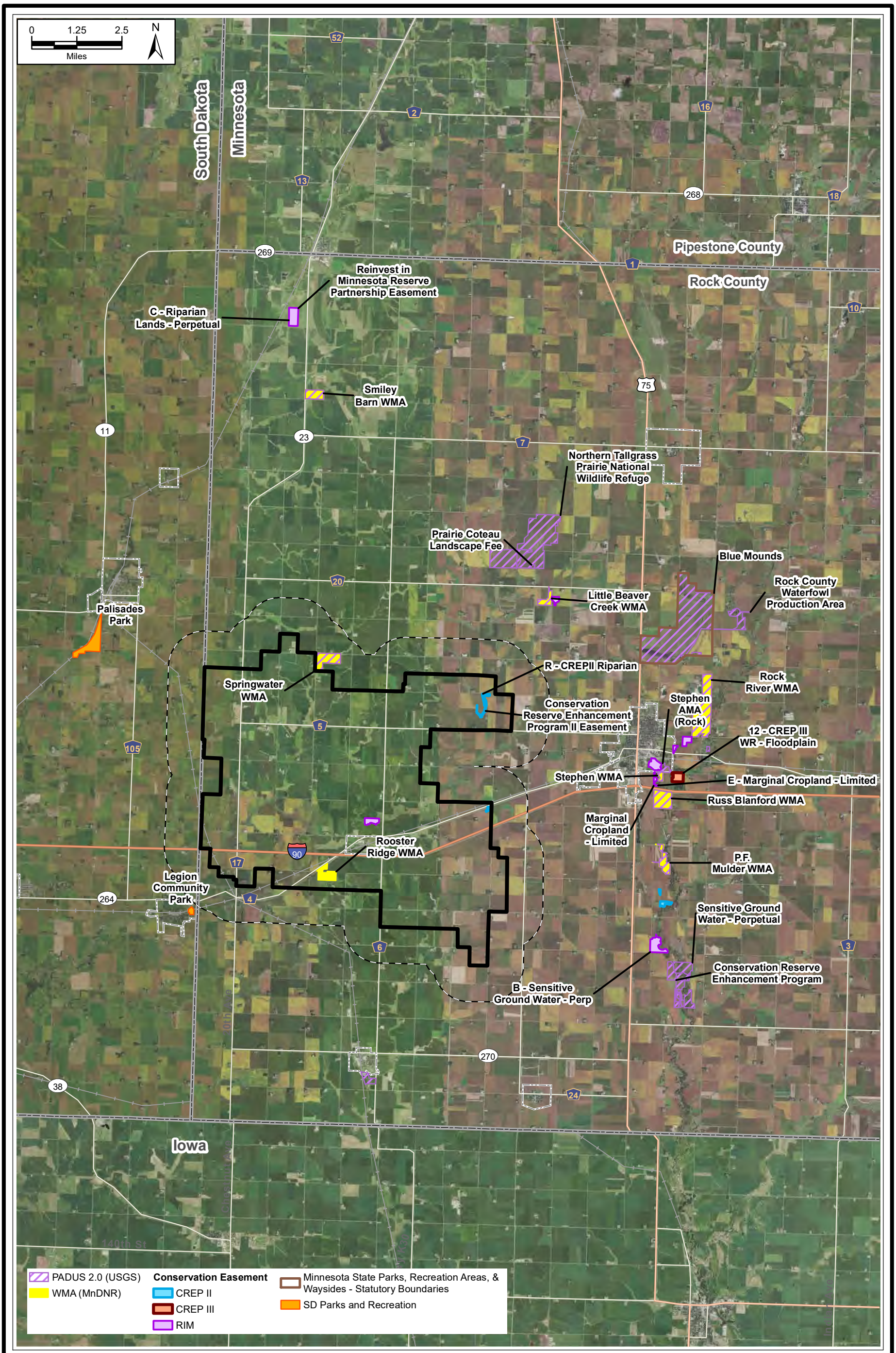


FIGURE 6.
PUBLIC LANDS MAP
WALLEYE WIND PROJECT
WALLEYE WIND, LLC

Project Boundary (±31,095 Ac.)
1 Mile Buffer
City Boundary

Sources: MN DNR; USGS PADUS2; ECT, 2020.

ECT Environmental Consulting & Technology, Inc.

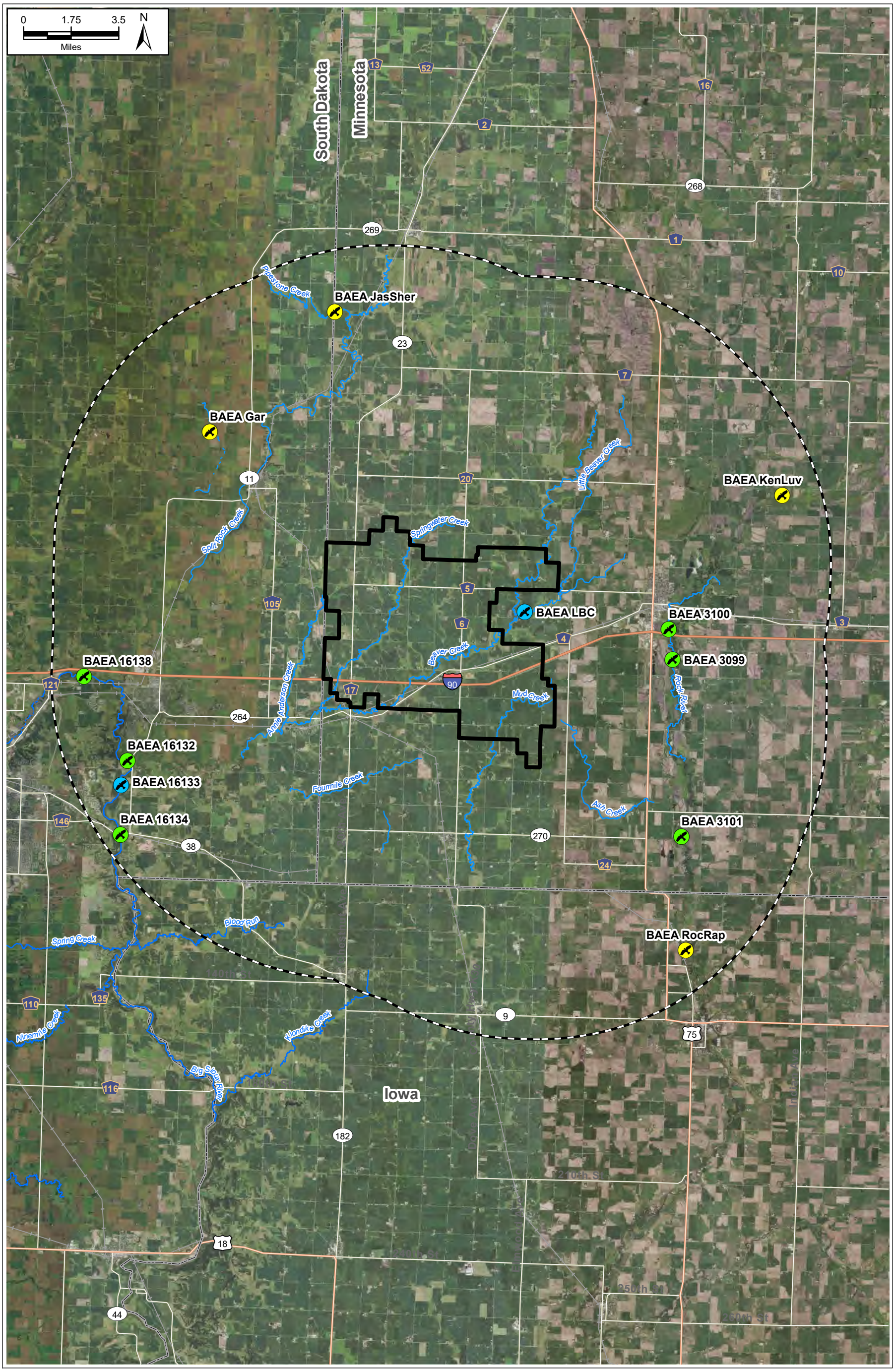


FIGURE 8.
BALD EAGLE NEST LOCATIONS
WALLEYE WIND PROJECT
WALLEYE WIND PROJECT, LLC

Project Boundary
10 Mile Buffer
State Boundary

Eagle Nest Status

2020/Active 2020
2018/Active 2020
Alternate 2020

Sources: NAIP 2019 Imagery; ECT, 2020.

ECT Environmental Consulting & Technology, Inc.

Appendix B

IPaC Results

IPaC Information for Planning and Consultation **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.

Location

Minnesota and South Dakota

Local offices

Minnesota-Wisconsin Ecological Services Field Office

(952) 252-0092
(952) 646-2873

MAILING ADDRESS
4101 American Blvd E
Bloomington, MN 55425-1665

PHYSICAL ADDRESS
4101 American Blvd E
-
Bloomington, MN 55425-1665

http://www.fws.gov/midwest/Endangered/section7/s7process/step1.html

South Dakota Ecological Services Field Office

(605) 224-8693
(605) 224-9974

420 South Garfield Avenue, Suite 400
Pierre, SD 57501-5408

http://www.fws.gov/southdakotafieldoffice/

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
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
Red Knot *Calidris canutus rufa* No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/1864	Threatened

Fishes

NAME	STATUS
Topeka Shiner *Notropis topeka (=tristis)* There is **final** critical habitat for this species. Your location overlaps the critical habitat. https://ecos.fws.gov/ecp/species/4122	Endangered

Insects

NAME	STATUS
Dakota Skipper *Hesperia dacotae* There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/1028	Threatened

Flowering Plants

NAME	STATUS
Prairie Bush-clover Lespedeza leptostachya No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/4458	Threatened
Western Prairie Fringed Orchid Platanthera praeclara No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/1669	Threatened

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

This location overlaps the critical habitat for the following species:

NAME	TYPE
Topeka Shiner Notropis topeka (=tristis) https://ecos.fws.gov/ecp/species/4122#crithab	Final

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.

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 Golden-plover Pluvialis dominica This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds elsewhere

Bald Eagle Haliaeetus leucocephalus This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Oct 15 to Aug 31
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
Black-billed Cuckoo Coccyzus erythropthalmus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9399	Breeds May 15 to Oct 10
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
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
Henslow's Sparrow Ammodramus henslowii This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/3941	Breeds May 1 to Aug 31
Hudsonian Godwit Limosa haemastica This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds elsewhere
Lesser Yellowlegs Tringa flavipes This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9679	Breeds 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
Red-headed Woodpecker Melanerpes erythrocephalus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Sep 10
Rusty Blackbird Euphagus carolinus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds elsewhere
Semipalmated Sandpiper Calidris pusilla This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds elsewhere
Wood Thrush Hylocichla mustelina This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Aug 31

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.

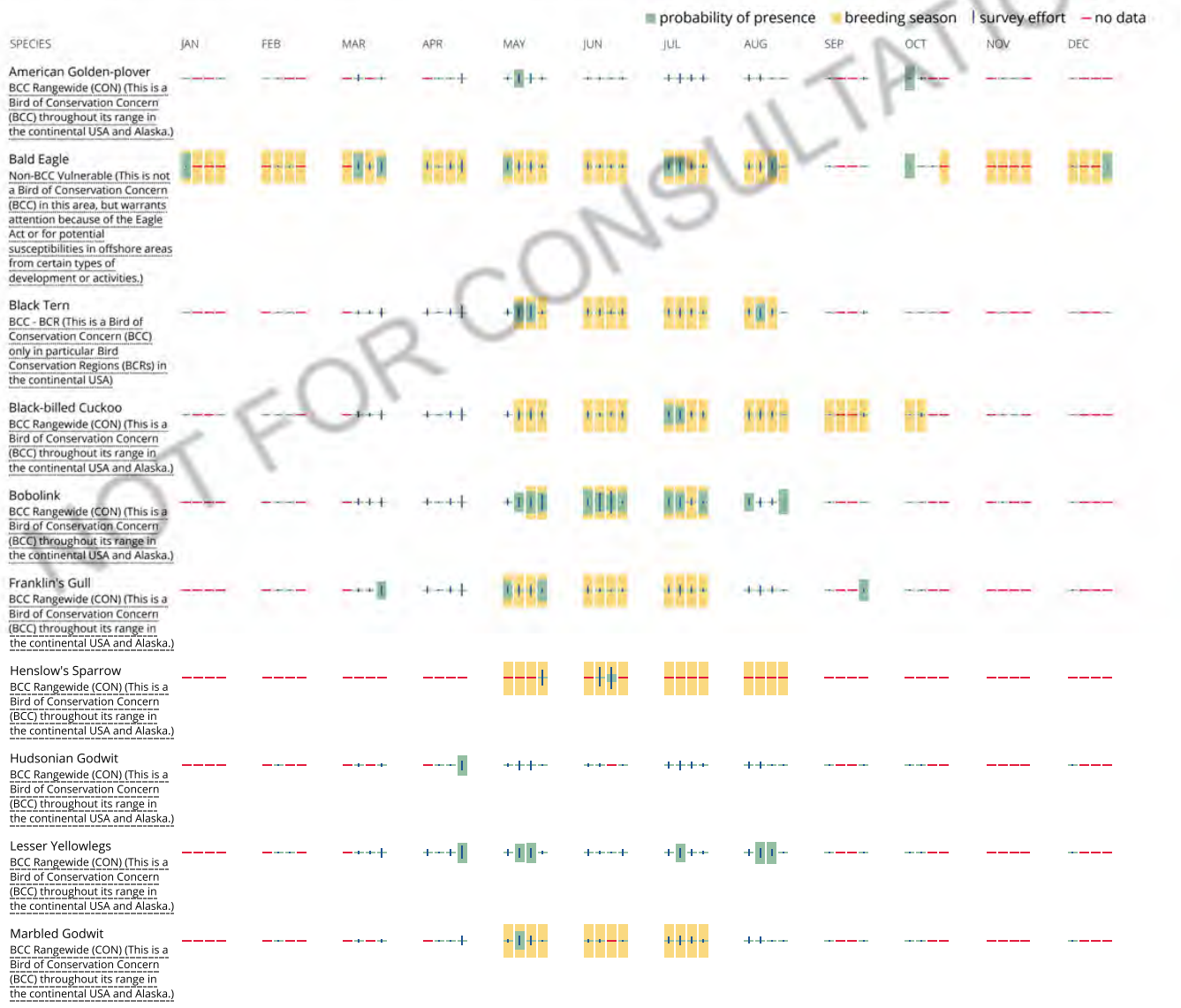
Breeding Season (■)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

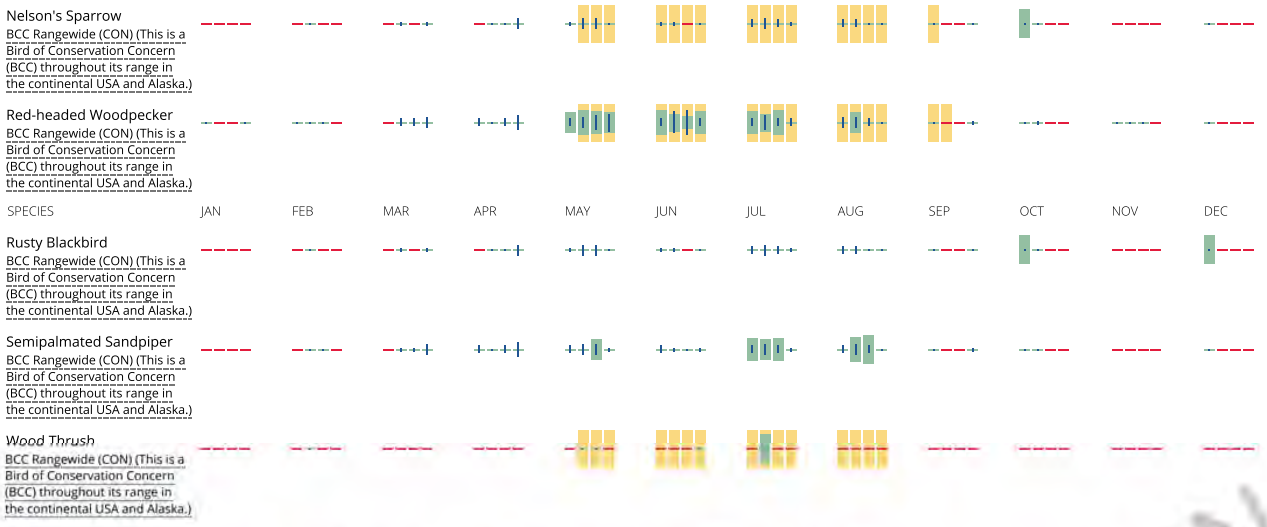
Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

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.





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.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, *visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds"* at the bottom of your migratory bird trust resources page.

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

This location overlaps the following National Wildlife Refuge lands:

LAND	ACRES
Windom Wetland Management District	2,839.88 acres

(507) 831-2220
(507) 831-5524

MAILING ADDRESS
49663 County Road Number 17
Windom, MN 56101-3026

PHYSICAL ADDRESS
49663 County Road Number 17
Windom, MN 56101-3026

https://www.fws.gov/refuges/profiles/index.cfm?id=32587

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.

WETLAND INFORMATION IS NOT AVAILABLE AT THIS TIME
This can happen when the National Wetlands Inventory (NWI) map service is unavailable, or for very large projects that intersect many wetland areas. Try again, or visit the NWI map to view wetlands at this location.

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.

Appendix C

Previous Tier 3 Studies

ENVIRONMENTAL & STATISTICAL CONSULTANTS
7575 Golden Valley Road, Suite 300, Golden Valley, Minnesota 55427
Phone: 612.655.1726 ♦ www.west-inc.com

COVER MEMORANDUM

Date: June 10, 2020

To: Walleye Wind Project, LLC

From: Western EcoSystems Technology, Inc.

Subject: Walleye Wind Project – 2016 Raptor Nest Survey Report Cover Memo

INTRODUCTION

Walleye Wind Project, LLC is developing the Walleye Wind Project (Project) in Rock County, Minnesota (Figure 1). The 2016 Raptor Nest Survey Report attached to this memorandum was initially prepared for a study area that preceded the current Project, which included infrastructure in South Dakota. The Project now being proposed by Walleye Wind, LLC will have no infrastructure or any part of the Project in South Dakota. Therefore, references in this report to South Dakota are no longer applicable to the current Project. However, this report is provided due to the study area's proximity to and partial overlap with the current Project, as it provides information pertinent to Minnesota state agency review. The study area and current Project boundary are depicted in Figure 1, below.

Please also note that in the attached 2016 Raptor Nest Survey Report, all references to "Project" and "Project boundary" refer to the area delineated by the 2016 Raptor Nest Survey study area as shown on Figure 1.

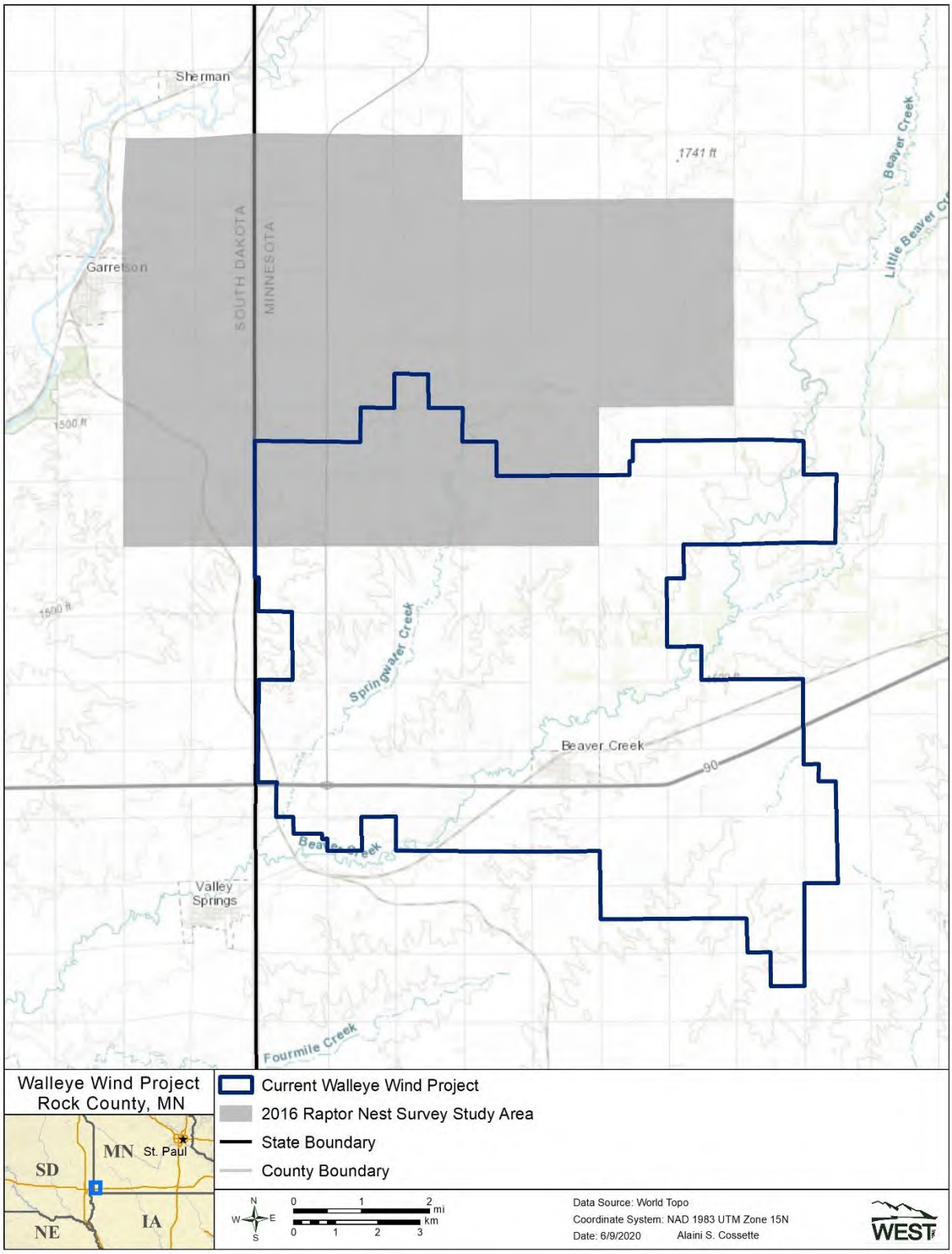


Figure 1. 2016 Raptor Nest Survey study area in comparison to the current Walleye Wind Project, Rock County, Minnesota.

Confidential Business Information

Raptor Nest Survey Results for the Walleye Wind Project Rock County, Minnesota and Minnehaha County, South Dakota

Prepared for:

Renewable Energy Systems, Inc.
12 South 6th Street, Suite 930
Minneapolis, Minnesota 55402

Prepared by:

Western EcoSystems Technology, Inc.
1710 Douglas, Suite 283
Golden Valley, MN 55422

May 25, 2016

STUDY PARTICIPANTS

Western EcoSystems Technology

Joyce Pickle	Project Manager
Chad Rittenhouse	Research Biologist
Adam Kreger	GIS Specialist

REPORT REFERENCE

Pickle, J., C. Rittenhouse and A. Kreger. 2016. Raptor Nest Survey Results for the Walleye Wind Project, Rock County, Minnesota and Minnehaha County, South Dakota. May 25, 2016. Prepared for Renewable Energy Systems Americas, Inc. Prepared by Western EcoSystems Technology, Inc. (WEST), Golden Valley, Minnesota.

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INTRODUCTION

Renewable Energy Systems Americas (RES) is developing the Walleye Wind Project (Project) in Rock County, Minnesota and Minnehaha County, South Dakota (Figure 1). RES requested that Western EcoSystems Technology, Inc. (WEST) conduct an aerial based raptor nest survey to help evaluate the potential impacts of construction on nesting raptors. This report provides results of the general raptor nest survey conducted at the Project on March 24 – 25, 2016.

STUDY AREA

The Project is located on the South Dakota-Minnesota border, just east of the town of Garreston, South Dakota (Figure 1). The Project falls in the Western Corn Belt Plains Ecoregion (USEPA 2013, 2015). The Western Corn Belt Plains Ecoregion is composed of glaciated till plains and undulating loess plains. Much of the region was originally dominated by tall-grass prairie, riparian forest, and woody and herbaceous wetlands. Today, most of the area has been cleared for farms producing corn, soybeans, and livestock. Many smaller streams in this ecoregion have been tiled, ditched, and tied into existing drainage systems, which caused a reduction in the amount of aquatic habitat. The majority of the Project is composed of cropland and developed areas (89%) with sparse forest patches and wetlands.

METHODS

Aerial Raptor Nest Survey

One aerial survey was conducted from a helicopter in late March (March 24 – 25, 2016), a period before leaf out when raptors would be actively tending to a nest or incubating eggs. Aerial surveys were conducted in accordance with the guidance provided in the U.S. Fish and Wildlife Service (USFWS) *Eagle Conservation Plan Guidance: Module 1 – Land-based Wind Energy, Version 2* (ECPG; USFWS 2013) and the USFWS Inventory and Monitoring Protocols (Pagel et al. 2010). An experienced raptor ecologist and a skilled helicopter pilot conducted the survey. Raptors are defined here as kites, accipiters, buteos, harriers, eagles, falcons, and owls. However, the main focus of the survey was to identify bald eagle nests. Bald eagle nest surveys focused on locating eyries (large, stick nest structures) in suitable eagle nesting substrate (trees, transmission lines, cliff faces, etc.) within and around the proposed Project (Figure 1), considering a 1-mi and a 10-mi buffer (Figure 1).

Surveys within the project boundary and 1-mi buffer documented all potential raptor nests, including bald eagles, while the surveys up to the 10-mi buffer focused only on identifying potential bald eagle nests. Efforts were made to minimize disturbance to breeding raptors; the greatest possible distance at which the species could be identified was maintained, with distances varying depending upon nest location and wind conditions.

In general, all potential bald eagle and raptor nest habitat was surveyed by flying transects between 0.25 and 0.5 mi (0.4 and 0.8 km) apart, flying at speeds of 60 to 75 mi per hour (mph; 97 to 121 km per hour) throughout the proposed Project and associated 10-mi buffer. Surveys

were typically conducted between 07:00 hours and 18:00 hours. The locations of all potential raptor nests were recorded using a hand-held Global Positioning System (GPS); coordinates were set at Latitude/Longitude (hddd.ddddd°) World Geodetic System (WGS) 84 unit. The survey included all confirmed and potential nests regardless of their activity status. To determine the status of a nest, the biologist relied on clues that included behavior of adults and presence of eggs, young, or whitewash. Attempts were made to identify the species of raptor associated with each active nest. Raptor species, nest type, nest status, nest condition, and substrate, were recorded at each nest location to the extent possible.

Terminology

Included below are descriptions of terms used during the documentation of nests (see Results section).

Nest ID - WEST assigned a unique nest identification number for each nest documented.

Species - A species was assigned to each nest when possible, otherwise, it was classified as an unknown raptor nest. Nests documented as unknown raptor species are defined as any stick nest that did not have an occupant associated with it at the time of the survey. Many times nests will become abandoned or no longer used, and over time, may become a historic nest site. Unknown raptor nests, including old nests or nests that could become suitable for raptors, are documented in order to populate a nest database to ensure that future surveys include all potentially suitable nest sites.

Nest Condition - Nest condition was categorized using descriptions ranging from poor to excellent. Although the determination of nest condition can be subjective and may vary between observers, it gives a general sense of when a nest or nest site may have last been used. Nests in poor to fair condition are typically in disrepair, sloughing, or sagging heavily, and would require some level of effort to rebuild in order to be suitable for successful nesting. Nests in good to excellent condition are those that appear to have been well maintained, have a well-defined bowl shape, are not sagging or sloughing, and appear to be suitable for nesting.

Substrate - The substrate in which a nest was observed was recorded to provide observers a visual reference. Substrates range from manmade structures (such as power lines, nest platforms, and dock hoists) to biological and physical structures (conifer and deciduous tree species, cliff faces).

Nest Status - WEST categorizes basic nest use consistent with definitions from the ECPG. Nests were classified as occupied if any of the following were observed at the nest structure: (1) an adult in an incubating position, (2) eggs, (3) nestlings or fledglings, (4) occurrence of a pair of adults (or, sometimes sub-adults), (5) a newly constructed or refurbished stick nest in the area where territorial behavior of a raptor had been observed early in the breeding season, or (6) a recently repaired nest with fresh sticks (clean breaks) or fresh boughs on top, and/or droppings and/or molted feathers on its rim or underneath. Occupied nests were further classified as active if an egg or eggs had been laid or nestlings were observed, or inactive if no eggs or chicks were

present. A nest that does not meet the above criteria for "occupied" was classified as "unoccupied".

RESULTS

Aerial Raptor Nest Survey

A WEST biologist detected a total of 38 raptor nests representing three raptor species (Table 1) during aerial surveys conducted on March 24 – 25, 2016. Two occupied bald eagle nests, two occupied red-tailed hawk (*Buteo jamaicensis*) nests, one occupied great-horned owl (*Bubo virginianus*) nest, and 33 unoccupied, inactive unknown raptor nests were identified (Table 1; Figure 1).

No occupied or potential bald eagle nests were located within the Project (Figure 1). No bald eagles were observed during the survey within the Project. Two occupied active bald eagle nests were documented in this survey, within riparian habitat along the Big Sioux River (Figure 1). No federal or state-listed threatened or endangered raptor species were observed nesting within the Project or the associated buffers. The following section provides a description of the bald eagle nests that were identified. Appendix A contains photos of all potential bald eagle nests. Table 1 summarizes the data collected at all observed raptor nests.

Nest 37 – this nest is located approximately 8.44 mi (13.58 km) southwest of the Project boundary. The nest was in excellent condition. Two bald eagles were observed; one was perched and one was observed in a nesting position. The nest is therefore considered occupied and active in 2016 (Appendix A, Figure 1).

Nest 38 – this nest is located approximately 7.76 mi (12.49 km) southwest of the Project boundary. The nest was in excellent condition. An adult bald eagle was observed in a nesting position. The nest is therefore considered occupied and active in 2016 (Appendix A, Figure 2).

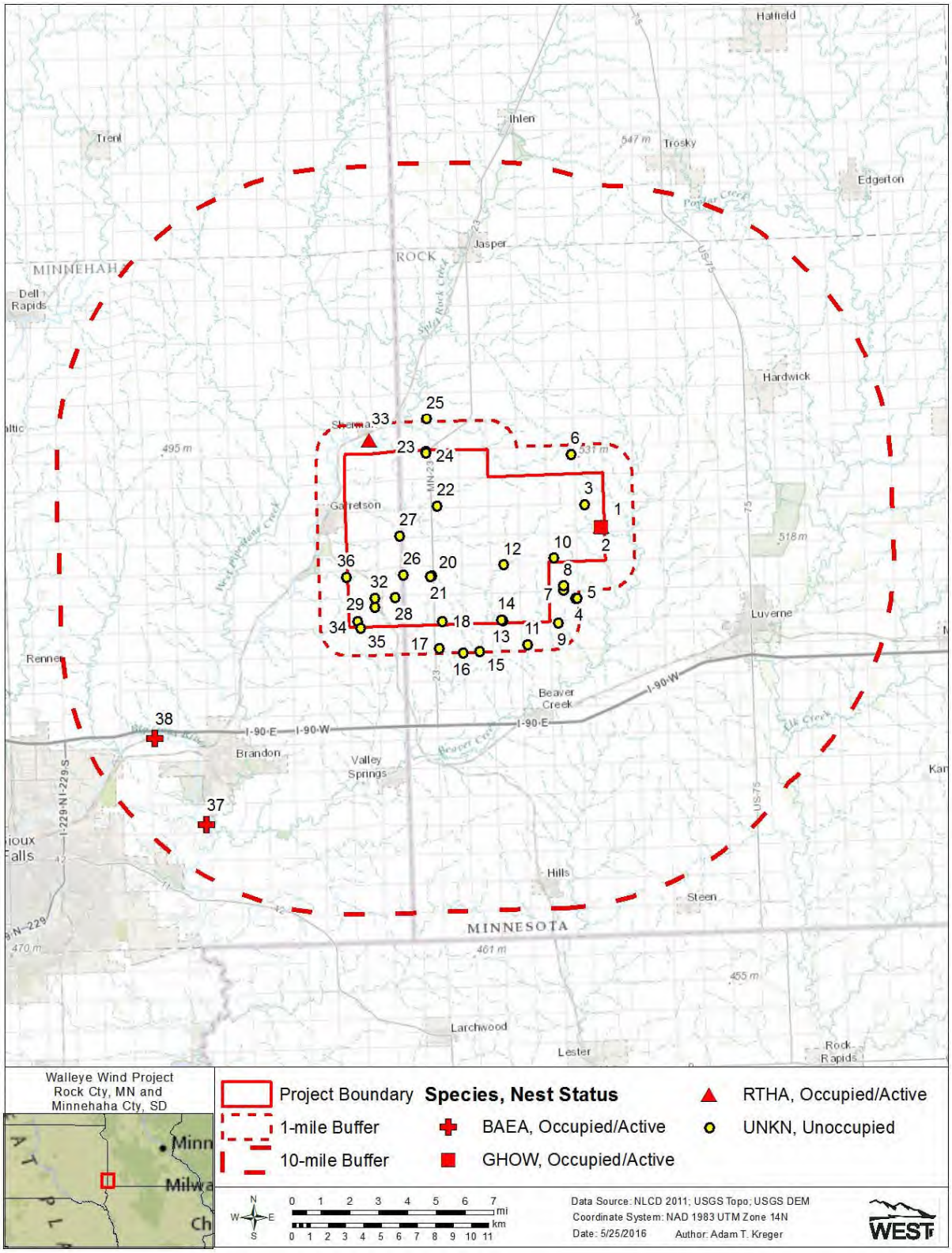

Figure 1. Locations of raptor nests observed at the Walleye Wind Project, Rock County, Minnesota, and Minnehaha County, South Dakota, and associated 1-mi and 10-mi buffers March 24 – 25, 2016.

Table 1. Raptor nest unique ID (NEST ID), locations (Lat/Long, hddd.dddd°; WGS 84) and features for identified nests during the March 24 – 25, 2016 survey for the Walleye Wind Project, Rock County, Minnesota, and Minnehaha County, South Dakota. Bald eagle (BAEA), Red-tailed hawk (RTHA), great-horned owl (GHOW), and unknown raptor (UNKN) nests were located.

Nest	Nest ID	Species	Nest substrate	Latitude	Longitude	Status at time of survey	Condition
1	032416-RTHA-MN-144	Red-tailed Hawk	Tree	43.707691	-96.312949	Occupied, active	Excellent
2	032416-GHOW-MN-145	Great-horned Owl	Tree	43.70629	-96.314637	Occupied, active	Excellent
3	032416-UNKN-MN-146	Unknown	Tree	43.717853	-96.325994	Unoccupied, inactive	Poor
4	032416-UNKN-MN-147	Unknown	Tree	43.670871	-96.334245	Unoccupied, inactive	Poor
5	032416-UNKN-MN-148	Unknown	Tree	43.671031	-96.333293	Unoccupied, inactive	Good
6	032416-UNKN-MN-149	Unknown	Tree	43.743468	-96.334475	Unoccupied, inactive	Fair
7	032416-UNKN-MN-150	Unknown	Tree	43.675245	-96.34255	Unoccupied, inactive	Fair
8	032416-UNKN-MN-151	Unknown	Tree	43.677388	-96.342307	Unoccupied, inactive	Fair
9	032416-UNKN-MN-152	Unknown	Tree	43.658674	-96.34683	Unoccupied, inactive	Good
10	032416-UNKN-MN-153	Unknown	Tree	43.691466	-96.348498	Unoccupied, inactive	Good
11	032416-UNKN-MN-154	Unknown	Tree	43.648392	-96.368753	Unoccupied, inactive	Poor
12	032416-UNKN-MN-155	Unknown	Tree	43.688902	-96.383623	Unoccupied, inactive	Fair
13	032416-UNKN-MN-156	Unknown	Tree	43.660972	-96.385358	Unoccupied, inactive	Poor
14	032416-UNKN-MN-157	Unknown	Tree	43.661088	-96.38602	Unoccupied, inactive	Poor
15	032416-UNKN-MN-158	Unknown	Tree	43.645665	-96.401958	Unoccupied, inactive	Good
16	032416-UNKN-MN-159	Unknown	Tree	43.645285	-96.413562	Unoccupied, inactive	Good
17	032416-UNKN-MN-160	Unknown	Tree	43.647988	-96.429708	Unoccupied, inactive	Good
18	032416-UNKN-MN-161	Unknown	Tree	43.661306	-96.427314	Unoccupied, inactive	Good
19	032416-UNKN-MN-162	Unknown	Tree	43.684018	-96.434386	Unoccupied, inactive	Good
20	032416-UNKN-MN-163	Unknown	Tree	43.684492	-96.433582	Unoccupied, inactive	Poor
21	032416-UNKN-MN-164	Unknown	Tree	43.684014	-96.434355	Unoccupied, inactive	Poor
22	032416-UNKN-MN-165	Unknown	Tree	43.719569	-96.428248	Unoccupied, inactive	Poor
23	032416-UNKN-MN-166	Unknown	Tree	43.746996	-96.435082	Unoccupied, inactive	Good
24	032416-UNKN-MN-167	Unknown	Tree	43.746345	-96.434986	Unoccupied, inactive	Good
25	032416-UNKN-MN-168	Unknown	Tree	43.763592	-96.433858	Unoccupied, inactive	Poor
26	032416-UNKN-MN-169	Unknown	Tree	43.685432	-96.453486	Unoccupied, inactive	Poor
27	032416-UNKN-SD-170	Unknown	Tree	43.704884	-96.454916	Unoccupied, inactive	Fair
28	032416-UNKN-SD-171	Unknown	Tree	43.674099	-96.459338	Unoccupied, inactive	Fair
29	032416-UNKN-SD-172	Unknown	Tree	43.669676	-96.473876	Unoccupied, inactive	Fair
30	032416-UNKN-SD-173	Unknown	Tree	43.673952	-96.473378	Unoccupied, inactive	Fair
31	032416-UNKN-SD-174	Unknown	Tree	43.674035	-96.473232	Unoccupied, inactive	Fair
32	032416-UNKN-SD-175	Unknown	Tree	43.674108	-96.4734	Unoccupied, inactive	Fair
33	032416-RTHA-SD-176	Red-tailed Hawk	Tree	43.754718	-96.472122	Occupied, active	Excellent
34	032416-UNKN-SD-177	Unknown	Tree	43.662526	-96.485896	Unoccupied, inactive	Fair

Table 1. Raptor nest unique ID (NEST ID), locations (Lat/Long, hddd.dddd°; WGS 84) and features for identified nests during the March 24 – 25, 2016 survey for the Walleye Wind Project, Rock County, Minnesota, and Minnehaha County, South Dakota. Bald eagle (BAEA), Red-tailed hawk (RTHA), great-horned owl (GHOW), and unknown raptor (UNKN) nests were located.

Nest	Nest ID	Species	Nest substrate	Latitude	Longitude	Status at time of survey	Condition
35	032416-UNKN-SD-178	Unknown	Tree	43.659209	-96.483837	Unoccupied, inactive	Fair
36	032416-UNKN-SD-179	Unknown	Tree	43.685023	-96.492827	Unoccupied, inactive	Good
37	032516-BAEA-SD-180	Bald Eagle	Tree	43.562668	-96.594158	Occupied, active	Excellent
38	032516-BAEA-SD-181	Bald Eagle	Tree	43.606778	-96.628101	Occupied, active	Excellent

DISCUSSION/CONCLUSION

These surveys provided additional information on eagle and raptor use within the vicinity of the Project. Aerial surveys did not find bald eagle nests within the Project. The Project site is dominated by cultivated agricultural lands with relatively little forest cover. The Project does include small pond, river, and wetland systems that might provide foraging opportunities to eagles. Woody habitats with mature large trees, which may provide nesting habitat for bald eagles, exist along the Big Sioux River (Nest 37, Nest 38), to the southwest of the Project boundary.

The ECPG states that eagle pairs at nests within one-half the mean inter-nest distance from the Project area are susceptible to disturbance take and blade strike mortality. The mean inter-nest distance of all bald eagle nests observed during this survey is approximately 3.5 mi (5.6 km) with a half mean inter-nest distance of 1.8 mi (2.9 km). The closest eagle nest to the project boundary is approximately 7.7 miles to the southwest. Given their distance from the Project area and lack of intervening habitat, bald eagles inhabiting these nests are not expected to be at increased risk of disturbance take and blade strike mortality as a result of Project development.

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APPENDIX A: IMAGES OF EAGLE NESTS (OCCUPIED-ACTIVE AND UNOCCUPIED/INACTIVE) IN THE 10-MILE BUFFER OF THE WALLEYE WIND PROJECT, ROCK COUNTY, MINNESOTA AND MINNEHAHA COUNTY, SOUTH DAKOTA

Figure 1. Nest 37 is located approximately 8.44 mi (13.58 km) southwest of the Project boundary. The nest was in excellent condition. Two bald eagles were observed; one was perched and one was observed in a nesting position. The nest is therefore considered occupied and active in 2016.

Figure 2. Nest 2 is located approximately 7.76 mi (12.49 km) southwest of the Project boundary. The nest was in excellent condition. An adult bald eagle was observed in a nesting position. The nest is therefore considered occupied and active in 2016.

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COVER MEMORANDUM

Date: June 10, 2020

To: Walleye Wind Project, LLC

From: Western EcoSystems Technology, Inc.

Subject: Walleye Wind Project – 2018 Raptor Nest Survey Report Cover Memo

INTRODUCTION

Walleye Wind Project, LLC is developing the Walleye Wind Project (Project) in Rock County, Minnesota (Figure 1). The 2018 Raptor Nest Survey Report attached to this memorandum was initially prepared for a study area that preceded the current Project. This report is provided due to the study area's proximity to and partial overlap with the current Project, as it provides information pertinent to Minnesota state agency review. The 2018 Raptor Nest Survey study area and current Project are depicted in Figure 1, below.

Please also note that in the attached 2018 Raptor Nest Survey Report, all references to "Project" and "Project boundary" refer to the area delineated by the 2018 Raptor Nest Survey study area as shown in Figure 1.

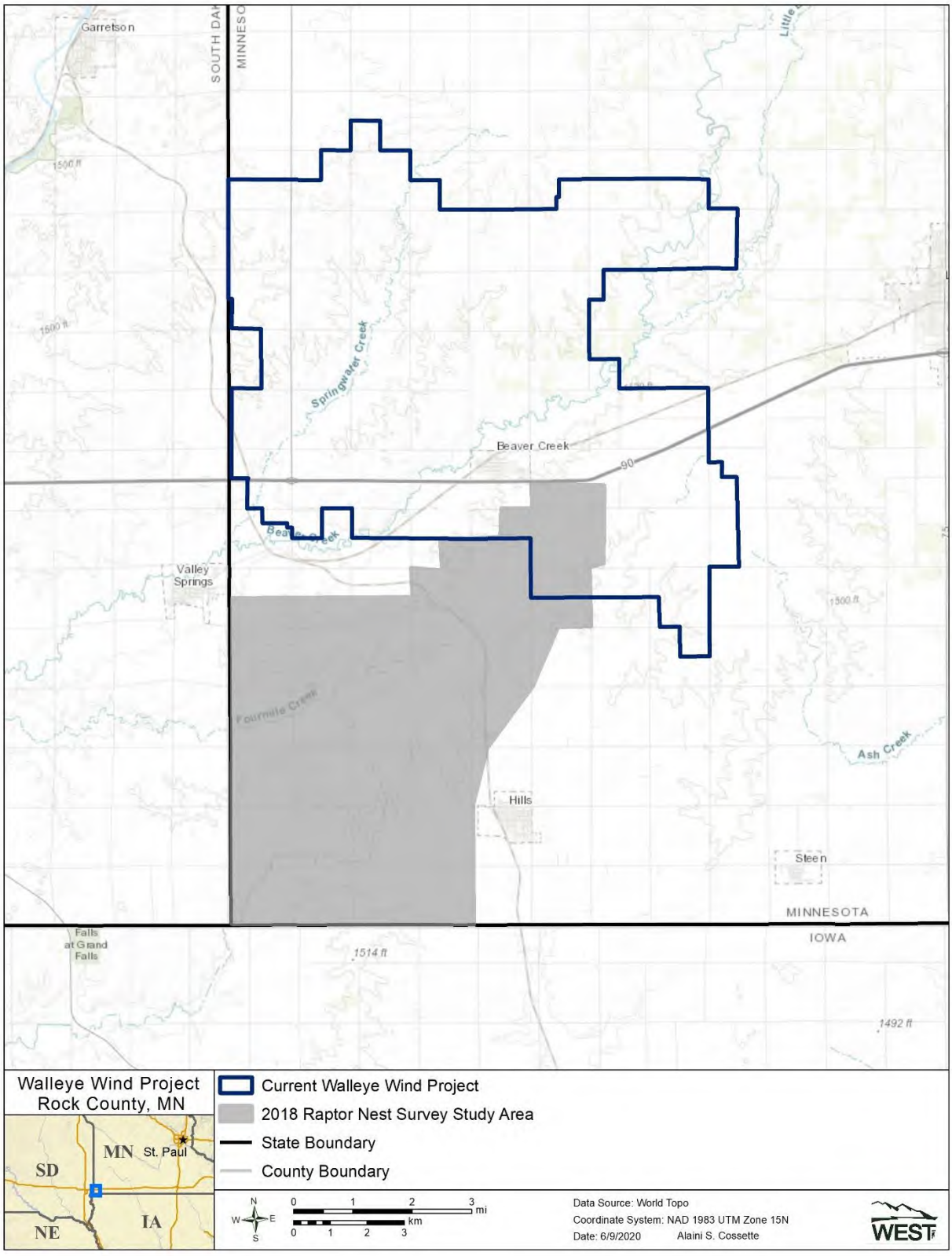

Figure 1. 2018 Raptor Nest Survey study area in comparison to the current Walleye Wind Project, Rock County, Minnesota.

2018 Raptor Nest Survey Report

Walleye Wind Energy Project

Rock County, Minnesota

Prepared for:

Walleye Wind Project, LLC

330 2nd Avenue South, Suite 820
Minneapolis, Minnesota 55401

Prepared by:

Western EcoSystems Technology, Inc.

7575 Golden Valley Road, Suite 350
Golden Valley, Minnesota 55427

August 15, 2018

UPDATED February 20, 2020

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REPORT REFERENCE

Western EcoSystems Technology, Inc. 2018. Raptor Nest Survey Report for the Walleye Wind Energy Project, Rock County, Minnesota. Prepared for Walleye Wind Project, LLC. Minneapolis, Minnesota. Prepared by Western EcoSystems Technology, Inc. (WEST), Golden Valley, Minnesota. August 15, 2018. Updated February 20, 2020.

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INTRODUCTION

Walleye Wind Project, LLC (Walleye Wind) is considering the development of a utility-scale wind energy project, the Walleye Wind Energy Project (Project), in Rock County, Minnesota. At the request of Walleye Wind, Western EcoSystems Technology, Inc. (WEST) conducted an aerial raptor nest survey to record bald eagle (*Haliaeetus leucocephalus*) and other raptor nests in the proximity of potential turbine siting areas. This survey will aid in assessing potential effects of the Project on eagles and other raptors. The survey was conducted in accordance with the guidance provided in the US Fish and Wildlife Service (USFWS) *Eagle Conservation Plan Guidance* (ECPG; USFWS 2013) and the USFWS *Interim Golden Eagle Technical Guidance* (Pagel et al. 2010).

SURVEY AREA

The boundary of the proposed Project area encompasses 18,890 acres (76.4 square kilometers, 29.5 square miles) in Rock County, Minnesota (Figure 1). The Project area falls within the Western Corn Belt Plains Ecoregion, which encompasses southern Minnesota (US Environmental Protection Agency 2013). The Western Corn Belt Plains Ecoregion is composed of glaciated till plains and undulating loess plains. Much of the region was originally dominated by tall-grass prairie, riparian forest, oak-prairie savannas, and brushy and herbaceous wetlands. Today, most of the area has been cleared for highly productive farms producing corn, soybeans and livestock. Many smaller streams in this ecoregion have been tilled, ditched and tied into existing drainage systems which has caused a reduction in the amount of aquatic habitat. The Project area is on the very southern edge of the Prairie Coteau in Minnesota.

The elevation of the Project area ranges from approximately 404 – 485 meters (1,325 – 1,591 feet). Topography of the Project is generally flat with some gently rolling hills; a majority of the site (88%) is cultivated for crop production. A number of streams are present within the Project area.

METHODS

Raptor Nest Survey

Raptor surveys were conducted from a helicopter from April 17 – 19, 2018, a period before leaf out when raptors are actively tending to a nest or incubating eggs. Aerial surveys were conducted in accordance with the guidance provided in the ECPG (USFWS 2013) and the USFWS *Interim Golden Eagle Technical Guidance* (Pagel et al. 2010). A raptor ecologist and a helicopter pilot conducted the surveys. Raptors are defined here as kites, accipiters, buteos, harriers, eagles, falcons, and owls (Buehler 2000). Pre-flight planning included the creation of field maps and mobile Geographic Information System files and review of relevant background information, such as previously recorded nest locations, topographic maps, and aerial photographs.

Surveys within the Project boundary and 1-mile (1.6-kilometer [km]) buffer documented all potential raptor nests, including bald eagles, while the surveys out to the 10-mi (16-km) buffer focused only on identifying potential bald eagle nests. Bald eagle nest surveys focused on locating eyries (large, stick nest structures) in suitable eagle nesting substrate (trees, transmission lines, cliff faces, etc.) within and around the proposed Project area (Figure 1). Efforts were made to minimize disturbance to breeding raptors; the greatest possible distance at which the species could be identified was maintained, with distances varying, depending upon nest location and wind conditions.

In general, all potential raptor nest habitat was surveyed by flying transects spaced 0.25 – 1.0 mi (0.8 – 1.6 km) apart, flying at speeds of approximately 46 mi per hour (74 km per hour) when actively scanning for nests. Surveys were typically conducted between 07:00 hours and 18:00 hours.

The survey track was recorded using a Global Positioning System (GPS) enabled tablet device to ensure that all areas were adequately covered. The helicopter was positioned to allow thorough visual inspection of the habitat, and in particular, to provide a view of the tops of the tallest dominant trees where bald eagles generally prefer to nest (Buehler 2000). The locations of all potential raptor nests were recorded using a GPS enabled tablet running locus pro software. This included all confirmed and potential nests regardless of their activity status.

To determine the status of a nest, the biologist evaluated behavior of adults on or near the nest, and presence of eggs, young, whitewash, or fresh building materials. Attempts were made to identify the species of raptor associated with each active nest. Raptor species, nest type, nest status, nest condition, and nest substrate were recorded at each nest location to the extent possible.

Terminology

Included below are descriptions of terms used during the documentation of nests (see Results section).

Nest ID – A unique nest identification number was assigned for each nest documented.

Species – A species was assigned to each nest when possible, otherwise, it was classified as an unidentified raptor nest. Nests documented as unidentified raptor species were defined as any stick nest not having an occupant associated with it at the time of the survey. Many times nests become abandoned or are no longer used, and over time, may become a historic nest site. Unidentified raptor nests, including old nests or nests that could become suitable for raptors, were documented in order to populate a nest database to ensure future surveys include all potentially suitable nest sites. Unidentified raptor species nests that appeared consistent in size and structure with bald eagle nests were further classified as potential alternate nest sites for bald eagles.

Nest Condition – Nest condition was categorized as good, fair, or poor. Although the determination of nest condition can be subjective and may vary between observers, it gives a general sense of when a nest or nest site was last used. Nests in good condition were excellently maintained with very well-defined bowl, no sagging, possible to use immediately or currently in use. Nests in fair condition had a fairly well-defined bowl, minor sagging, and might require some repair or addition to use immediately. Nests in poor condition were sloughing or sagging heavily and would require effort to restore for successful nesting.

Substrate – Nest substrate was recorded to provide observers a visual reference to re-locate the nest. Substrates may include manmade structures such as power lines, nest platforms, and dock hoists, and biological and physical structures such as conifer and deciduous tree species or cliff faces.

Nest Status – Nest status was categorized using definitions consistent with the USFWS ECPG. When applicable, bald eagle nests and potential bald eagle nests are further classified in the nest details section as "in-use" or "alternate" based on updated definitions of these terms in the final eagle rule effective January 17, 2017 (50 CFR Parts 13 and 22). Nests were classified as occupied if any of the following were observed at the nest structure: (1) an adult in an incubating position; (2) eggs; (3) nestlings or fledglings; (4) a pair of adults (sometimes sub-adults); (5) a newly constructed or refurbished stick nest in the area where territorial behavior of a raptor had been observed earlier in the breeding season; or (6) a recently repaired nest with fresh sticks (clean breaks) or fresh boughs on top, and/or droppings and/or molted feathers on its rim or underneath. Occupied nests were further classified as active if (1) an adult was present on the nest in incubating position, (2) an egg or eggs were present, or (3) nestlings were observed. Nests were classified as inactive if no eggs or chicks were present. Nests not meeting the above criteria for "Occupied" were classified as "Unoccupied".

RESULTS

A total of 22 stick nests representing two identified raptor species and one colonial waterbird species were detected during aerial surveys conducted April 17 – 19, 2018 (Table 1). Three occupied active bald eagle nests and one occupied inactive bald eagle nest were documented along the Big Sioux River, all of which were more than 7.0 miles (11.3 km) from the Project. Five unidentified raptor nests appeared consistent in size and structure with bald eagle nests: one was occupied inactive and four were inactive. All of these potential bald eagle nests were more than 6.5 miles (10.4 km) from the Project. Additional raptor nests documented during the survey included four occupied active red-tailed hawk (*Buteo jamaicensis*) nests: one within the Project boundary, two within one mile of the Project, and one just outside of the 1-mile buffer of the Project. Seven inactive nests of unidentified raptor species were also documented: six within the Project boundary and one within one mile of the Project. One stick nest that may have been built by a raptor (but was occupied by American crow [*Corvus brachyrhynchos*]) was documented within one mile of the Project. One occupied active great blue heron (*Ardea herodias*) rookery was also observed 7.3 miles from the Project.

The following section provides more details on each eagle nest and nests consistent in size and structure with eagle nests documented during the aerial surveys:

Nest 16132 – This nest was located approximately 7.1 mi (11.4 km) west of the Walleye Wind Energy Project area. The nest was in good condition at the time of the aerial survey. One adult bald eagle was observed on the nest in an incubating position, and the nest was considered an occupied active bald eagle nest in 2018 (Figure 1, Appendix A1). WEST also documented this nest as an occupied active bald eagle nest in 2016 (previous recorded as Nest 37; Pickle et al. 2016).

Nest 16135 – This nest was located approximately 8.3 mi (13.4 km) southwest of the Walleye Wind Energy Project area and was a new nest documented by WEST in 2018. The nest was in good condition at the time of the aerial survey. One adult bald eagle was observed on the nest in an incubating position, and the nest was considered an occupied active bald eagle nest in 2018 (Figure 1, Appendix A2).

Nest 16138 – This nest was located approximately 9.0 mi (14.5 km) northwest of the Walleye Wind Energy Project area. The nest was in good condition at the time of the aerial survey. One adult bald eagle was observed on the nest in an incubating position. The nest was considered an occupied active bald eagle nest in 2018 (Figure 1, Appendix A3). WEST also documented this nest as an occupied active bald eagle nest in 2016 (previously recorded as Nest 38; Pickle et al. 2016).

Nest 16134 – This nest was located approximately 7.2 mi (11.6 km) west of the Walleye Wind Energy Project area and was a new nest documented by WEST in 2018. The nest was in good condition at the time of the aerial survey and appeared to be recently tended, with both greenery and wash (i.e., fresh/recent droppings) observed in the nest. One adult bald eagle was observed perched on the nest and flying near the nest. Since no eggs or chicks were observed, the nest was considered an occupied inactive bald eagle nest in 2018 (Figure 1, Appendix A4).

Nest 16133 – This nest was located approximately 7.3 mi (11.7 km) west of the Walleye Wind Energy Project area. The nest was in good condition and was consistent in size and structure with a bald eagle nest. No eagles were seen on the nest or in close proximity to the nest; however, wash and feathers were observed in the nest. The nest is therefore considered an occupied inactive unidentified raptor nest in 2018 (Figure 1, Appendix A5).

Nest 3099 – This nest was located approximately 6.6 mi (10.6 km) northeast of the Walleye Wind Energy Project area. The nest was in fair condition and consistent in size and structure with a bald eagle nest. No eagles were seen on the nest or in close proximity to the nest. The nest was therefore considered inactive in 2018 (Figure 1, Appendix A6).

Nest 3100 – This nest was located approximately 6.8 mi (10.9 km) northeast of the Walleye Wind Energy Project area. The nest was in fair condition and consistent in size and structure with a

bald eagle nest. No eagles were seen on the nest or in close proximity to the nest. The nest was therefore considered inactive in 2018 (Figure 1, Appendix A7).

Nest 3101 - This nest was located approximately 7.8 mi (12.6 km) east of the Walleye Wind Energy Project area. The nest was in fair condition and consistent in size and structure with a bald eagle nest. No eagles were seen on the nest or in close proximity to the nest. The nest was therefore considered inactive in 2018 (Figure 1, Appendix A8).

Nest 16136 – This nest was located approximately 8.5 mi (13.7 km) southwest of the Walleye Wind Energy Project area. The nest was in good condition and was consistent in size and structure with a bald eagle nest. No eagles were seen on the nest or in close proximity to the nest. The nest was therefore considered inactive in 2018 (Figure 1, Appendix A9).

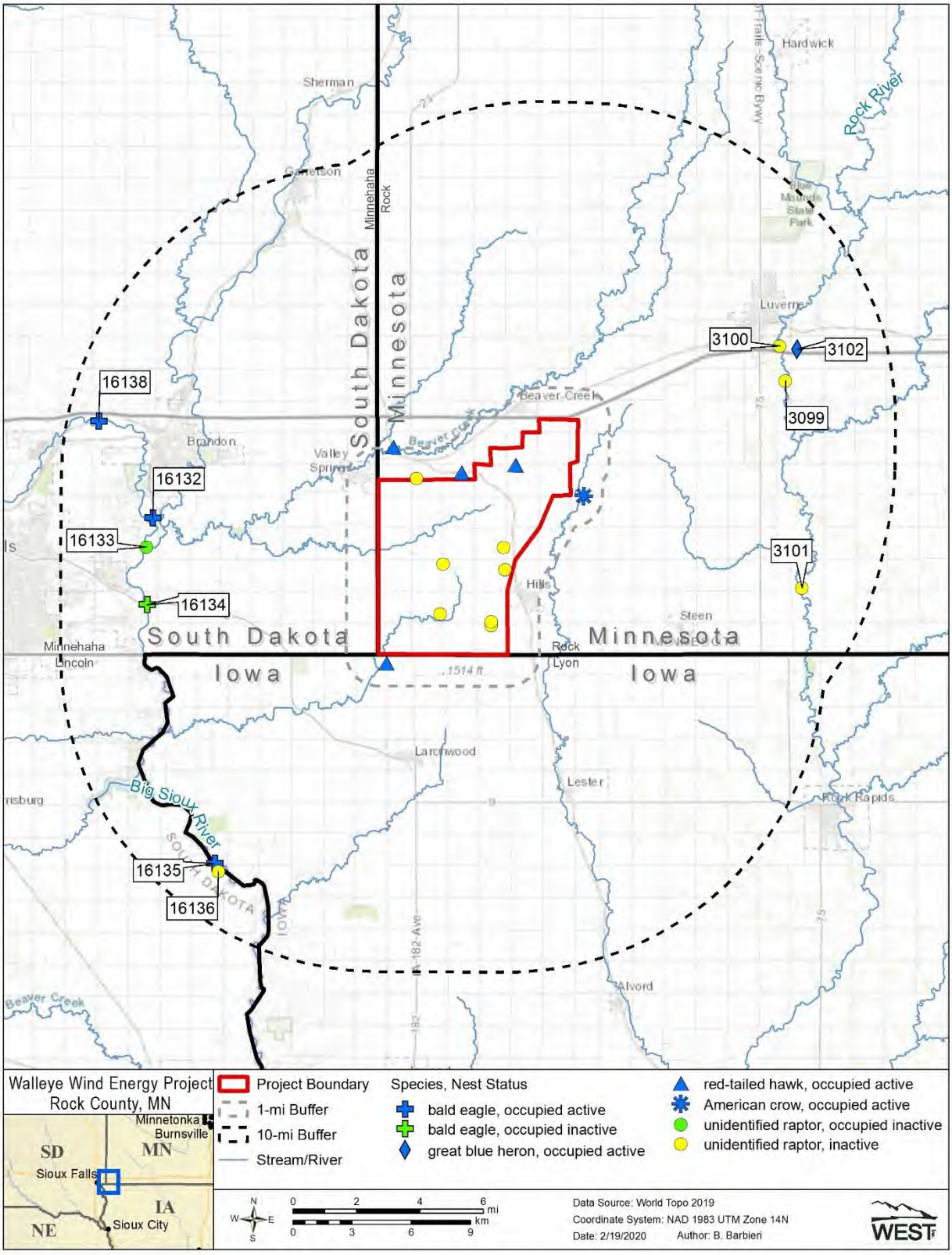

Figure 1. Stick nests documented April 17 – 19, 2018, near the Walleye Wind Energy Project, Rock County, Minnesota.

Table 1. Raptor nest ID, location, species, status, substrate, and condition of nests documented April 17 – 19, 2018, near the Walleye Wind Energy Project, Rock County, Minnesota.

Nest ID	Latitude	Longitude	Species[1]	Status at time of survey	Nest Substrate	Condition
16132	43.5627	-96.5942	BAEA	occupied active	deciduous tree	good
16135	43.4051	-96.5550	BAEA	occupied active	deciduous tree	good
16138	43.6068	-96.6281	BAEA	occupied active	deciduous tree	good
16134	43.5231	-96.5976	BAEA	occupied inactive	deciduous tree	good
16133	43.5495	-96.5983	UNRA*	occupied inactive	deciduous tree	good
3099	43.6250	-96.1971	UNRA*	inactive	deciduous tree	fair
3100	43.6410	-96.2005	UNRA*	inactive	deciduous tree	fair
3101	43.5306	-96.1871	UNRA*	inactive	deciduous tree	fair
16136	43.4016	-96.5528	UNRA*	inactive	deciduous tree	good
3102	43.6394	-96.1899	GBHE	occupied active	deciduous tree	good
3092	43.5833	-96.4004	RTHA	occupied active	deciduous tree	good
3097	43.5866	-96.3664	RTHA	occupied active	deciduous tree	good
16137	43.4964	-96.4475	RTHA	occupied active	deciduous tree	good
16139	43.5949	-96.4431	RTHA	occupied active	deciduous tree	good
3098	43.5727	-96.3239	AMCR	occupied active	deciduous tree	fair
3089	43.5810	-96.4286	UNRA	inactive	deciduous tree	fair
3090	43.5418	-96.4119	UNRA	inactive	deciduous tree	fair
3091	43.5191	-96.4139	UNRA	inactive	deciduous tree	fair
3093	43.5155	-96.3818	UNRA	inactive	deciduous tree	fair
3095	43.5495	-96.3740	UNRA	inactive	deciduous tree	fair
3096	43.5392	-96.3730	UNRA	inactive	deciduous tree	fair
3094	43.5138	-96.3819	UNRA	inactive	deciduous tree	poor

[1.] AMCR = American crow, BAEA = bald eagle, GBHE = great blue heron, RTHA = red-tailed hawk, UNRA = unidentified raptor species, UNRA* = unidentified species nest characteristic in structure and size of bald eagle and may be an alternate nest or historic nesting site.

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Appendix A. Images of Bald Eagle Nests and Nests Consistent in Size and Structure with Bald Eagle Nests Found April 17 – 19, 2018 within the 10-mile Buffer of the Walleye Wind Energy Project, Rock County, Minnesota

Appendix A1. Nest 16132 was located approximately 7.1 mi (11.4 km) west of the Walleye Wind Energy Project boundary. The nest was in good condition and one bald eagle was observed on the nest in an incubating position. The nest was considered occupied and active in 2018.

Appendix A2. Nest 16135 was located approximately 8.3 mi (13.4 km) southwest of the Walleye Wind Energy Project boundary. The nest was in good condition and one bald eagle was observed on the nest in an incubating position. The nest was considered occupied and active in 2018.

Appendix A3. Nest 16138 was located approximately 9.0 mi (14.5 km) northwest of the Walleye Wind Energy Project boundary. The nest was in good condition and one bald eagle was observed on the nest in an incubating position. The nest was considered occupied and active in 2018.

Appendix A4. Nest 16134 was located approximately 7.2 mi (11.6 km) west of the Walleye Wind Energy Project boundary. The nest was in good condition and greenery and wash were observed in the nest. One bald eagle was observed perched on and flying near the nest. The nest was considered an occupied inactive bald eagle nest in 2018.

Appendix A5. Nest 16133 was located approximately 7.3 mi (11.7 km) west of the Walleye Wind Energy Project boundary. The nest was in good condition and wash was observed in the nest. No bald eagles were observed on or near the nest, and it was considered an occupied inactive unidentified raptor nest in 2018.

Appendix A6. Nest 3099 was located approximately 6.6 mi (10.6 km) northeast of the Walleye Wind Energy Project boundary. The nest was in fair condition and consistent in size and structure with a bald eagle nest. No eagles were seen near the nest. The nest was considered inactive in 2018.

Appendix A7. Nest 3100 was located approximately 6.8 mi (10.9 km) northeast of the Walleye Wind Energy Project boundary. The nest was in fair condition and consistent in size and structure with a bald eagle nest. No eagles were seen near the nest. The nest was considered inactive in 2018.

Appendix A8. Nest 3101 was located approximately 7.8 mi (12.6 km) east of the Walleye Wind Energy Project boundary. The nest was in fair condition and consistent in size and structure with a bald eagle nest. No eagles were seen near the nest. The nest was considered inactive in 2018.

Appendix A9. Nest 16136 was located approximately 8.5 mi (13.7 km) southwest of the Walleye Wind Energy Project boundary. The nest was in good condition and consistent in size and structure with a bald eagle nest. No eagles were seen near the nest. The nest was considered inactive in 2018.

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COVER MEMORANDUM

Date: June 10, 2020

To: Walleye Wind Project, LLC

From: Western EcoSystems Technology, Inc.

Subject: Walleye Wind Project – 2018 Avian Use Survey Report Cover Memo

INTRODUCTION

Walleye Wind Project, LLC is developing the Walleye Wind Project (Project) in Rock County, Minnesota (Figure 1). The 2018 Avian Use Survey Report attached to this memorandum was initially prepared for a study area that preceded the current Project. This report is provided due to the study area's proximity to and partial overlap with the current Project, as it provides information pertinent to Minnesota state agency review. The 2018 Avian Use Survey study area and current Project boundary are depicted in Figure 1, below.

Please also note that in the attached 2018 Avian Use Study Report, all references to "Project" and "current Project area" refer to the likely buildable area that was anticipated at the time of the 2018 surveys as defined by the study area shown in Figure 1.

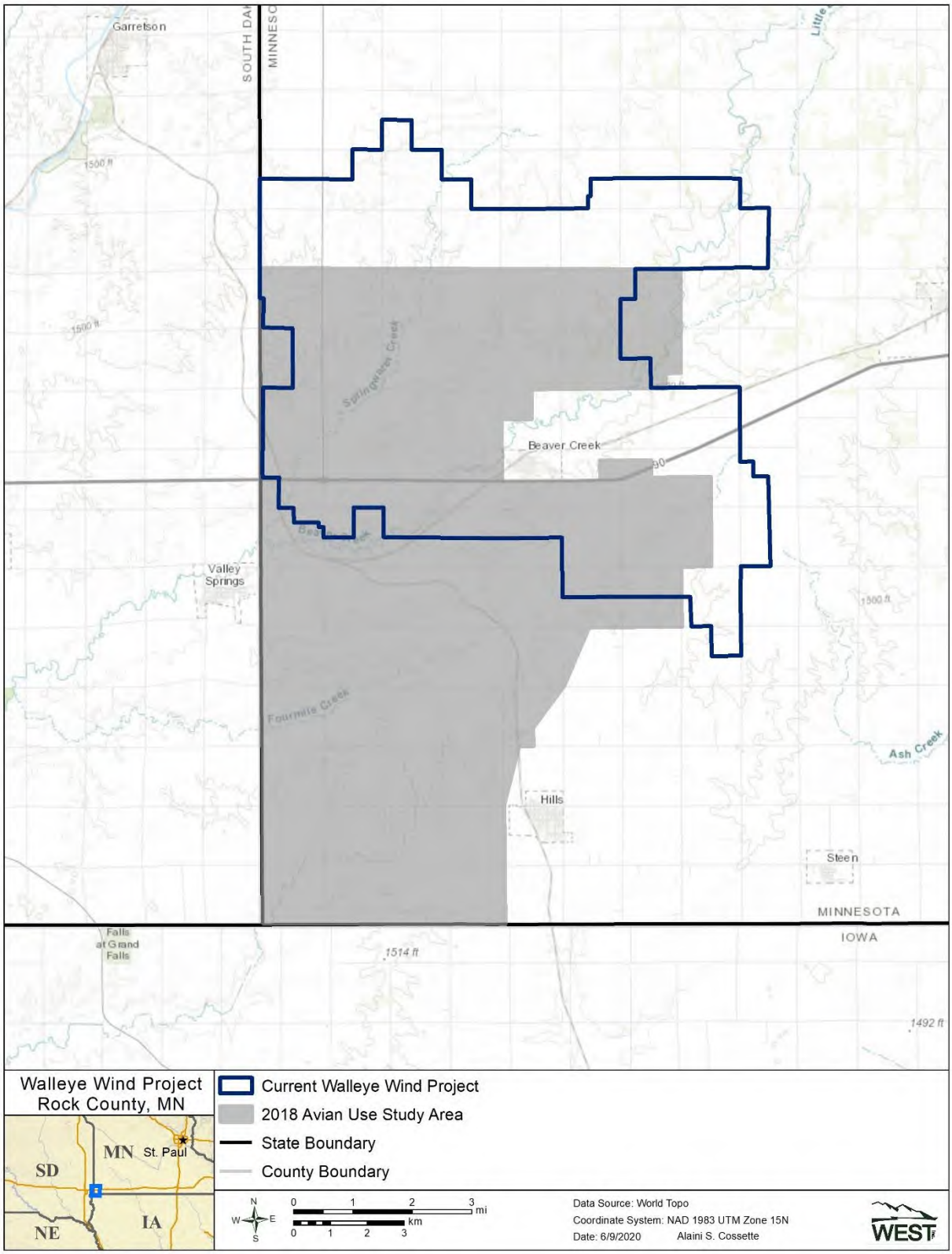

Figure 1. 2018 Avian Use Survey study area in comparison to the current Walleye Wind Project, Rock County, Minnesota.

Avian Use Study
Walleye Wind Energy Project
Rock County, Minnesota

Year 1 Report
January 2018 – December 2018

Prepared for:

Walleye Wind Project, LLC

12 South 6th Street, Suite 930
Minneapolis, Minnesota 55402

Prepared by:

Adam Kreger and Aaron Suehring

Western EcoSystems Technology, Inc.
7575 Golden Valley Road, Suite 300
Golden Valley, Minnesota 55427

May 2019

WEST Inc.

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REPORT REFERENCE

Kreger, A., and A. Suehring. 2019. Avian Use Study, Walleye Wind Energy Project, Rock County, Minnesota Year 1 Report January 2018 – December 2018. Prepared for Walleye Wind Project, LLC, Minneapolis, Minnesota. Prepared by Western EcoSystems Technology, Inc. (WEST), Golden Valley, Minnesota. May 2019.

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1 INTRODUCTION

Walleye Wind Project, LLC (Walleye) is developing the Walleye Wind Energy Project (Project) in Rock County, Minnesota (Figure 1)[1]. Walleye contracted Western EcoSystems Technology, Inc. (WEST) to conduct pre-construction baseline surveys to estimate temporal and spatial avian use of the Study Area (area where surveys were conducted). Methods were consistent with the US Fish and Wildlife Service (USFWS) *Eagle Conservation Plan Guidance* (ECPG; USFWS 2013), the USFWS *Land-Based Wind Energy Guidelines* (USFWS 2012), and Minnesota Department of Natural Resources (MNDNR) *Avian and Bat Survey Protocols for Large Wind Energy Conversion Systems in Minnesota* (MNDNR 2012).

Study objectives assessed: 1) species composition, relative abundance, and diversity; 2) overall avian use, percent of use, and frequency of occurrence; 3) flight height; and 4) spatial use for large and small birds. Additional objectives documented use of the Study Area by threatened, endangered, and sensitive bird species and eagles. This report describes the results of the avian use study that was conducted at the Study Area from January 29, 2018 – December 17, 2018.

2 STUDY AREA

The Study Area encompasses 15,954 hectares (39,424 acres) in Rock County, Minnesota (Figure 1). The Study Area falls within the Western Corn Belt Plains Ecoregion, which encompasses southern Minnesota (US Environmental Protection Agency 2017). The Western Corn Belt Plains Ecoregion is composed of glaciated till plains and undulating loess plains. Much of the region was originally dominated by tall-grass prairie, riparian forest, oak-prairie savannas, and brushy and herbaceous wetlands. Today, most of the area has been cleared for agricultural production and consists of cultivated cropland (Figure 2). Many smaller streams in this ecoregion have been tilled, ditched and tied into existing drainage systems, which has caused a reduction in the amount of aquatic habitat.

[1] The current Project Area depicted on Figure 1 represents the current likely buildable area, and the current Study Area represents the total area where surveys were conducted.

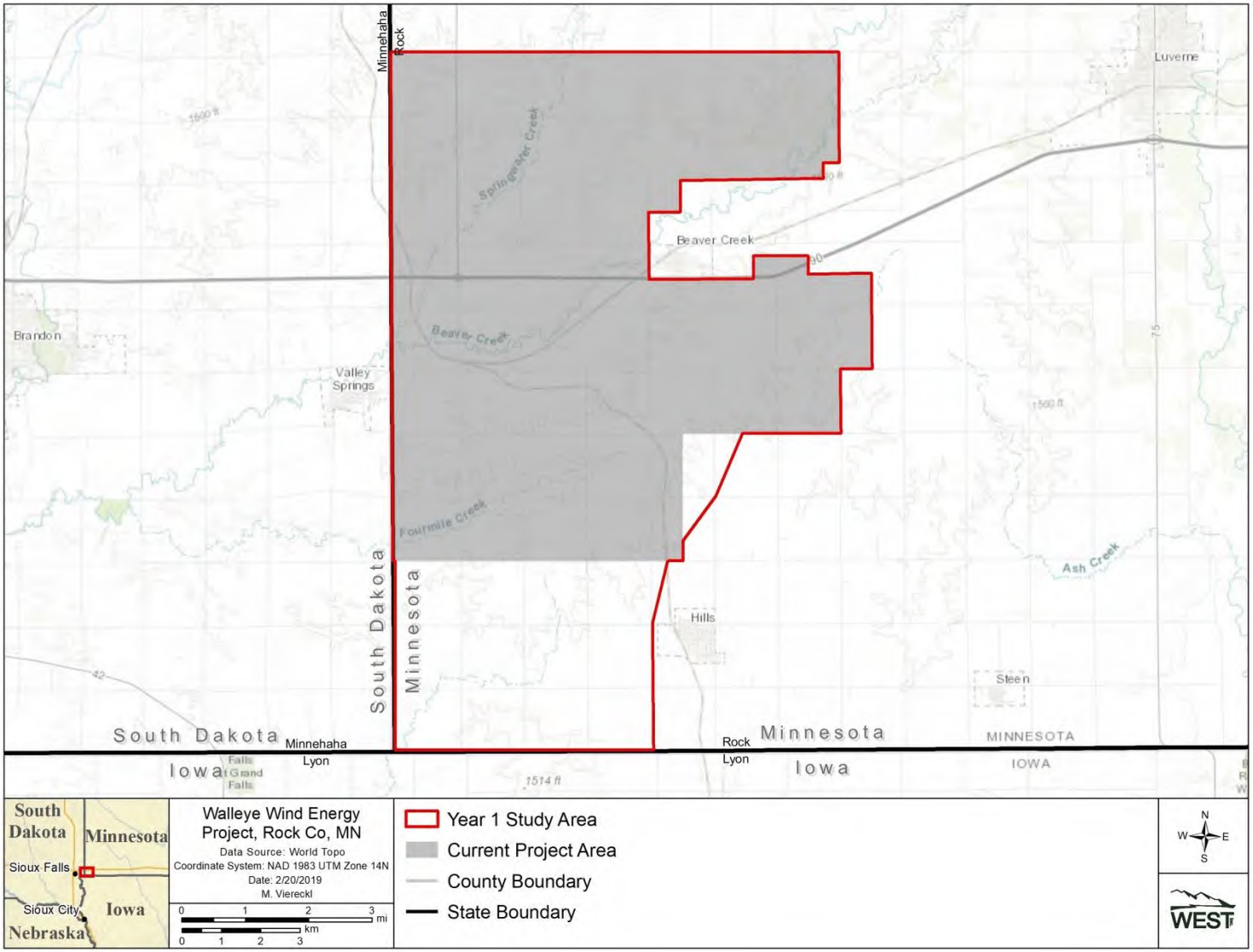

Figure 1. Location of the Walleye Wind Energy Project Study Area in Rock County, Minnesota.

According to the 2011 National Land Cover Database (NLCD; US Geological Survey [USGS] NLCD 2011, Homer et al. 2015), the majority of the Study Area consists of cultivated cropland (83.8%), followed by hay/pasture (6.7%), developed open space (5.6%), and herbaceous (2.2%); other land cover types compose less than 1.0% of the Study Area and include developed low intensity, deciduous forest, emergent herbaceous wetlands, developed medium intensity, open water, barren land, shrub/scrub, and developed high intensity (Table 1; Figure 2).

Table 1. National Land Cover Database (NLCD) land cover types within the Walleye Wind Energy Project Study Area, Rock County, Minnesota.

Cover Type	Hectares	Acres	% Composition
Cultivated Crops	13,362	33,018	83.8
Hay/Pasture	1,061	2,622	6.7
Developed, Open Space	889	2,197	5.6
Herbaceous	347	858	2.2
Developed, Low Intensity	94	233	0.6
Deciduous Forest	90	223	0.6
Emergent Herbaceous Wetlands	63	155	0.4
Developed, Medium Intensity	27	68	0.2
Open Water	9	23	0.1
Barren Land	8	20	0.1
Shrub/Scrub	1	3	<0.1
Developed, High Intensity	1	2	<0.1
Total[a]	**15,954**	**39,424**	**100**

Source: 2011 NLCD (US Geological Survey NLCD 2011, Homer et al. 2015).

[a] Sums may not total values shown due to rounding.

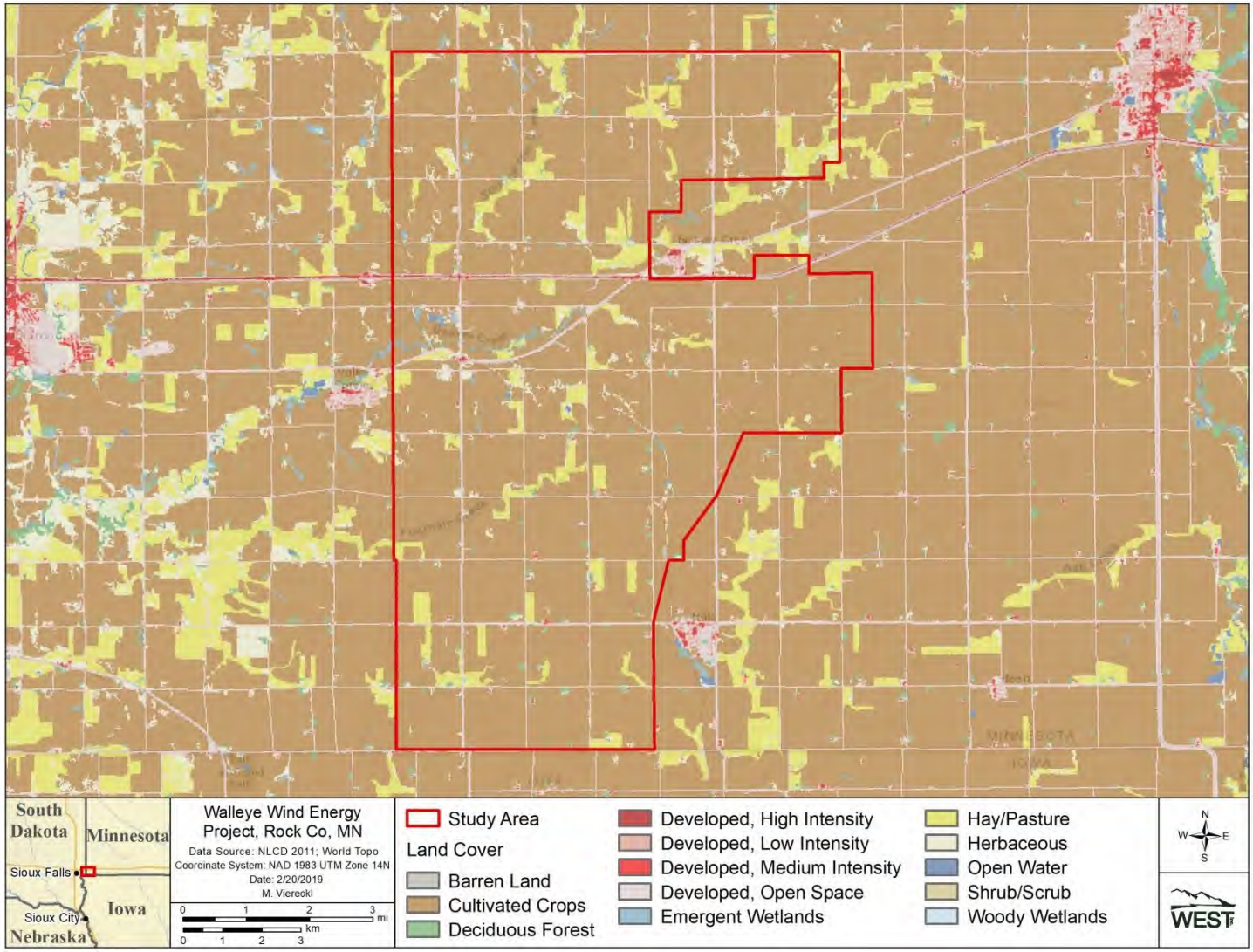

Figure 2. The land cover types within and adjacent to the Walleye Wind Energy Project Study Area in Rock County, Minnesota, (US Geological Survey National Land Cover Database 2011, Homer et al. 2015).

3 METHODS

3.1 Fixed-Point Bird Use Surveys

Fixed-point bird use surveys were conducted using methods described by Reynolds et al. (1980). Twenty-four[2] observation points consisting of 800-meter (m; 2,625-foot [ft]) radius circular plots were established within the Study Area. Circular plots covered approximately 30% of the Study Area (Figure 3). Observation points (the center of the 800-m plot) were separated by at least 1,600 m (5,249 ft) to avoid overlap and were located along public roads using a systematic sampling scheme with a random start in ArcGIS (a Geographic Information System software program).

Fixed-point bird use surveys were conducted once per month from January 29 – December 17, 2018, with seasons defined as: winter (January 29 – February 28 and December 1 – December 17), spring (March 1 – May 31), summer (June 1 – August 31), and fall (September 1 – November 30). Surveys were conducted during daylight hours; survey periods were varied to cover approximately all daylight hours during a season. Observation points were planned to be surveyed the same number of times. Surveys were missed on occasion due to poor visibility as a result of weather conditions or site access issues (e.g., sub-zero temperatures or impassable roads).

Separate surveys were conducted for large and small birds. Large bird surveys consisted of a 60-minute (min) survey period. During the first 20 min of the survey, all large bird species observed were recorded; during the remaining 40 min of the survey period, only eagles were recorded. The first 20 min of the 60-min survey period allowed for comparison of diurnal raptor use with other wind energy facilities in the region, while the full 60-min eagle use survey was consistent with the ECPG and was used to obtain a robust dataset with which to evaluate eagle use and potential collision risk. A separate 10-min small bird survey was conducted immediately prior to the 60-min large bird survey, during which time only small birds were recorded. Large birds included waterbirds, waterfowl, rails and coots, grebes and loons, gulls and terns, shorebirds, diurnal raptors, owls, vultures, upland game birds, doves and pigeons, large corvids (i.e., ravens, magpies, and crows), some cuckoos, and goatsuckers. Small birds were defined as cuckoos, hummingbirds, swifts, woodpeckers, and passerines.

All large and small birds seen were recorded during each survey using a unique observation number, regardless of distance from the observer. In some cases, observations represented repeated sightings of the same individual. Observations of large birds outside the 800-m plot, and of small birds outside the 100-m plot, were recorded. These data were included in the

[2] Points 1-5 were surveyed for the entire duration of the study (January – December, 2018). A Project boundary change in October 2018 resulted in the addition of 10 survey points (points 13-22; surveyed October – December, 2018) and the discontinuation of seven survey points (points 6-12; surveyed January – October, 2018). An additional boundary change in November 2018 resulted in the addition of two survey points (points 23 and 24; surveyed November – December, 2018).

development of species composition, relative abundance, and species diversity metrics, but were not included in analyses of avian use and flight heights.

The following information was recorded during each survey:

- date
- start and end time
- weather (i.e., temperature, wind speed, wind direction, precipitation, and cloud cover).

Additionally, the following data were recorded for each observation:

- Species (or best possible identification)
- number of individuals
- distance from observer (initial and closest)
- flight height above ground (initial, lowest, and highest)
- flight direction
- behavior (e.g., soaring, perched)

Approximate flight height and distance from plot center at first observation were recorded to the nearest 5-m (16-ft) interval.

Bald eagle (*Haliaeetus leucocephalus*) and golden eagle (*Aquila chrysaetos*) observations were recorded at 1-min intervals documenting when an eagle was within the 800-m plot and at or below 200-m (656-ft) above ground level, per the ECPG (i.e., eagle risk minutes). Flight height, distance, and activity (i.e., flying or perched) were also recorded during each 1-min interval. Eagles observed outside of plots or at heights greater than 200-m were recorded, but not included in the eagle risk minute analyses. The perch locations and flight paths of eagles were mapped to qualitatively assess areas of eagle use within the Study Area.

3.2 Incidental Wildlife Observations

Incidental observations provide records of avian use within the Study Area that were documented outside of the standardized surveys (e.g., large bird observations that did not occur within the 60-min survey window, particularly of sensitive or unique species). Incidental observations of sensitive species, rare species or behavior observations, and other notable birds were recorded in a similar fashion to standardized surveys; the observation number, date, time, species, number of individuals, sex/age class, distance from observer, activity, and flight height above ground were recorded. Biologists recorded the location of sensitive species by Universal Transverse Mercator coordinates using a hand-held Global Positioning System unit. Sensitive species include those listed on the federal Endangered Species Act of 1973, the Migratory Bird Treaty Act of 1918, those listed as threatened or endangered by the MNDNR (2018), and those designated as sensitive species by the MNDNR (2015).

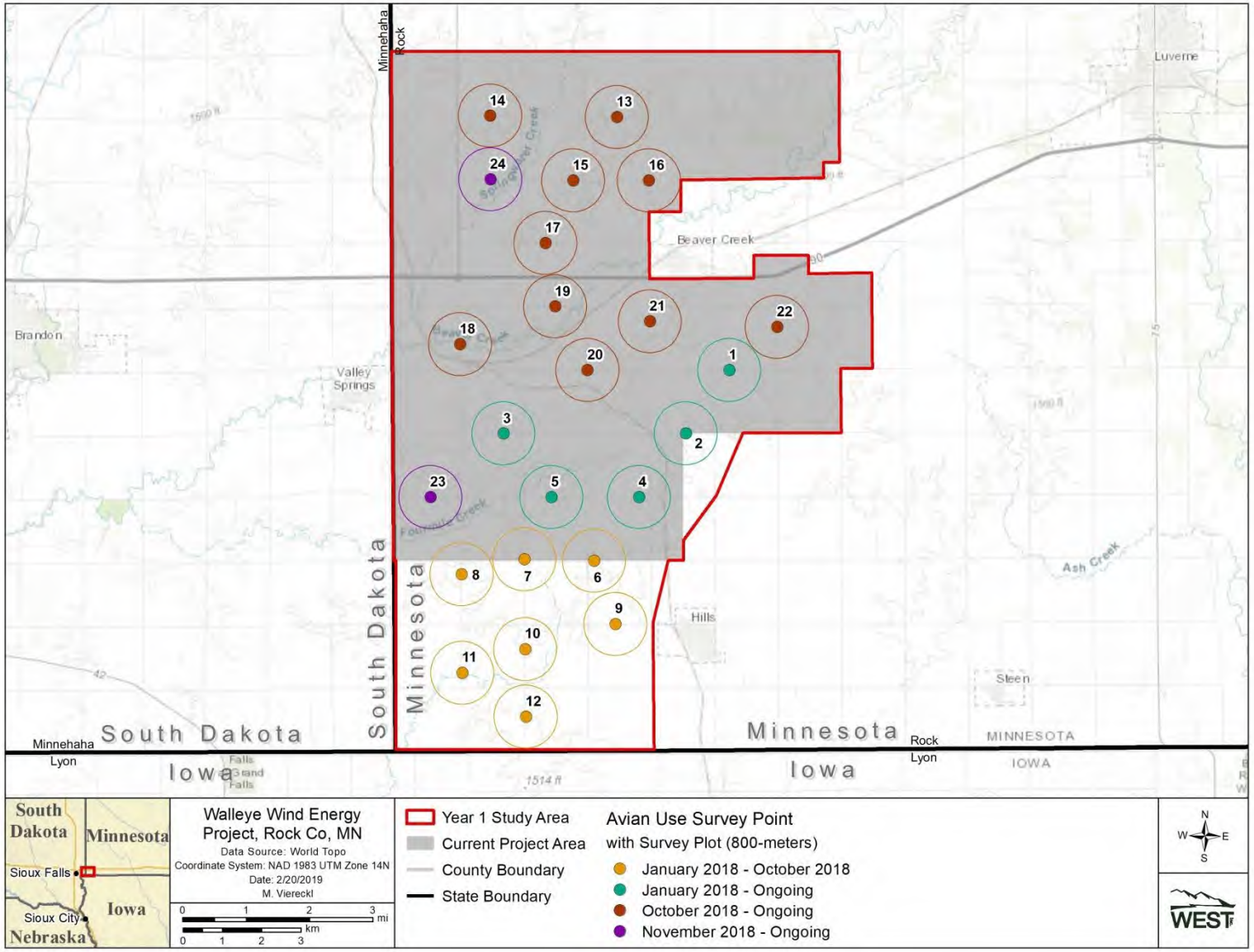

Figure 3. Locations of fixed-point bird use survey plots at the Walleye Wind Energy Project Study Area where surveys were conducted from January 29 – December 17, 2018.

3.3 Quality Assurance and Quality Control

Quality assurance and quality control (QA/QC) measures were implemented at all stages of the study, including in the field, during data entry and analysis, and report writing. Following field surveys, observers were responsible for inspecting data forms for completeness, accuracy, and legibility. A data technician then compared a sample of records from an electronic database to the raw data forms and corrected any errors. Irregular codes or data suspected as questionable were discussed with the observer or project manager. Errors, omissions, or problems identified in later stages of analysis were traced back to the raw data forms, and appropriate changes in all steps were made.

A Microsoft® SQL Server database was employed to store, organize, and retrieve survey data. Data were keyed into the electronic database using a pre-defined format to facilitate subsequent QA/QC and data analysis. All data forms and electronic data files were retained for reference. QA/QC measurements implemented for report writing included review of the final document by a technical editor, statistician, peer (research biologist), project manager, and senior manager.

4 DATA ANALYSIS

For analysis purposes, a visit was defined as the required length of time, in days, to survey all of the plots once within the Study Area. Visits were assigned according to the following criteria: a single visit had to be completed in a single season, and a visit could be spread across multiple dates, but a single date could not contain surveys from multiple visits.

4.1 Species Composition, Relative Abundance, and Diversity

Species composition (i.e., species and bird types observed during the surveys) and relative abundance (i.e., number of observations and groups of each species and bird type by season), and diversity (i.e., total number of species observed within each season) were compiled for all birds observed during the bird use surveys, irrespective of distance from observer (i.e., includes incidental observations). In addition, percent composition for each bird type was calculated by total percent of bird observations and total percent of bird observations by season to assess percent composition of bird types based on all bird observations, regardless of distance from observer. Species richness was calculated as the number of species per 800-m plot per survey for large birds and per 100-m plot for small birds, and then averaged across plots within each visit, followed by averaging across visits within a season. Overall species richness was calculated as a weighted average of seasonal values by the number of days in each season.

4.2 Bird Use, Percent of Use, and Frequency of Occurrence

Large bird use was calculated as the number of birds/800-m plot/20-min survey, and small bird use was calculated as the number of birds/100-m plot/10-min survey. Bird use was calculated by season by first summing the number of birds seen within each plot during a visit, then averaging the number of birds/plot across plots within each visit, and finally by averaging the number of birds/visit across visits within the season. Overall bird use was calculated as a weighted average of seasonal values by the number of calendar days in each season (as defined by the season

dates). Percent of use was calculated as the proportion of large bird use that was attributable to a particular bird type or species, and frequency of occurrence was calculated as the percent of surveys in which a particular bird type or species was observed.

Separate annual and seasonal estimates of eagle use were calculated for the full 60-min eagle survey period using the metric of eagle minutes. Consistent with guidance provided in the ECPG (USFWS 2013), eagle minutes are defined as the number of minutes (rounded to the next highest integer) an eagle is observed flying within the zone of risk (ZOR; defined for eagles as within 800 m of the observer and below 200 m [656 ft] above ground level) during the survey period.

4.3 Flight Height

Flight height data were used to identify the bird species and estimated bird use within an estimated rotor-swept height (RSH) ranging from 25-150 m (82-492 ft) above ground level. The group's (defined as a single bird or a flock of two or more individuals) flight height when first observed was used to calculate the percentage of the different groups flying at different height categories: below the RSH at zero to 25 m, within the RSH at 25-150 m, and above the RSH at 150 m.

4.4 Spatial Use

Spatial use was evaluated by comparing large bird use among plots. In addition, eagle and diurnal raptor flight paths were mapped to qualitatively show flight locations and flight direction within the survey plots. Aerial imagery was used to aid in recording flight path observations accurately.

5 RESULTS

5.1 Fixed-Point Bird Use Surveys

A total of 163 large bird surveys and 163 small bird surveys were completed at the Study Area over the course of 12 visits conducted from January 29 – December 17, 2018 (Tables 2a and 2b). This included approximately 54 hours of survey time for all large birds, 163 hours of survey time for eagles, and 27 hours of survey time for small birds. Two separate viewsheds and survey periods were used when calculating species richness, use, percent composition, percent frequency, and exposure index for large and small birds: an 800-m plot and 20-min survey period for large birds and a 100-m plot and 10-min survey period for small birds. Results pertaining to eagles, recorded during the full 60-min survey period (i.e., eagle minutes), are presented separately in Section 5.1.4.

5.1.1 Species Composition, Relative Abundance, and Diversity

During fixed-point bird use surveys, a total of 673 large bird observations in 205 groups and 935 small birds in 358 groups were documented during fixed-point bird use surveys (Appendices A1 and A2). The most commonly recorded large bird type was doves/pigeons (235 observations), which composed 34.9% of overall large bird observations (Appendix A1). The majority of dove/pigeon observations were rock pigeon (*Columba livia*; 197 observations in 38 groups). The second most-abundant large bird type was large corvids with 210 observations in 50 groups, comprising solely American crow (*Corvus brachyrhynchos*). Other large bird types observed

during surveys included waterfowl (108 observations), diurnal raptors (43 observations), shorebirds (33 observations), upland game birds (18 observations), vultures (12 observations), waterbirds (seven observations), gulls/terns (six observations), and owls (one observation). Small bird observations were dominated by passerine species (Appendix A2). The most commonly observed passerine was the horned lark (*Eremophila alpestris*) with a total of 271 observations in 33 groups. The majority of horned lark observations occurred during spring (141 observations in 14 groups).

Eight diurnal raptor species were identified during large bird surveys: red-tailed hawk (*Buteo jamaicensis*; 17 observations), Swainson's hawk (*Buteo swainsoni*; 10 observations), Cooper's hawk (*Accipiter cooperii*; three observations), northern harrier (*Circus hudsonius*; four observations), bald eagle (two observations), sharp-shinned hawk (*Accipiter striatus*; one observation), broad-winged hawk (*Buteo platypterus*; one observation), and American kestrel (*Falco sparverius*; one observation; Appendix A1). Additionally, one unidentified accipiter (*Accipiter* spp.), two unidentified buteos (*Buteo* spp.), and one unidentified raptor were recorded during surveys (Appendix A1). Diurnal raptor observations were most common during fall (21 observations), followed by spring (15), and summer (seven). No diurnal raptors were observed during winter. The two bald eagle observations that were documented during the 20-min large bird surveys were recorded during fall; additional information on eagle observations is presented in Section 5.1.4.

Most small birds recorded were passerines (927 observations in 352 groups), with grassland/sparrows composing a majority (49.6%) of passerine observations (Appendix A2). Other small bird types recorded during surveys included woodpeckers (three observations), swifts/hummingbirds (one observation), and four unidentified small birds.

In total, 30 large bird species and 47 small bird species were identified during fixed-point bird use surveys (Tables 2a and 2b). Large bird species richness was highest during summer (1.40 species/800-m plot/20-min survey), followed by spring (1.33), fall (1.10), and winter (0.47; Table 2a). Small bird species richness was highest during summer (3.78 species/100-m plot/10-min survey), followed by spring (2.11), fall (0.94), and winter (0.30; Table 2b).

Table 2a. Summary of large bird species richness (species/800-meter plot/20-minute survey), and sample size by season and overall recorded during fixed-point bird use surveys at the Walleye Wind Energy Project Study Area from January 29 – December 17, 2018.

Season	Visits	# Surveys Conducted	# Species	Large Bird Species Richness
Winter	3	41	4	0.47
Spring	3	36	20	1.33
Summer	3	35	14	1.40
Fall	3	51	16	1.10
Overall	**12**	**163**	**30**	**1.08**

Table 2b. Summary of small bird species richness (species/100-meter plot/10-minute survey), and sample size by season and overall recorded during fixed-point bird use surveys at the Walleye Wind Energy Project Study Area from January 29 – December 17, 2018.

Season	Visits	# Surveys Conducted	# Species	Small Bird Species Richness
Winter	3	41	3	0.30
Spring	3	36	26	2.11
Summer	3	35	34	3.78
Fall	3	51	18	0.94
Overall	**12**	**163**	**47**	**1.79**

5.1.2 Bird Seasonal Use, Percent of Use, and Frequency of Occurrence

Large bird use (observations/800-m plot/20-min survey) was highest during fall (6.26), followed by spring (5.42), winter (2.77), and summer (2.40; Table 3). Higher use in fall was largely attributed to use by doves/pigeons (2.64 observations/800-m plot/20-min survey in fall) and large corvids (2.25). Rock pigeon accounted for the majority of dove/pigeon use during fall (2.56 observations/800-m plot/20-min survey; Appendix B1). Small bird use was highest during summer (7.37 observations/100-m plot/10-min survey), followed by spring (6.94), fall (5.66), and winter (2.07; Table 3). Small bird use in all seasons was primarily influenced by passerines (Table 3, Appendix B2).

5.1.2.1 Waterbirds

Waterbird use was highest during spring (0.17 observations/800-m plot/20-min survey), followed by fall (0.02); waterbird use was not documented during summer or winter (Table 3; Appendix B1). Waterbird use accounted for 3.1% of large bird use in spring and 0.3% in fall. Great blue heron (*Ardea herodias*) accounted for all waterbird use during fall, and American white pelican (*Pelecanus erythrorhynchos*) accounted for all waterbird use during spring (Appendix B1). Waterbird use was documented more frequently during spring (2.8% of surveys) than fall (2.0% of surveys; Table 3).

5.1.2.2 Waterfowl

Waterfowl use was highest during spring (2.58 observations/800-m plot/20-min survey), followed by fall (0.33), and summer (0.09; Table 3; Appendix B1). Waterfowl use was not documented during winter (Table 3). Among large bird types, waterfowl accounted for the most large bird use in spring (47.7%; Table 3). Snow goose (*Chen caerulescens*) use accounted for the majority (45.1%) of large bird use in spring (Appendix B1). Waterfowl accounted for 5.3% of large bird use during fall and 3.8% during summer. Waterfowl were observed more frequently during spring (11.1% of surveys), followed by fall (5.6%), and summer (3.0%).

5.1.2.3 Shorebirds

Shorebird use in the Study Area was highest in fall (0.61 observation/800-m plot/20-min survey), followed by summer (0.17), and spring (0.14); shorebird use was not documented during winter (Table 3). Shorebird use composed 9.8% of large bird use in fall, 7.2% in summer, and 2.6% in spring. Shorebird use was documented during 14.4% of summer surveys, 11.1% of spring surveys, and 5.6% of fall surveys. Killdeer (*Charadrius vociferus*) use was the most commonly

documented among shorebirds during summer and spring; unidentified shorebird use and killdeer use were the most commonly documented during fall (Appendix B1).

5.1.2.4 Gulls/Terns

Use of the Study Area by gulls/terns was only documented in spring (0.17 observation/800-m plot/20-min survey); gulls/tern use was not observed during summer, fall, and winter (Table 3, Appendix B1). Gull/tern use accounted for 3.1% of large bird use in spring, and use was documented during 8.3% of spring surveys. Ring-billed gull (*Larus delawarensis*) use and Franklin's gull (*Leucophaeus pipixcan*) use were the only two gull species documented (Appendix B1).

5.1.2.5 Diurnal Raptors

Use of the Study Area by diurnal raptors was highest during spring (0.42 observation/800-m plot/20-min survey), followed by fall (0.34), and summer (0.20); diurnal raptor use was not documented during winter (Table 3). Diurnal raptor use composed 8.4% of large bird use in summer, 7.7% in spring, and 5.5% in fall. Diurnal raptor use was documented most frequently during fall (26.2% of surveys), followed by spring (25.0%), and summer (20.2%).

Use of the Study Area by accipiters was documented during spring (0.06 observation/80-m plot/20-min survey), summer (0.03), and fall (0.03; Table 3). Accipiter use composed 1.2% of large bird use during summer, 1.0% during spring, and 0.6% during fall.

Use of the Study Area by buteos was highest in spring (0.33 observation/80-m plot/20-min survey), followed by fall (0.21), and summer (0.17; Table 3). Red-tailed hawk composed the majority of buteo use in spring and fall; Swainson's hawk use composed the majority of buteo use in summer (Appendix B1). Buteo use composed between 3.3% and 7.3% of large bird use among seasons when buteo use was documented (Table 3). Buteo use was observed during 22.2% of spring surveys, 17.8% of fall surveys, and 17.4% of summer surveys.

Use of the Study Area by northern harriers was only documented during fall (0.07 observation/800-m plot/20-min survey; Table 3). Northern harrier use composed 1.1% of overall large bird use during fall, and use was documented during 7.0% of fall surveys.

The only eagle species recorded during surveys was bald eagle (Appendix B1). During the 20-min large bird surveys, use of the Study Area by bald eagles was only documented during fall (0.02 observation/800-m plot/20-min survey). Bald eagle use composed 0.2% of overall large bird use during fall, and use was documented during 1.5% of fall surveys (Table 3).

Use of the Study Area by falcons was relatively low during spring (0.03 observation/800-m plot/20-min survey); falcon use was not documented during any other season (Table 3). Falcon use composed 0.5% of overall large bird use during spring, and use was documented during 2.8% of spring surveys.

Use of the Study Area by other raptors (i.e., unidentified raptors) was relatively low during fall (0.02 observation/800-m plot/20-min survey); other raptor use was not documented during other seasons (Table 3). Overall large bird use was composed of 0.2% use by other raptors during fall, and other raptor use was documented during 1.5% of fall surveys.

5.1.2.6 Owls

Owl use, consisting solely of short-eared owl (*Asio flammeus*) use, was only documented during spring (0.03 observation/800-m plot/20-min survey; Table 3, Appendix B1). Owl use composed 0.5% of overall large bird use during spring, and use was documented during 2.8% of spring surveys (Table 3).

5.1.2.7 Vultures

Vulture use (i.e., turkey vultures [*Cathartes aura*]) was highest in spring (0.25 observation/800-m plot/20-min survey), followed by summer (0.09); vulture use was not recorded during fall or winter (Table 3, Appendix B1). Vulture use accounted for 4.6% of large bird use in spring and 3.6% in summer. Vulture use was observed during 13.9% of spring surveys and 8.6% of summer surveys (Table 3).

5.1.2.8 Upland Game Birds

Use of the Study Area by upland game birds was documented during every season, and was highest during summer (0.34 observation/800-m plot/20-min survey), followed by fall (0.06), spring (0.03), and winter (0.02; Table 3). Upland game bird use represented 14.1% of large bird use in summer, 1.0% in fall, 0.7% in winter, and 0.5% during spring. Upland game bird use was observed during 16.9% of summer surveys, 2.8% of spring surveys, 2.0% of winter surveys, and 1.5% of fall surveys. Ring-necked pheasant (*Phasianus colchicus*) use represented the majority of use by upland game birds in all seasons; unidentified gamebird use was also documented (Appendix B1).

5.1.2.9 Doves/Pigeons

Use of the Study Area by doves/pigeons was documented during every season, and use was highest during fall (2.64 observations/800-m plot/20-min survey), followed by winter (1.61), summer (1.13), and spring (0.31; Table 3). Dove/pigeon use represented 58.2% of large bird use in winter, 47.3% in summer, 42.2% in fall, and 5.6% in spring. Dove/pigeon use was observed during 48.2% of summer surveys, 36.1% of fall surveys, 21.7% of winter surveys, and 16.7% of spring surveys. Doves/pigeons included Eurasian collared-doves (*Streptopelia decaocto*), mourning doves (*Zenaida macroura*), and rock pigeons (Appendix B1).

5.1.2.10 Large Corvids

Use of the Study Area by large corvids (i.e., American crow) was highest in fall (2.25 observations/800-m plot/20-min survey), followed by spring (1.33), winter (1.14), and summer (0.37; Table 3, Appendix B1). Large corvid use accounted for 41.1% of large bird use in winter, 35.9% in fall, 24.6% in spring, and 15.6% in summer (Table 3). Large corvid use was documented

during 30.6% of spring surveys, 26.1% of fall surveys, 23.4% of winter surveys, and 14.6% of summer surveys.

5.1.2.11 Passerines

Use of the Study Area by passerines was highest during summer (7.31 observations/100-m plot/10-min survey), followed by spring (6.92), fall (5.58), and winter (2.05; Table 3). Passerine use represented 99.6% of small bird use in spring, 99.2% in summer, 99.1% in winter, and 98.7% in fall. Passerine use was observed most frequently during summer (91.4% of surveys), followed by spring (61.1%), fall (59.7%), and winter (28.4%; Table 3).

5.1.2.12 Swifts/Hummingbirds

Use of the Study Area by swifts/hummingbirds (i.e., chimney swift [*Chaetura pelagica*]) was only documented during spring (0.03 observation/100-m plot/10-min survey; Table 3, Appendix B2). Swift/hummingbird use accounted for 0.4% of small bird use during spring, and use was documented during 2.8% of spring surveys (Table 3).

5.1.2.13 Woodpeckers

Use of the Study Area by woodpeckers was highest in summer (0.03 observation/100-m plot/10-min survey), followed by fall and winter (0.02; Table 3). No woodpecker use was observed during spring. Woodpecker use composed 0.9% of small bird use in winter, 0.4% in summer, and 0.3% in fall. Woodpecker use was observed most frequently during summer (2.8% of surveys), followed by winter (2.0%), and fall (1.5%; Table 3).

Table 3. Mean bird use (number of birds/plot[a]/survey[b]), percent of total use (%), and frequency of occurrence (%) for each bird type and diurnal raptor subtype by season recorded during fixed-point bird use surveys at the Walleye Wind Energy Project Study Area from January 29 – December 17, 2018.

	Mean Use				% of Use				% Frequency			
Type/Subtype	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**
Waterbirds	0	0.17	0	0.02	0	3.1	0	0.3	0	2.8	0	2.0
Waterfowl	0	2.58	0.09	0.33	0	47.7	3.8	5.3	0	11.1	3.0	5.6
Shorebirds	0	0.14	0.17	0.61	0	2.6	7.2	9.8	0	11.1	14.4	5.6
Gulls/Terns	0	0.17	0	0	0	3.1	0	0	0	8.3	0	0
Diurnal Raptors	0	0.42	0.20	0.34	0	7.7	8.4	5.5	0	25.0	20.2	26.2
Accipiters	*0*	*0.06*	*0.03*	*0.03*	*0*	*1.0*	*1.2*	*0.6*	*0*	*5.6*	*2.8*	*3.5*
Buteos	*0*	*0.33*	*0.17*	*0.21*	*0*	*6.2*	*7.3*	*3.3*	*0*	*22.2*	*17.4*	*17.8*
Northern Harrier	*0*	*0*	*0*	*0.07*	*0*	*0*	*0*	*1.1*	*0*	*0*	*0*	*7.0*
Eagles	*0*	*0*	*0*	*0.02*	*0*	*0*	*0*	*0.2*	*0*	*0*	*0*	*1.5*
Falcons	*0*	*0.03*	*0*	*0*	*0*	*0.5*	*0*	*0*	*0*	*2.8*	*0*	*0*
Other Raptors	*0*	*0*	*0*	*0.02*	*0*	*0*	*0*	*0.2*	*0*	*0*	*0*	*1.5*
Owls	0	0.03	0	0	0	0.5	0	0	0	2.8	0	0
Vultures	0	0.25	0.09	0	0	4.6	3.6	0	0	13.9	8.6	0
Upland Game Birds	0.02	0.03	0.34	0.06	0.7	0.5	14.1	1.0	2.0	2.8	16.9	1.5
Doves/Pigeons	1.61	0.31	1.13	2.64	58.2	5.6	47.3	42.2	21.7	16.7	48.2	36.1
Large Corvids	1.14	1.33	0.37	2.25	41.1	24.6	15.6	35.9	23.4	30.6	14.6	26.1
Large Birds Overall[c]	**2.77**	**5.42**	**2.40**	**6.26**	**100**	**100**	**100**	**100**				
Passerines	2.05	6.92	7.31	5.58	99.1	99.6	99.2	98.7	28.4	61.1	91.4	59.7
Swifts/Hummingbirds	0	0.03	0	0	0	0.4	0	0	0	2.8	0	0
Woodpeckers	0.02	0	0.03	0.02	0.9	0	0.4	0.3	2.0	0	2.8	1.5
Unidentified Birds	0	0	0.03	0.06	0	0	0.4	1.0	0	0	2.8	2.0
Small Birds Overall[c]	**2.07**	**6.94**	**7.37**	**5.66**	**100**	**100**	**100**	**100**				

[a] 800-meter (m) radius plot for large birds; 100-m for small birds

[b] per 20-minute (min) survey for large birds; 10-min survey for small birds

[c] Sums of values may not add to total value shown due to rounding

5.1.3 Flight Height Characteristics

During 20-min large bird surveys, 155 groups (558 observations) were recorded flying within the 800-m radius survey plots (Table 4, Appendices C1 and C2). Of these, 13.3% were recorded flying at heights within the estimated RSH, based upon initial observation. Large bird types that were most often recorded in the RSH were waterbirds (85.7%) and gulls/terns (66.7%). Half (50.0%) of vulture observations were recorded flying within the RSH, while 41.7% were recorded below the RSH and 8.3% were recorded above the RSH. The majority (61.8%) of flying diurnal raptors were documented below the RSH. Among the diurnal raptor subtypes, eagles and falcons were most often recorded within the RSH (100%; one observation within each subtype). Waterfowl was the only bird type flying above the RSH for the majority of observations (81.5%).

During small bird surveys, 203 groups (601 observations) were recorded flying within the survey plots (Table 4). Of these, 16.8% were observed flying at heights within the estimated RSH; the remaining 83.2% were recorded flying below the RSH.

Table 4. Flight height characteristics by bird type[a] and diurnal raptor subtype recorded during fixed-point bird use surveys[b] at the Walleye Wind Energy Project Study Area from January 29 – December 17, 2018.

Bird Type	# Groups Flying	# Obs Flying	Mean Flight Height (m)	% Obs Flying	% within Flight Height Categories		
					0–25 m	25–150 m[c]	>150 m
Waterbirds	2	7	25.00	100	14.3	85.7	0
Waterfowl	7	108	87.71	100	14.8	3.7	81.5
Shorebirds	9	29	3.56	87.9	100	0	0
Gulls/Terns	3	6	47.00	100	33.3	66.7	0
Diurnal Raptors	33	34	44.52	81.0	61.8	32.4	5.9
Accipiters	*4*	*4*	*8.50*	*80.0*	*100*	*0*	*0*
Buteos	*23*	*24*	*52.09*	*80.0*	*54.2*	*37.5*	*8.3*
Northern Harrier	*3*	*3*	*12.00*	*75.0*	*100*	*0*	*0*
Eagles	*1*	*1*	*50.00*	*100*	*0*	*100*	*0*
Falcons	*1*	*1*	*150.00*	*100*	*0*	*100*	*0*
Other Raptors	*1*	*1*	*1.00*	*100*	*100*	*0*	*0*
Owls	1	1	1.00	100	100	0	0
Vultures	10	12	59.30	100	41.7	50.0	8.3
Upland Game Birds	3	6	1.00	33.3	100	0	0
Doves/Pigeons	53	193	11.98	82.1	92.2	7.8	0
Large Corvids	34	162	12.91	77.1	82.7	17.3	0
Large Birds Overall	**155**	**558**	**25.66**	**83.0**	**70.4**	**13.3**	**16.3**
Passerines	199	595	14.99	64.2	83.2	16.8	0
Swifts/Hummingbirds	1	1	80.00	100	0	100	0
Woodpeckers	1	1	1.00	33.3	100	0	0
Unidentified Birds	2	4	6.00	100	100	0	0
Small Birds Overall	**203**	**601**	**15.16**	**64.3**	**83.2**	**16.8**	**0**

[a] 800-meter (m) radius plot for large birds; 100-m for small birds

[b] per 20-minute (min) survey for large birds; per 10-min survey for small birds

[c] The likely "rotor swept height" for potential collision with a turbine blade, or 25–150 m (82–492 feet) above ground level

Obs = observations

5.1.4 Spatial Use

Overall, large bird use (observations/800-m plot/20-min survey) was highest at Point 18 (14.00) and Point 9 (12.20), primarily due to high dove/pigeon use at Point 18 (13.00) and high large corvid use at Point 9 (6.30; Figure 4a, Appendix D1). Large bird use was not recorded at points 13 and 16; use ranged from 0.50-10.67 observation/800-m plot/20-min survey at the remaining survey points.

Waterbird use was only documented at Point 9 (0.60 observation/800-m plot/20-min survey) and Point 15 (0.33); waterfowl use was documented at six points, and ranged from 0.09 observation/800-m plot/20-min survey at Point 2 to 5.00 at Point 7 (Appendix D1). Shorebird use was documented at seven points; use was greatest at Point 5 (1.67 observations/800-m plot/20-min survey). Gull/tern use was only documented at points 4, 6, and 2 (0.33, 0.10, and 0.09 observation/800-m plot/20-min survey, respectively).

Diurnal raptor use was observed at 16 survey points (Figure 4b, Appendix D1). Use was greatest at Point 21 (1.00 observation/800-m plot/20-min survey), and ranged from 0.09-0.67 at the remaining points where use was documented. Accipiter use was documented at five survey points, and ranged from 0.08 observation/800-m plot/20-min survey at points 5 and 3 to 0.10 at points 6 and 7. Buteo use was documented at the most survey points among diurnal raptors (13 survey points); buteo use ranged from 0.10 observation/800-m plot/20-min survey at Point 6 to 1.00 at Point 21. Northern harrier use was documented at three survey points, and ranged from 0.10 observation/800-m plot/20-min survey at Point 11 to 0.67 at Point 17. During the 20-min large bird surveys, eagle use was only documented at Point 11, which is outside of the current Project Area (0.10 observation/800-m plot/20-min survey; Figure 4c). Similar to eagle use, falcon use was also only documented at Point 11 (0.10 observation/800-m plot/20-min survey).

Owl use was only documented at Point 2, and use was relatively low (0.09 observation/800-m plot/20-min survey; Appendix D1). Vulture use was observed at five survey points. Vulture use was greatest at Point 5 (0.33 observation/800-m plot/20-min survey), and ranged from 0.10-0.30 at the remaining four points where use was documented. Upland gamebird use was documented at eight surveys points, and ranged from 0.08 observation/800-m plot/20-min survey at Point 5 to 1.33 at Point 19. Dove/pigeon use was documented at 19 survey points. Dove/pigeon use was greatest at Point 18 (13.00 observations/800-m plot/20-min survey), and ranged from 0.08-6.67 at the remaining survey points where use was documented. Large corvid use was documented at 17 survey points. Large corvid use was greatest at Point 9 (6.30 observations/800-m plot/20-min survey) and ranged from 0.08-4.40 at the remaining points where large corvid use was documented.

Flight paths mapped during large bird surveys provide some indication of general spatial use within the Study Area. Diurnal raptor flight paths recorded during the 20-min large bird surveys were relatively concentrated in the southern portion of the Study Area (Appendix E1). During the 60-min eagle surveys, bald eagle activity was generally recorded in the southern portion of the Study Area; however, relatively few flight paths were documented (Appendix E2).

Passerine use was observed at 20 survey points; use ranged from 0.33-27.00 observations/100-m plot/10-min survey (Appendix D2). Passerine use was greatest at Point 21. Swift/hummingbird use was only documented at Point 1 (0.08 observation/100-m plot/10-min survey). Woodpecker use was only documented at Point 19 (0.33 observation/100-m plot/10-min survey), and points 3 and 4 (0.08 at each point).

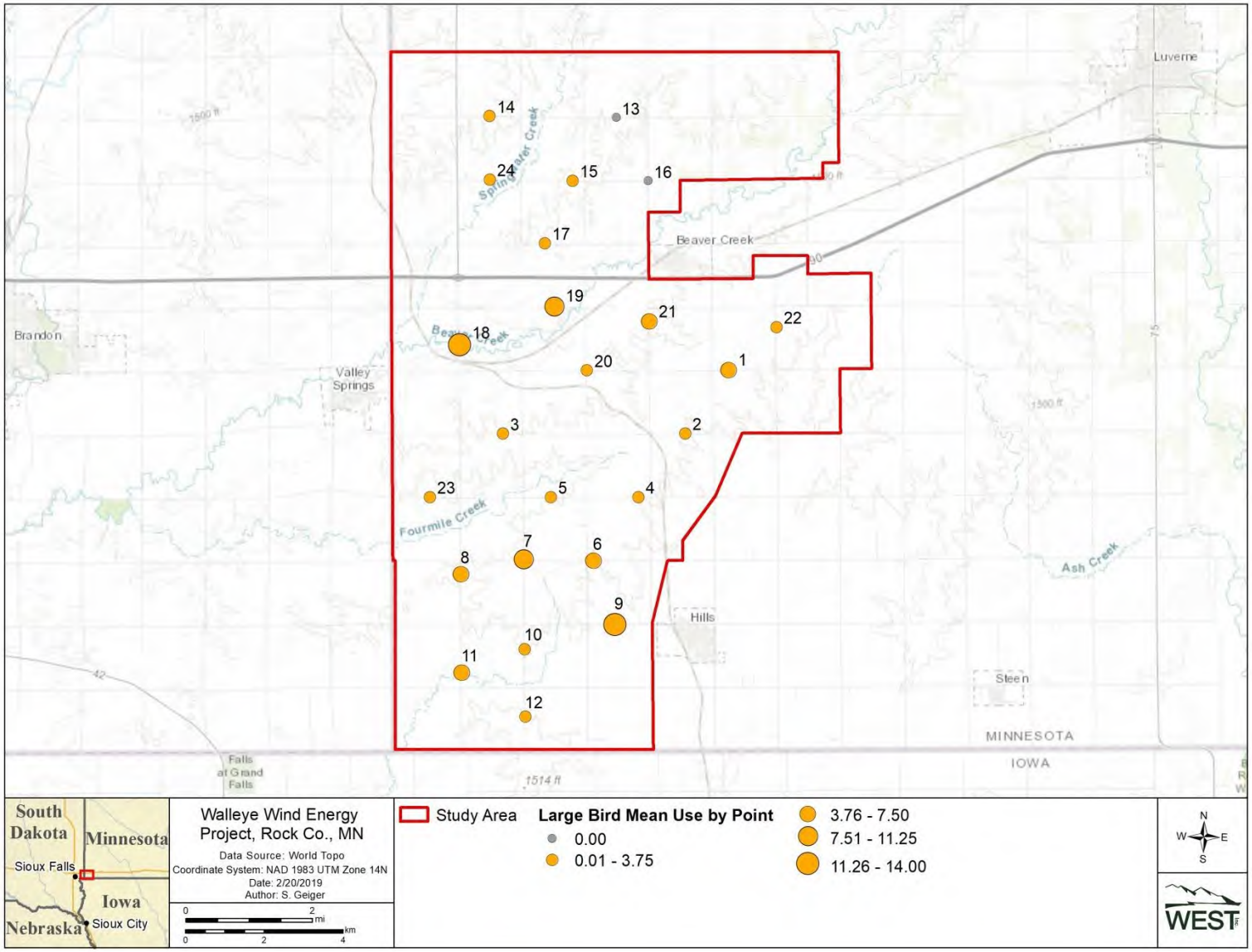

Figure 4a. Large bird use by observation point recorded during 20-minute large bird surveys at the Walleye Wind Energy Project Study Area from January 29 – December 17, 2018.

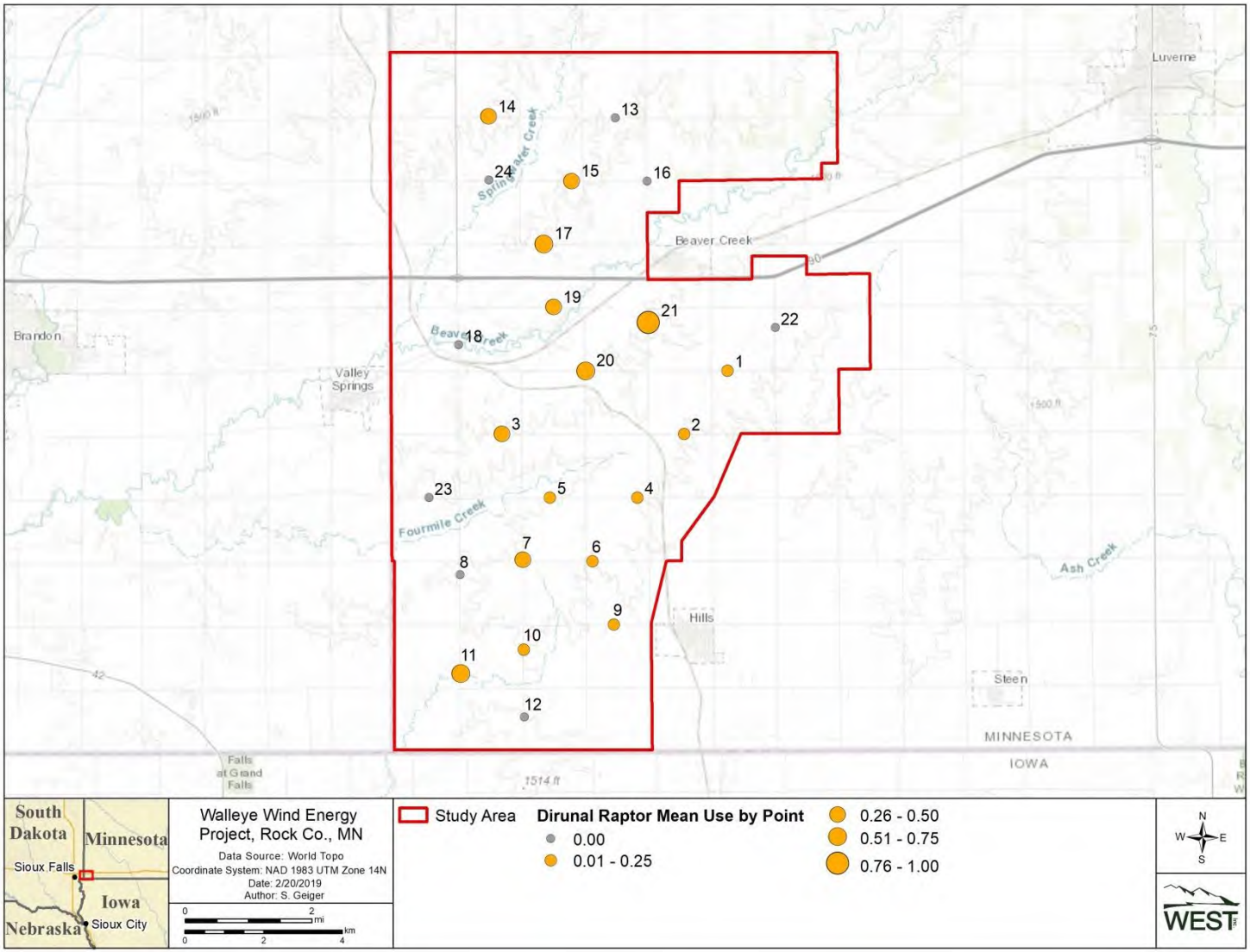

Figure 4b. Diurnal raptor use by observation point recorded during 20-minute large bird surveys at the Walleye Wind Energy Project Study Area from January 29 – December 17, 2018.

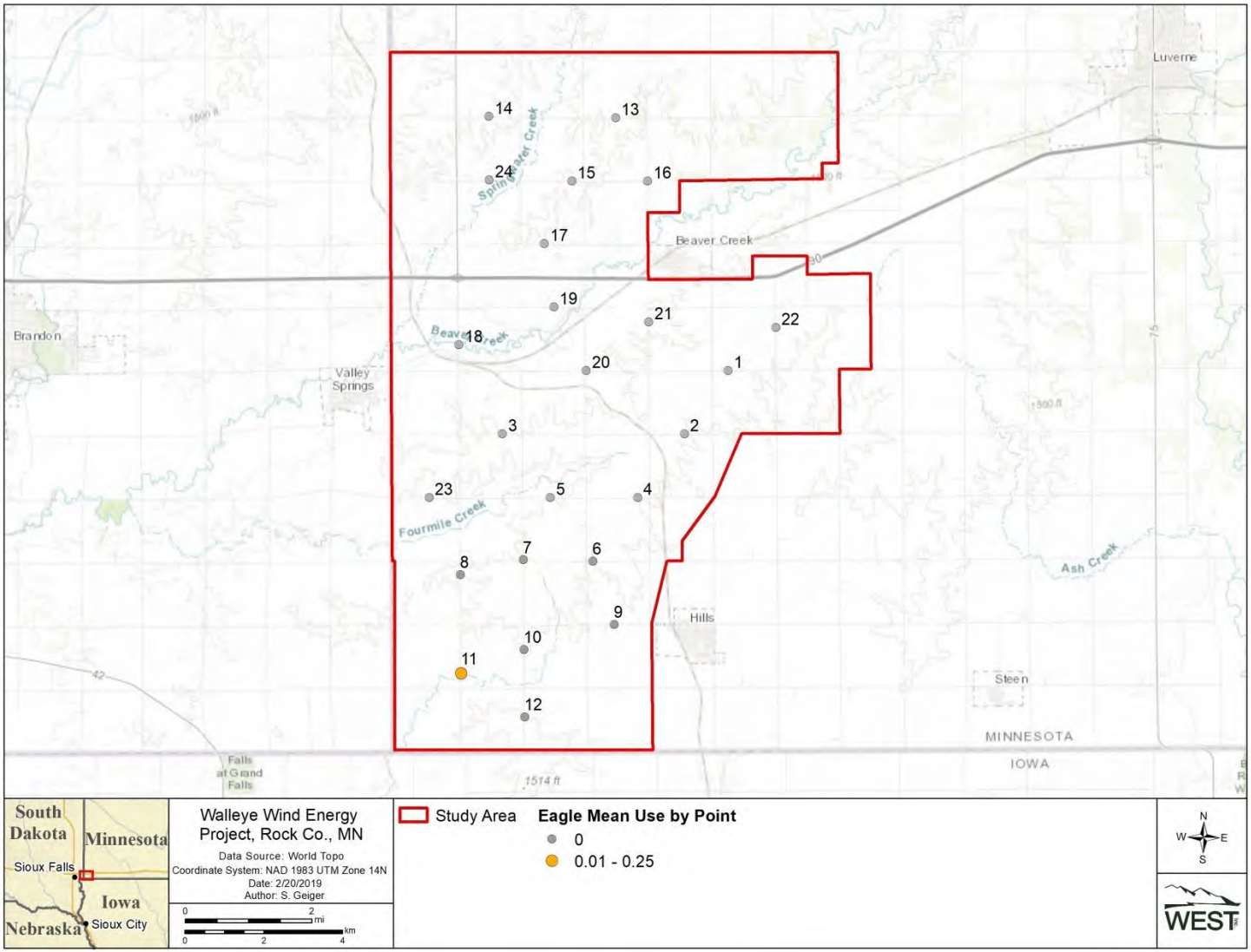

Figure 4c. Eagle use by observation point recorded during 20-minute large bird surveys at the Walleye Wind Energy Project Study Area from January 29 – December 17, 2018.

5.1.5 Eagle Minutes

Following the ECPG guidance for eagle use surveys, a total of 38 bald eagle minutes were documented during 163 hours of observation time, with the greatest number of total eagle minutes documented in October 2018 (25 eagle minutes; Tables 5 and 6). In total, six eagle minutes were documented in the ZOR; the majority of eagle minutes in the ZOR were recorded during October 2018 (four eagle minutes), followed by January and December 2018 (one eagle minute during each month; Table 5). Eagle minutes per minute of survey were greatest during fall (0.0013), followed by winter (0.0008; Table 6). No eagle minutes in the zone of risk were recorded during spring or summer. Most eagle minutes in the zone of risk were documented at Point 9 (three eagle minutes), followed by two points that are outside the current Project Area: Point 11 (two eagle minutes) and Point 19 (one eagle minute; Table 7).

Table 5. Bald eagle observations, total eagle minutes, and eagle minutes in the zone of risk by month recorded during 60-minute eagle surveys at the Walleye Wind Energy Project Study Area from January 29 – December 17, 2018.

Month/Year	Eagle Observations	Total Eagle Minutes	Eagle Minutes in Zone of Risk[a]
January 2018	2	3	1
February 2018	1	4	0
March 2018	0	0	0
April 2018	1	4	0
May 2018	0	0	0
June 2018	0	0	0
July 2018	0	0	0
August 2018	0	0	0
September 2018	0	0	0
October 2018	3	25	4
November 2018	0	0	0
December 2018	1	2	1
Total	**8**	**38**	**6**

[a] Bald eagles flying within 800 meters (m; 2,625 feet [ft]) of the observer and less than 200 m (656 ft) above ground level.

Table 6. Bald eagle minutes in the zone of risk and eagle minutes per minute of survey by season recorded during 60-minute eagle surveys at the Walleye Wind Energy Project Study Area from January 29 – December 17, 2018.

Season	Survey Hours	Survey Effort (Minutes)	Eagle Minutes in Zone of Risk[a]	Eagle Minutes per Minute of Survey
Winter[b] (1/29/18-2/28/18 & 12/1/18-12/17/18)	41	2,460	2	0.0008
Spring (3/1/18-5/31/18)	36	2,160	0	0
Summer (6/1/18-8/31/18)	35	2,100	0	0
Fall (9/1/18-11/30/18)	51	3,060	4	0.0013
Total	**163**	**9,780**	**6**	**0.0006**

[a] Bald eagles flying within 800 meters (m; 2,625 feet [ft]) of the observer and less than 200 m (656 ft) above ground level.

[b] Data combined for both seasons.

Table 7. Bald eagle minutes and eagle minutes in the zone of risk by point recorded during 60-minute eagle surveys at the Walleye Wind Energy Project Study Area from January 29 – December 17, 2018.

Survey Point	Total Eagle Minutes	Eagle Minutes in Zone of Risk[a]
1	4	0
2	0	0
3	0	0
4	0	0
5	4	0
6	0	0
7	0	0
8	0	0
9	24	3
10	0	0
11	4	2
12	0	0
13	0	0
14	0	0
15	0	0
16	0	0
17	0	0
18	0	0
19	2	1
20	0	0
21	0	0
22	0	0
23	0	0
24	0	0
Total	**38**	**6**

[a] Bald eagles flying within 800 meters (m; 2,625 feet [ft]) of the observer and less than 200 m (656 ft) above ground level.

5.2 Threatened, Endangered, and Sensitive Species Observations

No federally listed threatened or endangered species were observed during surveys or incidentally; however, sixteen sensitive species were observed (Table 8). Fifteen of these species were designated as Species of Greatest Conservation Need (SGCN; MNDNR 2015), while three of these species (American white pelican, Franklin's gull, and short-eared owl) were also designated as species of Special Concern (SPC; MNDNR 2015). The bald eagle, a species protected by the Bald and Golden Eagle Protection Act (BGEPA; 1940), was also documented (15 observations).

Table 8. Summary of sensitive species observed at the Walleye Wind Energy Project Study Area recorded during large bird (LB), eagle, and small bird (SB) surveys, or as incidental observations (Inc.) from January 29 – December 17, 2018.

			LB		Eagle[a]		SB		Inc.		Total	
Species	**Scientific Name**	**Status**	**# of grps**	**# of obs**	**# of grps**	**# of obs**	**# of grps**	**# of obs**	**# of grps**	**# of obs**	**# of grps**	**# of obs**
American kestrel	*Falco sparverius*	SGCN	2	2	0	0	0	0	5	6	7	8
American white pelican	*Pelecanus erythrorhynchos*	SGCN;SPC	1	6	0	0	0	0	0	0	1	6
bald eagle	*Haliaeetus leucocephalus*	BGEPA	0	0	8	8	0	0	6	7	14	15
bobolink	*Dolichonyx oryzivorus*	SGCN	0	0	0	0	7	10	0	0	7	10
brown thrasher	*Toxostoma rufum*	SGCN	0	0	0	0	1	1	0	0	1	1
chimney swift	*Chaetura pelagica*	SGCN	0	0	0	0	0	0	1	1	1	1
dickcissel	*Spiza americana*	SGCN	0	0	0	0	23	26	0	0	23	26
eastern meadowlark	*Sturnella magna*	SGCN	0	0	0	0	1	1	0	0	1	1
Franklin's gull	*Leucophaeus pipixcan*	SGCN;SPC	1	4	0	0	0	0	0	0	1	4
northern harrier	*Circus hudsonius*	SGCN	4	4	0	0	0	0	10	10	14	14
red-headed woodpecker	*Melanerpes erythrocephalus*	SGCN	0	0	0	0	1	1	0	0	1	1
sedge wren	*Cistothorus platensis*	SGCN	0	0	0	0	1	1	0	0	1	1
short-eared owl	*Asio flammeus*	SGCN;SPC	1	1	0	0	0	0	0	0	1	1
Swainson's hawk	*Buteo swainsoni*	SGCN	9	10	0	0	0	0	2	2	11	12
upland sandpiper	*Bartramia longicauda*	SGCN	3	3	0	0	0	0	0	0	3	3
western meadowlark	*Sturnella neglecta*	SGCN	0	0	0	0	13	21	0	0	13	21
Total	**16 species**		**21**	**30**	**8**	**8**	**47**	**61**	**24**	**26**	**100**	**125**

[a] The large-bird surveys were conducted during the first 20-minutes (min) of the 60-min eagle surveys; therefore, the count of eagle groups and observations documented during the 20-min large bird survey were included in the 60-min eagle survey columns.

SPC = Species of Special Concern, as designated in the Minnesota Wildlife Action Plan (2015)

SGCN = Species of Greatest Conservation Need, as designated in the Minnesota Wildlife Action Plan (2015)

BGEPA – Bald and Golden Eagle Protection Act (1940)

grps=groups, obs=observations

5.3 Incidental Observations

Six bird species were incidentally observed outside of the standardized fixed-point use surveys, totaling 61 observations within 58 separate groups (Table 9). These included seven observations of bald eagles in six groups.

Table 9. Wildlife species incidentally observed outside of the standardized fixed-point bird use surveys at the Walleye Wind Energy Project Study Area from January 29 – December 17, 2018.

Species	Scientific Name	# of groups	# of observations
American kestrel	*Falco sparverius*	5	6
bald eagle	*Haliaeetus leucocephalus*	6	7
northern harrier	*Circus hudsonius*	10	10
red-tailed hawk	*Buteo jamaicensis*	34	35
sharp-shinned hawk	*Accipiter striatus*	1	1
Swainson's hawk	*Buteo swainsoni*	2	2
Total	**6 species**	**58**	**61**

6 DISCUSSION

Studies of avian use at the Project provide a baseline of spatial and temporal bird use that can be compared to bird use at other proposed regional wind energy facilities with similarly collected data. Additionally, baseline avian use data provided by this study can be compared with future fatality monitoring studies conducted at the Project. In doing so, this study will help to better predict potential impacts of future wind energy development in Minnesota and the larger Midwest region.

Exposure to facility infrastructure is affected by how much a species uses an area (percent of use), as well as how often use occurs (frequency of occurrence). Frequency of occurrence and percent of use provide relative measures of species exposure to the proposed facility. Percent of use was calculated as the proportion of large or small bird mean use that was attributable to a particular bird type or species. Frequency of occurrence was calculated as the percent of surveys in which a particular bird type or species was observed. For example, flocks of waterfowl, waterbirds, and shorebirds can be comprised of hundreds, thousands, or tens of thousands of individual birds, which would result in a very high percentage of use. However, examining the percent of use alone would not account for the acute exposure to the facility associated with a small number of very large flocks (low frequency of occurrence). A high percent of use may indicate that a species has higher exposure relative to other species, but when the exposure is acute, the species may be less likely to be affected. Conversely, a species that has a low percentage of use and a high frequency of occurrence would have long-term exposure to the facility, increasing the likelihood that this species may be affected by the facility. Exposure to facility infrastructure is more accurately assessed by evaluating both percent of use and frequency of occurrence.

6.1 Potential Impacts

Wind energy facilities can directly or indirectly impact wildlife resources. Direct impacts include fatalities from construction and operation of the wind energy facility and the loss of habitat where infrastructure is placed. Indirect impacts include the displacement of wildlife, either temporarily or permanently, during construction or the operational period of a wind energy facility, and rendering habitat unsuitable through fragmentation of the landscape.

Project construction could affect birds through loss of habitat or fatalities from construction equipment. Impacts from decommissioning of the facility are anticipated to be similar to construction in terms of noise, disturbance, and equipment used. Potential mortality from construction equipment is expected to be low, as equipment used in wind energy facility construction generally moves at slow rates or is stationary for long periods (e.g., cranes). The highest risk of direct mortality to birds during construction or decommissioning is most likely the potential destruction of nests of ground- and shrub-nesting species during initial site clearing, although this risk can be minimized through best management practices that include use of existing roads or previously developed land during the construction phase.

Mortality or injury due to collisions with turbines or guy wires of meteorological towers is the most probable direct impact to birds from wind energy facilities. Collisions may occur with resident birds foraging and flying within the Project Area, or with migrant birds seasonally moving through the area. Post-construction fatality monitoring reports from wind energy facilities in the Midwest show varying levels of bird mortality across the region, ranging from a low of 0.26 fatalities/megawatt (MW)/year at the Prince Wind Farm in Ontario, Canada (Natural Resource Solutions, Inc. 2008a), to a high of 8.25 fatalities/MW/year at the Wessington Springs facility in South Dakota (Derby et al. 2010a; Figure 5, Appendix F1). The highest publicly available estimated fatality rate among wind energy facilities in Minnesota was at the Buffalo Ridge facility with 5.93 fatalities/MW/year in 1999 (Johnson et al. 2000; Figure 5, Appendix F1). Fatality rates at the Walleye Wind Energy Project are likely to fall within the range of those reported at other facilities within the Midwest region and may be similar to rates reported at facilities in Minnesota (i.e., 0.37 to 5.93 fatalities/MW/year; Figure 5, Appendix F1).

In addition to direct effects through collision mortality, wind energy development can indirectly affect wildlife resources, causing a loss of habitat where infrastructure is placed and loss of habitat through behavioral avoidance and perhaps habitat fragmentation. Loss of habitat from installation of wind energy facility infrastructure (i.e., turbines, access roads, maintenance buildings, substations and overhead transmission lines) can be long-term or temporary; however, long-term infrastructure generally occupies less than 5% of the entire development area (US Department of the Interior 2005). Estimates of temporary construction impacts range from 0.2 to 1.0 ha (0.5 to 2.5 ac) per turbine (Strickland and Johnson 2006, Denholm et al. 2009). The Study Area is predominantly disturbed agricultural lands and developed areas. Therefore, the potential for indirect impacts through wildlife habitat fragmentation is anticipated to be relatively low.

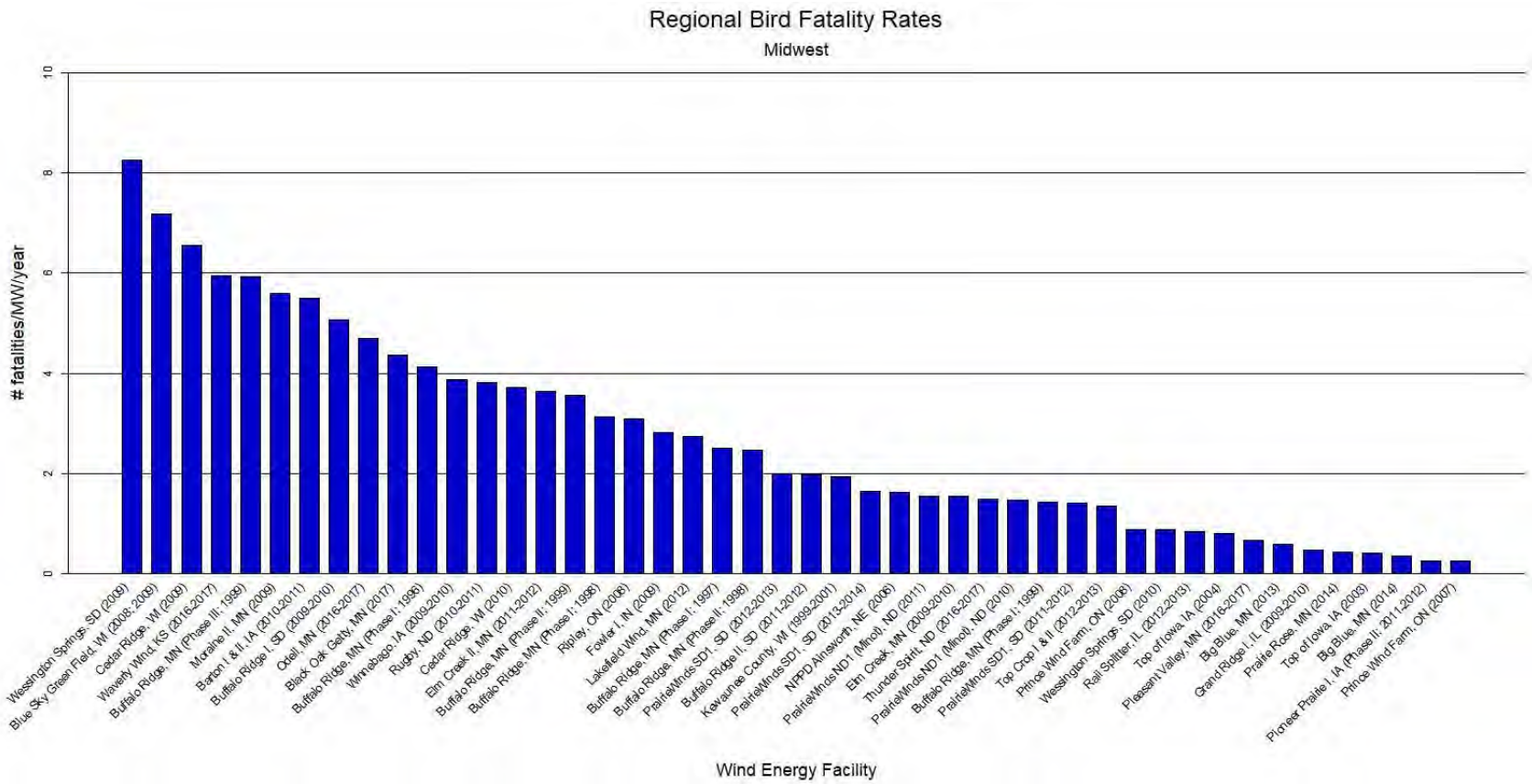

Figure 5. Fatality rates for all birds (number of birds per megawatt per year) reported in publicly available studies at wind energy facilities in the Midwest region of North America (Appendix F1).

Figure 5 (*continued*). Fatality rates for all birds (number of birds per megawatt per year) reported in publicly available studies at wind energy facilities in the Midwest region of North America (Appendix F1).

Data from the following sources:

Wind Energy Facility	Reference	Wind Energy Facility	Reference
Wessington Springs, SD (09)	Derby et al. 2010a	Buffalo Ridge II, SD (11-12)	Derby et al. 2012a
Blue Sky Green Field, WI (08; 09)	Gruver et al. 2009	Kewaunee County, WI (99-01)	Howe et al. 2002
Cedar Ridge, WI (09)	BHE Environmental 2010	PrairieWinds SD1, SD (13-14)	Derby et al. 2014
Waverly Wind, KS (16-17)	Tetra Tech 2017a	NPPD Ainsworth, NE (06)	Derby et al. 2007
Buffalo Ridge, MN (Phase III; 99)	Johnson et al. 2000	PrairieWinds ND1 (Minot), ND (11)	Derby et al. 2012b
Moraine II, MN (09)	Derby et al. 2010b	Elm Creek, MN (09-10)	Derby et al. 2010c
Barton I & II, IA (10-11)	Derby et al. 2011a	Thunder Spirit, ND (16-17)	Derby et al. 2018
Buffalo Ridge I, SD (09-10)	Derby et al. 2010d	PrairieWinds ND1 (Minot), ND (10)	Derby et al. 2011b
Odell, MN (16-17)	Chodachek and Gustafson 2018	Buffalo Ridge, MN (Phase I; 99)	Johnson et al. 2000
Black Oak Getty, MN (17)	Pickle et al. 2018	PrairieWinds SD1, SD (11-12)	Derby et al. 2012c
Buffalo Ridge, MN (Phase I; 96)	Johnson et al. 2000	Top Crop I & II (12-13)	Good et al. 2013a
Winnebago, IA (09-10)	Derby et al. 2010e	Prince Wind Farm, ON (06)	Natural Resource Solutions, Inc. 2008b
Rugby, ND (10-11)	Derby et al. 2011c	Wessington Springs, SD (10)	Derby et al. 2011d
Cedar Ridge, WI (10)	BHE Environmental 2011	Rail Splitter, IL (12-13)	Good et al. 2013b
Elm Creek II, MN (11-12)	Derby et al. 2012d	Top of Iowa, IA (04)	Jain 2005
Buffalo Ridge, MN (Phase II; 99)	Johnson et al. 2000	Pleasant Valley, MN (16-17)	Tetra Tech 2017b
Buffalo Ridge, MN (Phase I; 98)	Johnson et al. 2000	Big Blue, MN (13)	Fagen Engineering 2014
Ripley, ON (08)	Jacques Whitford 2009	Grand Ridge I, IL (09-10)	Derby et al. 2010f
Fowler I, IN (09)	Johnson et al. 2010a	Prairie Rose, MN (14)	Chodachek et al. 2015
Lakefield Wind, MN (12)	Minnesota Public Utilities Commission 2012	Top of Iowa, IA (03)	Jain 2005
Buffalo Ridge, MN (Phase I; 97)	Johnson et al. 2000	Big Blue, MN (14)	Fagen Engineering 2015
Buffalo Ridge, MN (Phase II; 98)	Johnson et al. 2000	Pioneer Prairie I, IA (Phase II; 11-12)	Chodachek et al. 2012
PrairieWinds SD1, SD (12-13)	Derby et al. 2013	Prince Wind Farm, ON (07)	Natural Resource Solutions, Inc. 2009

6.2 Bird Types of Concern

Two bird types are of concern in the region and were observed with some regularity during the study: waterfowl and diurnal raptors. Both bird types are discussed in more detail below.

6.2.1 Waterfowl

Waterfowl accounted for the greatest proportion of large bird use in spring; however, over 80% of flying waterfowl were observed above the RSH during the 20-min large bird surveys, and Canada goose (*Branta canadensis*) was the only waterfowl species among the 12 bird species documented flying within the RSH. Although seasonal risk to waterfowl may vary between years, risk is generally expected to be highest in spring and fall during migration due to the Project's location between the Mississippi and Central flyways.

Historically, waterfowl do not seem especially vulnerable to turbine collisions. In an analysis of 116 studies of bird mortality at over 70 facilities, waterfowl made up 2.7% of 4,975 fatalities found (Erickson et al. 2014). In a database of 60 publicly available wind energy facility studies in the Midwest region of North America, waterfowl made up 9.5% of 1,284 fatalities found (see Appendix G for a list of facilities and references).

6.2.2 Diurnal Raptors

Exposure Index Analysis

Exposure index analysis, which considers relative probability of exposure based on abundance, proportion of observations flying, and proportion of flight height of each species within the RSH, may provide some insight into which species would fly most often within RSH and potentially be the most likely turbine casualties. However, this index does not take into consideration behavior (e.g., foraging, courtship), flight speed, size of the bird, the ability to detect and avoid turbines, and other factors that may vary among species and influence likelihood of turbine collision. For these reasons, the exposure index is only a relative index of collision risk among species. During this study, the diurnal raptor species with the highest exposure index was red-tailed hawk (0.04), followed by Swainson's hawk (<0.01).

Fatality Studies

Diurnal raptor fatality rates (fatalities/MW/year) at wind energy facilities in the Midwest with publicly available data have ranged from zero to 0.47 fatalities/MW/year, with a mean of 0.07 fatalities/MW/year (Figure 6, Appendix F2). Among facilities in Minnesota, the highest diurnal raptor fatality rate was recorded at the Buffalo Ridge facility in 1999 (0.47 fatalities/MW/year); however, 11 other facilities in Minnesota have reported a raptor fatality rate of zero (Appendix F2). Diurnal raptor fatality rates at the Project are likely to fall within the range of those reported at other facilities in the Midwest.

Across the Midwest, a total of 103 diurnal raptors representing nine identified species are documented as wind turbine fatalities in 40 studies of modern wind energy facilities with publicly available fatality data (Table 10; see Appendix F2 for a list of facilities and references), although not all facilities found diurnal raptor fatalities. Buteos were found most often as fatalities (79

fatalities; 76.7% of raptor fatalities), followed by falcons (12; 11.7%), accipiters (nine; 8.7%), and harriers (one; 1.0%). About 86% of all buteo fatalities were red-tailed hawk (68 fatalities), about 83% of falcon fatalities were American kestrel (10 fatalities), about 67% of accipiter fatalities were sharp-shinned hawk (six fatalities), and northern harrier represented the only harrier fatality. Combined, these four species accounted for about 83% of all diurnal raptor fatalities documented in the Midwest. Each remaining species individually accounted for four or fewer fatalities and less than 5% of the total fatalities (Table 10). During the study, red-tailed hawks composed approximately 40% of all diurnal raptor observations recorded during 20-min large bird surveys (Appendix A1). These observations, along with the relatively high number of red-tailed hawk fatalities at Midwestern facilities, suggest that red-tailed hawk may comprise the majority of raptor fatalities at the Project, should raptor fatalities occur.

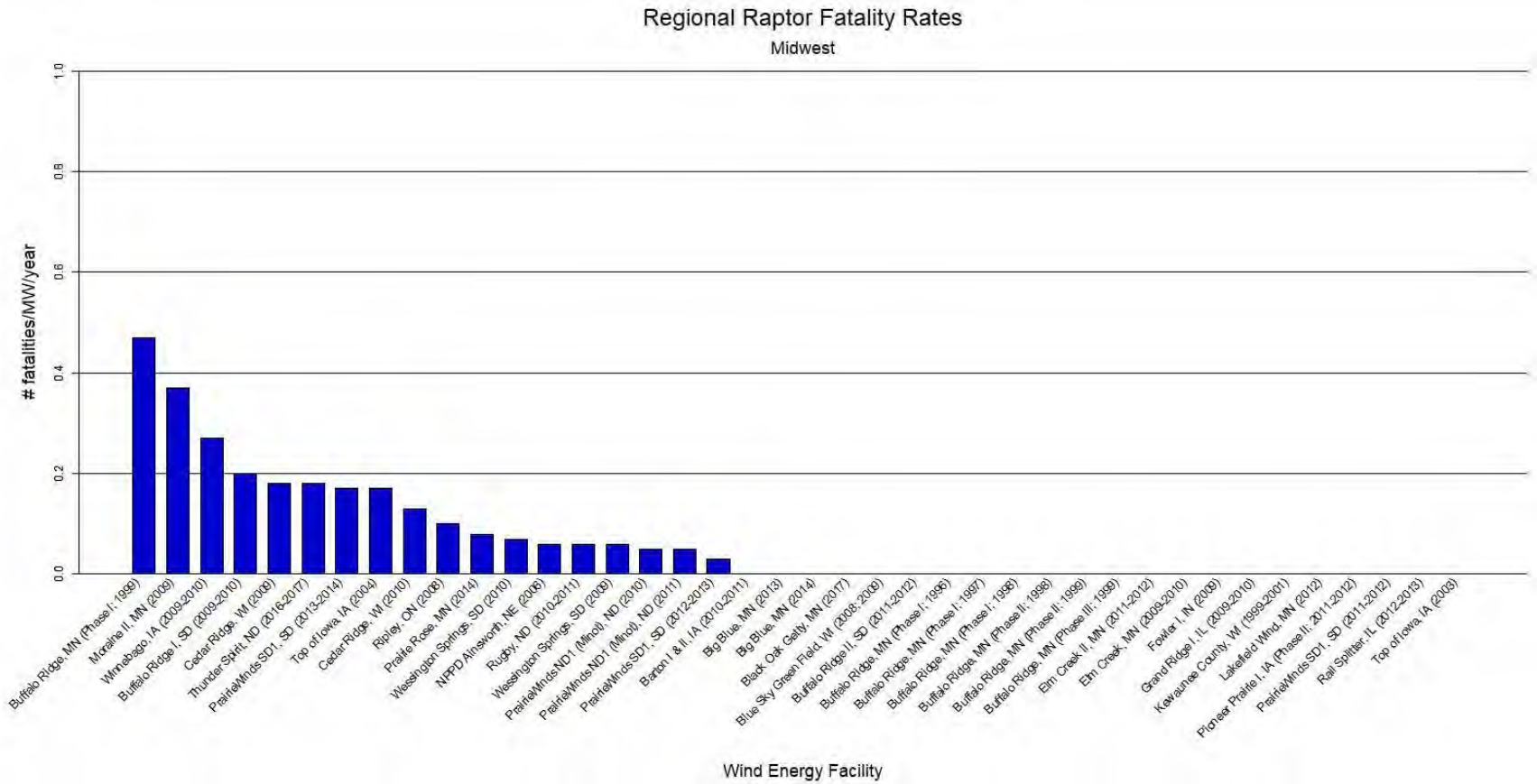

Figure 6. Fatality rates for diurnal raptors (number of raptors per megawatt per year) from publicly available studies at wind energy facilities in the Midwest region of North America (Appendix F2).

Figure 6 (*continued*). Fatality rates for diurnal raptors (number of raptors per megawatt per year) from publicly available studies at wind energy facilities in the Midwest region of North America (Appendix F2).

Data from the following sources:

Wind Energy Facility	Reference	Wind Energy Facility	Reference
Buffalo Ridge, MN (Phase I; 99)	Johnson et al. 2000	Big Blue, MN (14)	Fagen Engineering 2015
Moraine II, MN (09)	Derby et al. 2010b	Black Oak Getty, MN (17)	Pickle et al. 2018
Winnebago, IA (09-10)	Derby et al. 2010e	Blue Sky Green Field, WI (08; 09)	Gruver et al. 2009
Buffalo Ridge I, SD (09-10)	Derby et al. 2010d	Buffalo Ridge II, SD (11-12)	Derby et al. 2012a
Cedar Ridge, WI (09)	BHE Environmental 2010	Buffalo Ridge, MN (Phase I; 96)	Johnson et al. 2000
Thunder Spirit, ND (16-17)	Derby et al. 2018	Buffalo Ridge, MN (Phase I; 97)	Johnson et al. 2000
PrairieWinds SD1, SD (13-14)	Derby et al. 2014	Buffalo Ridge, MN (Phase I; 98)	Johnson et al. 2000
Top of Iowa, IA (04)	Jain 2005	Buffalo Ridge, MN (Phase II; 98)	Johnson et al. 2000
Cedar Ridge, WI (10)	BHE Environmental 2011	Buffalo Ridge, MN (Phase II; 99)	Johnson et al. 2000
Ripley, ON (08)	Jacques Whitford 2009	Buffalo Ridge, MN (Phase III; 99)	Johnson et al. 2000
Prairie Rose, MN (14)	Chodachek et al. 2015	Elm Creek II, MN (11-12)	Derby et al. 2012d
Wessington Springs, SD (10)	Derby et al. 2011d	Elm Creek, MN (09-10)	Derby et al. 2010c
NPPD Ainsworth, NE (06)	Derby et al. 2007	Fowler I, IN (09)	Johnson et al. 2010a
Rugby, ND (10-11)	Derby et al. 2011c	Grand Ridge I, IL (09-10)	Derby et al. 2010f
Wessington Springs, SD (09)	Derby et al. 2010a	Kewaunee County, WI (99-01)	Howe et al. 2002
PrairieWinds ND1 (Minot), ND (10)	Derby et al. 2011b	Lakefield Wind, MN (12)	Minnesota Public Utilities Commission 2012
PrairieWinds ND1 (Minot), ND (11)	Derby et al. 2012b	Pioneer Prairie I, IA (Phase II; 11-12)	Chodachek et al. 2012
PrairieWinds SD1, SD (12-13)	Derby et al. 2013	PrairieWinds SD1, SD (11-12)	Derby et al. 2012c
Barton I & II, IA (10-11)	Derby et al. 2011a	Rail Splitter, IL (12-13)	Good et al. 2013b
Big Blue, MN (13)	Fagen Engineering 2014	Top of Iowa, IA (03)	Jain 2005

Table 10. Diurnal raptor fatalities, by species, recorded at new-generation wind energy facilities in the Midwest.

Species	Scientific Name	Number of Raptor Fatalities*	Percent Composition of Raptor Fatalities
red-tailed hawk	*Buteo jamaicensis*	68	66.0
American kestrel	*Falco sparverius*	10	9.7
sharp-shinned hawk	*Accipiter striatus*	6	5.8
Swainson's hawk	*Buteo swainsoni*	4	3.9
rough-legged hawk	*Buteo lagopus*	3	2.9
Cooper's hawk	*Accipiter cooperii*	3	2.9
merlin	*Falco columbarius*	2	1.9
broad-winged hawk	*Buteo platypterus*	2	1.9
unidentified buteo	*Buteo spp*	2	1.9
northern harrier	*Circus hudsonius*	1	1.0
unidentified hawk		1	1.0
unidentified raptor		1	1.0
Total		**103**	**100**

* Number of raptor fatalities is unadjusted, raw counts (not corrected for searcher efficiency or scavenging). Percent composition may not total value shown due to rounding.

Cumulative fatalities and species from data compiled by Western EcoSystems Technology, Inc. from publicly available fatality documents (see Appendix F2).

Information on eagle fatalities may be found from the following sources: Allison 2012, Erickson et al. 2001, Pagel et al. 2013, Smallwood and Karas 2009, and US Department of Agriculture Rural Utilities Service and US Department of Energy Western Area Power Administration 2010; several of these accounts are discussing one or more of the same fatalities, and do not provide enough information for the total numbers to be definitively identified. Therefore, eagle fatality data is not presented in this table.

6.1 Species of Concern

Bald eagle was the only federally protected species (protected under the BGEPA) documented during the study. American white pelican, Franklin's gull, and short-eared owl were the only state-protected species, designated as SPC.

6.1.1 Bald Eagle

Bald eagles are typically associated with aquatic habitats (e.g., rivers, lakes, reservoirs, coastal areas) with mature forested shorelines or cliffs, though they may occur in arid regions of the southwestern US (Buehler 2000). Bald eagles, particularly when they are young, are opportunistic foragers, preferring to scavenge and pirate food rather than capture their own prey (Todd et al. 1982, Harmata 1984). Fish are preferred prey, but bald eagles will eat a variety of mammalian, avian, and reptilian species, and carrion (Todd et al. 1982, Stalmaster 1987, Mersmann 1989). Bald eagles primarily hunt from a perch or by soaring high over foraging areas, and may also hunt from the ground or while wading in water.

Most immature and dispersing eagles migrate and move nomadically, making it difficult to distinguish between true migration and general wandering (Buehler 2000). Adults begin fall migration when food becomes unavailable. Most bald eagles migrate alone; however, large concentrations can occur at communal feeding and roost sites; often hundreds or even thousands of eagles can congregate on wintering grounds (Buehler 2000). Suitable migration stopover habitat depends more upon food availability than vegetation composition or structural

concentrations (Buehler 2000). The majority of wintering populations are located in the contiguous US, coastal Canada, and Alaska (Millsap 1986). Suitable winter habitats contain easy foraging opportunities, protected perches, and absence of human disturbance.

Bald eagle fatalities caused by wind turbine collisions have increased slightly over the past few years, yet remain relatively low. According to Kritz et al. (2018), a total of 45 bald eagle fatalities that had been found at wind farms were reported to the USFWS between 2013 and 2018; this is more than eight times the previous number of known reported bald eagle fatalities (six bald eagle fatalities reported from 1997-2012; Pagel et al. 2013). However, risk is still considered low despite this species large and increasing population and widespread distribution across North America (Buehler 2000, Allison 2012). Regionally, 31 of the 51 bald eagle fatalities were documented in the Midwest, including three in Minnesota (Kritz et al. 2018; Pagel et al. 2013). Although concerns over the trend in bald eagle fatalities exist, understanding is weakly substantiated due to lack of published documentation (Pagel et al. 2013). For a thorough discussion of the potential effects of wind energy development on eagles, please refer to the ECPG (USFWS 2013).

During 163 hours of surveys, eight bald eagles were documented for a total of 38 eagle minutes, six of which were within the ZOR. This suggests relatively low use of Study Area by bald eagles, with the majority of use occurring in fall. A second year of eagle use surveys at the Project is currently underway and will provide additional data to better inform an analysis of potential risk for bald eagles at the Project.

6.1.2 American White Pelican

American white pelicans inhabit shallow marshes, rivers, and lakes, feeding opportunistically on fish, crayfish and salamanders (Knopf and Evans 2004). American white pelicans are gregarious, frequently observed roosting, flying, and feeding in large flocks. Fluctuating water levels and human persecution have been cited as the primary causes of this species' decline in the late 19th and early 20th centuries (Wires et al. 2005, MNDNR 2019). American white pelican populations have since recovered and continue to increase approximately 3% per year (Knopf and Evans 2004).

Migration to the breeding grounds occurs in March, and egg laying begins about four to five days after nest site selection (Knopf and Evans 2004). Eggs are incubated for approximately 30 days before hatching, and both parents take turns incubating the eggs while the other forages for food. American white pelicans generally select sparsely vegetated nest sites, and construct nests in shallow depressions on the ground with a low rim of soil, gravel, or nearby vegetation (Knopf and Evans 2004). The Project occurs within the migration range of the American white pelican, suggesting they may use the Project as stopover habitat during migration in spring and fall. However, American white pelican use was only documented during the spring, and use was relatively low.

6.1.3 Franklin's Gull

Franklin's gulls are found throughout interior North America during breeding and migration in large flocks (Burger and Gochfeld 2009). This species generally migrates through the Great Plains

region in spring and fall. This species is dependent on marshes during breeding, and is therefore sensitive to drought and anthropogenic water level fluctuations. Franklin's gulls experienced widespread population declines from habitat loss as a result of historic large-scale drainage projects; however, the population has begun to increase in recent years (Minnesota Breeding Bird Atlas 2019, Burger and Gochfeld 2009). Franklin's gulls forage in dense flocks over wet pastures and feed on fish, mice, insects, and other small invertebrates.

Franklin's gulls nests over water in freshwater marshes, on floating mats, muskrat houses, or other floating debris (Burger and Gochfeld 2009). They arrive at their nesting site around mid-April and begin nest-building immediately after establishing a nesting territory. Nests are constructed by both parents out of wet organic material; nesting material is frequently stolen from neighboring conspecific nests. After laying the eggs, they are incubated by both parents for approximately 26 days. The Project occurs within the migration range of the Franklin's gull, and breeding pairs have been documented in Minnesota; however, Franklin's gull use was only documented during spring, and use was relatively low. Use of the Project Area would likely be limited to infrequent occurrences during spring and fall migration.

6.1.4 Short-Eared Owl

The short-eared owl is one of the most widely distributed owls in North America. Short-eared owls are ground-nesting species that prefer open country, and inhabit grasslands and marshlands throughout the US (Wiggins et al. 2006). Because they nest on the ground, they are particularly susceptible to predation. Habitat fragmentation has been the primary threat to this species on the Great Plains, as grassland habitats have been converted to agricultural uses (Wiggins et al. 2006). This species hunts flying low to the ground, during day and night, and feeds primarily on small mammals, and occasionally other birds.

Short-eared owls are one of the few owls to construct their own nest (Wiggins et al. 2006). They nest on the ground, primarily in grasslands. Egg-laying occurs from March through June, with a peak in May. Although this species has potential to occur within the Project Area year-round, short-eared owl use was only documented during spring, and use was relatively low. Therefore, wind turbine collision risk to this species is anticipated to be low.

7 CONCLUSIONS

Over the 163 avian use surveys that occurred at the Study Area between January and December 2018, a total of 673 large bird observations and 935 small bird observations were recorded. Large bird use was higher in fall and spring (primarily due to higher use by waterfowl during spring, and doves/pigeons and large corvids during fall); with much lower levels of use in summer and winter. Currently, few published studies are available from the Midwest that would allow for a comparison of raptor use and fatality rates. Diurnal raptor fatality rates are expected to be within the range of fatality rates observed at other facilities in Minnesota and the larger Midwest region (Appendix F2). Diurnal raptor use was fairly even across the Study Area; waterfowl use was relatively higher at points 7 and 1.

Species of conservation concern observed in the Study Area included one species protected by BGEPA (bald eagle), three SPC species (American white pelican, Franklin's gull, and short-eared owl), and 12 additional species considered to be SGCN. Use of the Study Area by these species was relatively low. Eight bald eagle observations and 38 eagle minutes (six minutes in the ZOR) were recorded over 163 hours of survey at the Study Area, with seven additional bald eagle observations reported incidentally. Bald eagle observations were generally concentrated in the southern portion of the Study Area, which lies outside of the current Project Area. Bald eagles were only documented in fall during the 20-min large bird surveys. No golden eagles were documented during this study. WEST is currently conducting a second year of avian use surveys at the Project and will update the eagle use data in the second year report.

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Appendix A. All Bird Types and Species Observed during Fixed-Point Bird Use Surveys at the Walleye Wind Energy Project Study Area from January 29 – December 17, 2018

Appendix A1. Summary of individuals and group observations by bird type and species recorded during 20-minute large bird use surveys at the Walleye Wind Energy Project Study Area[a] from January 29 – December 17, 2018.

		Winter		Spring		Summer		Fall		Total	
Type/Species	**Scientific Name**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**
Waterbirds		**0**	**0**	**1**	**6**	**0**	**0**	**1**	**1**	**2**	**7**
great blue heron	*Ardea herodias*	0	0	0	0	0	0	1	1	1	1
American white pelican	*Pelecanus erythrorhynchos*	0	0	1	6	0	0	0	0	1	6
Waterfowl		**0**	**0**	**4**	**93**	**1**	**3**	**2**	**12**	**7**	**108**
mallard	*Anas platyrhynchos*	0	0	0	0	1	3	0	0	1	3
Canada goose	*Branta canadensis*	0	0	1	4	0	0	2	12	3	16
common goldeneye	*Bucephala clangula*	0	0	1	1	0	0	0	0	1	1
snow goose	*Chen caerulescens*	0	0	2	88	0	0	0	0	2	88
Shorebirds		**0**	**0**	**4**	**5**	**6**	**6**	**3**	**22**	**13**	**33**
upland sandpiper	*Bartramia longicauda*	0	0	1	1	2	2	0	0	3	3
killdeer	*Charadrius vociferus*	0	0	3	4	4	4	2	2	9	10
unidentified shorebird		0	0	0	0	0	0	1	20	1	20
Gulls/Terns		**0**	**0**	**3**	**6**	**0**	**0**	**0**	**0**	**3**	**6**
ring-billed gull	*Larus delawarensis*	0	0	2	2	0	0	0	0	2	2
Franklin's gull	*Leucophaeus pipixcan*	0	0	1	4	0	0	0	0	1	4
Diurnal Raptors		**0**	**0**	**13**	**15**	**7**	**7**	**21**	**21**	**41**	**43**
Accipiters		*0*	*0*	*2*	*2*	*1*	*1*	*2*	*2*	*5*	*5*
Cooper's hawk	*Accipiter cooperii*	0	0	2	2	1	1	0	0	3	3
unidentified accipiter	*Accipiter* spp.	0	0	0	0	0	0	1	1	1	1
sharp-shinned hawk	*Accipiter striatus*	0	0	0	0	0	0	1	1	1	1
Buteos		*0*	*0*	*10*	*12*	*6*	*6*	*12*	*12*	*28*	*30*
red-tailed hawk	*Buteo jamaicensis*	0	0	5	6	1	1	10	10	16	17
broad-winged hawk	*Buteo platypterus*	0	0	1	1	0	0	0	0	1	1
unidentified buteo	*Buteo* spp.	0	0	0	0	1	1	1	1	2	2
Swainson's hawk	*Buteo swainsoni*	0	0	4	5	4	4	1	1	9	10
Northern Harrier		*0*	*0*	*0*	*0*	*0*	*0*	*4*	*4*	*4*	*4*
northern harrier	*Circus hudsonius*	0	0	0	0	0	0	4	4	4	4
Eagles		*0*	*0*	*0*	*0*	*0*	*0*	*2*	*2*	*2*	*2*
bald eagle	*Haliaeetus leucocephalus*	0	0	0	0	0	0	2	2	2	2
Falcons		*0*	*0*	*1*	*1*	*0*	*0*	*0*	*0*	*1*	*1*
American kestrel	*Falco sparverius*	0	0	1	1	0	0	0	0	1	1
Other Raptors		*0*	*0*	*0*	*0*	*0*	*0*	*1*	*1*	*1*	*1*
unidentified raptor		0	0	0	0	0	0	1	1	1	1
Owls		**0**	**0**	**1**	**1**	**0**	**0**	**0**	**0**	**1**	**1**

Appendix A1. Summary of individuals and group observations by bird type and species recorded during 20-minute large bird use surveys at the Walleye Wind Energy Project Study Area[a] from January 29 – December 17, 2018.

		Winter		Spring		Summer		Fall		Total	
Type/Species	**Scientific Name**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**
short-eared owl	*Asio flammeus*	0	0	1	1	0	0	0	0	1	1
Vultures		**0**	**0**	**7**	**9**	**3**	**3**	**0**	**0**	**10**	**12**
turkey vulture	*Cathartes aura*	0	0	7	9	3	3	0	0	10	12
Upland Game Birds		**1**	**1**	**1**	**1**	**7**	**12**	**2**	**4**	**11**	**18**
ring-necked pheasant	*Phasianus colchicus*	1	1	1	1	6	7	2	4	10	13
unidentified gamebird		0	0	0	0	1	5	0	0	1	5
Doves/Pigeons		**10**	**70**	**7**	**11**	**28**	**40**	**22**	**114**	**67**	**235**
rock pigeon	*Columba livia*	9	69	3	6	6	11	20	111	38	197
Eurasian collared-dove	*Streptopelia decaocto*	1	1	1	1	3	4	0	0	5	6
mourning dove	*Zenaida macroura*	0	0	3	4	19	25	2	3	24	32
Large Corvids		**12**	**43**	**16**	**48**	**7**	**13**	**15**	**106**	**50**	**210**
American crow	*Corvus brachyrhynchos*	12	43	16	48	7	13	15	106	50	210
Large Birds Overall		**23**	**114**	**57**	**195**	**59**	**84**	**66**	**280**	**205**	**673**

[a] Regardless of distance from observer.

Note: grps = groups, obs = observations

Appendix A2. Summary of individuals and group observations by bird type and species recorded during 10-minute small bird use surveys at the Walleye Wind Energy Project[a] from January 29 – December 17, 2018.

		Winter		Spring		Summer		Fall		Total	
Type/Species	**Scientific Name**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**
Passerines		**15**	**92**	**91**	**249**	**182**	**257**	**64**	**329**	**352**	**927**
unidentified passerine		1	1	0	0	10	17	26	57	37	75
Blackbirds/Orioles		*0*	*0*	*42*	*63*	*57*	*78*	*12*	*76*	*111*	*217*
red-winged blackbird	*Agelaius phoeniceus*	0	0	14	18	16	23	1	20	31	61
bobolink	*Dolichonyx oryzivorus*	0	0	3	3	4	7	0	0	7	10
Brewer's blackbird	*Euphagus cyanocephalus*	0	0	0	0	1	1	0	0	1	1
Baltimore oriole	*Icterus galbula*	0	0	0	0	3	3	0	0	3	3
brown-headed cowbird	*Molothrus ater*	0	0	7	12	9	13	0	0	16	25
common grackle	*Quiscalus quiscula*	0	0	9	17	13	15	0	0	22	32
eastern meadowlark	*Sturnella magna*	0	0	0	0	1	1	0	0	1	1
western meadowlark	*Sturnella neglecta*	0	0	2	4	6	10	5	7	13	21
unidentified meadowlark	*Sturnella* spp.	0	0	2	2	0	0	0	0	2	2
European starling	*Sturnus vulgaris*	0	0	5	7	2	2	1	1	8	10
unidentified blackbird		0	0	0	0	2	3	5	48	7	51
Creepers/Nuthatches		*0*	*0*	*0*	*0*	*0*	*0*	*1*	*2*	*1*	*2*
white-breasted nuthatch	*Sitta carolinensis*	0	0	0	0	0	0	1	2	1	2
Finches/Crossbills		*0*	*0*	*4*	*5*	*13*	*19*	*3*	*3*	*20*	*27*
house finch	*Haemorhous mexicanus*	0	0	1	1	0	0	0	0	1	1
American goldfinch	*Spinus tristis*	0	0	3	4	13	19	3	3	19	26
Flycatchers		*0*	*0*	*0*	*0*	*3*	*3*	*0*	*0*	*3*	*3*
eastern kingbird	*Tyrannus tyrannus*	0	0	0	0	3	3	0	0	3	3
Grassland/Sparrows		*14*	*91*	*28*	*159*	*40*	*48*	*15*	*162*	*97*	*460*
American pipit	*Anthus rubescens*	0	0	0	0	0	0	2	60	2	60
Lapland longspur	*Calcarius lapponicus*	0	0	1	1	0	0	1	40	2	41
horned lark	*Eremophila alpestris*	14	91	14	141	1	1	4	38	33	271
dark-eyed junco	*Junco hyemalis*	0	0	1	2	0	0	0	0	1	2
song sparrow	*Melospiza melodia*	0	0	2	2	8	8	0	0	10	10
house sparrow	*Passer domesticus*	0	0	1	4	1	4	0	0	2	8
Savannah sparrow	*Passerculus sandwichensis*	0	0	3	3	2	2	0	0	5	5
vesper sparrow	*Pooecetes gramineus*	0	0	1	1	2	2	0	0	3	3
dickcissel	*Spiza americana*	0	0	2	2	21	24	0	0	23	26
clay-colored sparrow	*Spizella pallida*	0	0	1	1	0	0	0	0	1	1
chipping sparrow	*Spizella passerina*	0	0	2	2	1	1	0	0	3	3
American tree sparrow	*Spizelloides arborea*	0	0	0	0	0	0	1	4	1	4
Harris' sparrow	*Zonotrichia querula*	0	0	0	0	0	0	3	15	3	15
unidentified sparrow		0	0	0	0	4	6	4	5	8	11

Appendix A2. Summary of individuals and group observations by bird type and species recorded during 10-minute small bird use surveys at the Walleye Wind Energy Project[a] from January 29 – December 17, 2018.

		Winter		Spring		Summer		Fall		Total	
Type/Species	**Scientific Name**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**	**# grps**	**# obs**
Mimids		*0*	*0*	*0*	*0*	*1*	*1*	*0*	*0*	*1*	*1*
brown thrasher	*Toxostoma rufum*	0	0	0	0	1	1	0	0	1	1
Swallows		*0*	*0*	*11*	*12*	*35*	*63*	*1*	*1*	*47*	*76*
barn swallow	*Hirundo rustica*	0	0	6	7	13	16	1	1	20	24
cliff swallow	*Petrochelidon pyrrhonota*	0	0	1	1	19	44	0	0	20	45
bank swallow	*Riparia riparia*	0	0	1	1	0	0	0	0	1	1
tree swallow	*Tachycineta bicolor*	0	0	3	3	1	1	0	0	4	4
unidentified swallow		0	0	0	0	2	2	0	0	2	2
Tanagers		*0*	*0*	*0*	*0*	*1*	*1*	*0*	*0*	*1*	*1*
indigo bunting	*Passerina cyanea*	0	0	0	0	1	1	0	0	1	1
Thrushes		*0*	*0*	*4*	*6*	*12*	*15*	*5*	*26*	*21*	*47*
American robin	*Turdus migratorius*	0	0	4	6	12	15	5	26	21	47
Warblers		*0*	*0*	*0*	*0*	*5*	*5*	*0*	*0*	*5*	*5*
common yellowthroat	*Geothlypis trichas*	0	0	0	0	5	5	0	0	5	5
Wrens		*0*	*0*	*0*	*0*	*4*	*4*	*0*	*0*	*4*	*4*
sedge wren	*Cistothorus platensis*	0	0	0	0	1	1	0	0	1	1
house wren	*Troglodytes aedon*	0	0	0	0	3	3	0	0	3	3
Corvids		*0*	*0*	*2*	*4*	*1*	*3*	*1*	*2*	*4*	*9*
blue jay	*Cyanocitta cristata*	0	0	2	4	1	3	1	2	4	9
Swifts/Hummingbirds		**0**	**0**	**1**	**1**	**0**	**0**	**0**	**0**	**1**	**1**
chimney swift	*Chaetura pelagica*	0	0	1	1	0	0	0	0	1	1
Woodpeckers		**1**	**1**	**0**	**0**	**1**	**1**	**1**	**1**	**3**	**3**
northern flicker	*Colaptes auratus*	0	0	0	0	0	0	1	1	1	1
red-headed woodpecker	*Melanerpes erythrocephalus*	0	0	0	0	1	1	0	0	1	1
downy woodpecker	*Picoides pubescens*	1	1	0	0	0	0	0	0	1	1
Unidentified Birds		**0**	**0**	**0**	**0**	**1**	**1**	**1**	**3**	**2**	**4**
unidentified bird (small)		0	0	0	0	1	1	1	3	2	4
Small Birds Overall		**16**	**93**	**92**	**250**	**184**	**259**	**66**	**333**	**358**	**935**

[a] Regardless of distance from observer.

Note: grps = groups, obs = observations

Appendix B. Mean Use, Percent of Use, and Frequency of Occurrence for Large and Small Birds Observed during Fixed-Point Bird Use Surveys at the Walleye Wind Energy Project Study Area from January 29 – December 17, 2018

Appendix B1. Mean large bird use (number of large birds/800-meter plot/20-minute survey), percent of total use (%), and frequency of occurrence (%) for each large bird type and species by season recorded during fixed-point bird use surveys at the Walleye Wind Energy Project Study Area from January 29 – December 17, 2018.

	Mean Use				% of Use				% Frequency			
Type/Species	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**
Waterbirds	**0**	**0.17**	**0**	**0.02**	**0**	**3.1**	**0**	**0.3**	**0**	**2.8**	**0**	**2.0**
great blue heron	0	0	0	0.02	0	0	0	0.3	0	0	0	2.0
American white pelican	0	0.17	0	0	0	3.1	0	0	0	2.8	0	0
Waterfowl	**0**	**2.58**	**0.09**	**0.33**	**0**	**47.7**	**3.8**	**5.3**	**0**	**11.1**	**3.0**	**5.6**
mallard	0	0	0.09	0	0	0	3.8	0	0	0	3.0	0
Canada goose	0	0.11	0	0.33	0	2.1	0	5.3	0	2.8	0	5.6
common goldeneye	0	0.03	0	0	0	0.5	0	0	0	2.8	0	0
snow goose	0	2.44	0	0	0	45.1	0	0	0	5.6	0	0
Shorebirds	**0**	**0.14**	**0.17**	**0.61**	**0**	**2.6**	**7.2**	**9.8**	**0**	**11.1**	**14.4**	**5.6**
upland sandpiper	0	0.03	0.06	0	0	0.5	2.3	0	0	2.8	2.8	0
killdeer	0	0.11	0.12	0.06	0	2.1	4.8	0.9	0	8.3	11.6	2.8
unidentified shorebird	0	0	0	0.56	0	0	0	8.9	0	0	0	2.8
Gulls/Terns	**0**	**0.17**	**0**	**0**	**0**	**3.1**	**0**	**0**	**0**	**8.3**	**0**	**0**
ring-billed gull	0	0.06	0	0	0	1.0	0	0	0	5.6	0	0
Franklin's gull	0	0.11	0	0	0	2.1	0	0	0	2.8	0	0
Diurnal Raptors	**0**	**0.42**	**0.20**	**0.34**	**0**	**7.7**	**8.4**	**5.5**	**0**	**25.0**	**20.2**	**26.2**
Accipiters	*0*	*0.06*	*0.03*	*0.03*	*0*	*1.0*	*1.2*	*0.6*	*0*	*5.6*	*2.8*	*3.5*
Cooper's hawk	0	0.06	0.03	0	0	1.0	1.2	0	0	5.6	2.8	0
unidentified accipiter	0	0	0	0.02	0	0	0	0.3	0	0	0	2.0
sharp-shinned hawk	0	0	0	0.02	0	0	0	0.2	0	0	0	1.5
Buteos	*0*	*0.33*	*0.17*	*0.21*	*0*	*6.2*	*7.3*	*3.3*	*0*	*22.2*	*17.4*	*17.8*
red-tailed hawk	0	0.17	0.03	0.16	0	3.1	1.3	2.6	0	13.9	3.0	15.0
broad-winged hawk	0	0.03	0	0	0	0.5	0	0	0	2.8	0	0
unidentified buteo	0	0	0.03	0.02	0	0	1.2	0.2	0	0	2.8	1.5
Swainson's hawk	0	0.14	0.12	0.03	0	2.6	4.8	0.4	0	8.3	11.6	2.8
Northern Harrier	*0*	*0*	*0*	*0.07*	*0*	*0*	*0*	*1.1*	*0*	*0*	*0*	*7.0*
northern harrier	0	0	0	0.07	0	0	0	1.1	0	0	0	7.0
Eagles	*0*	*0*	*0*	*0.02*	*0*	*0*	*0*	*0.2*	*0*	*0*	*0*	*1.5*
bald eagle	0	0	0	0.02	0	0	0	0.2	0	0	0	1.5
Falcons	*0*	*0.03*	*0*	*0*	*0*	*0.5*	*0*	*0*	*0*	*2.8*	*0*	*0*
American kestrel	0	0.03	0	0	0	0.5	0	0	0	2.8	0	0
Other Raptors	*0*	*0*	*0*	*0.02*	*0*	*0*	*0*	*0.2*	*0*	*0*	*0*	*1.5*
unidentified raptor	0	0	0	0.02	0	0	0	0.2	0	0	0	1.5
Owls	**0**	**0.03**	**0**	**0**	**0**	**0.5**	**0**	**0**	**0**	**2.8**	**0**	**0**
short-eared owl	0	0.03	0	0	0	0.5	0	0	0	2.8	0	0

Appendix B1. Mean large bird use (number of large birds/800-meter plot/20-minute survey), percent of total use (%), and frequency of occurrence (%) for each large bird type and species by season recorded during fixed-point bird use surveys at the Walleye Wind Energy Project Study Area from January 29 – December 17, 2018.

	Mean Use				% of Use				% Frequency			
Type/Species	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**
Vultures	**0**	**0.25**	**0.09**	**0**	**0**	**4.6**	**3.6**	**0**	**0**	**13.9**	**8.6**	**0**
turkey vulture	0	0.25	0.09	0	0	4.6	3.6	0	0	13.9	8.6	0
Upland Game Birds	**0.02**	**0.03**	**0.34**	**0.06**	**0.7**	**0.5**	**14.1**	**1.0**	**2.0**	**2.8**	**16.9**	**1.5**
ring-necked pheasant	0.02	0.03	0.20	0.06	0.7	0.5	8.3	1.0	2.0	2.8	14.1	1.5
unidentified gamebird	0	0	0.14	0	0	0	5.8	0	0	0	2.8	0
Doves/Pigeons	**1.61**	**0.31**	**1.13**	**2.64**	**58.2**	**5.6**	**47.3**	**42.2**	**21.7**	**16.7**	**48.2**	**36.1**
rock pigeon	1.59	0.17	0.31	2.56	57.5	3.1	13.0	40.9	19.8	8.3	16.9	30.6
Eurasian collared-dove	0.02	0.03	0.12	0	0.7	0.5	4.8	0	2.0	2.8	8.8	0
mourning dove	0	0.11	0.71	0.08	0	2.1	29.5	1.3	0	5.6	36.9	5.6
Large Corvids	**1.14**	**1.33**	**0.37**	**2.25**	**41.1**	**24.6**	**15.6**	**35.9**	**23.4**	**30.6**	**14.6**	**26.1**
American crow	1.14	1.33	0.37	2.25	41.1	24.6	15.6	35.9	23.4	30.6	14.6	26.1
Large Birds Overall[a]	**2.77**	**5.42**	**2.40**	**6.26**	**100**	**100**	**100**	**100**				

[a] Sums of values may not add to total value shown due to rounding

Appendix B2. Mean small bird use (number of small birds/100-meter plot/10-minute survey), percent of total use (%), and frequency of occurrence (%) for each small bird type and species by season recorded during fixed-point bird use surveys at the Walleye Wind Energy Project from January 29 – December 17, 2018.

	Mean Use				% of Use				% Frequency			
Type/Species	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**
Passerines	**2.05**	**6.92**	**7.31**	**5.58**	**99.1**	**99.6**	**99.2**	**98.7**	**28.4**	**61.1**	**91.4**	**59.7**
unidentified passerine	0.03	0	0.47	0.94	1.3	0	6.4	16.6	2.8	0	19.4	36.6
Blackbirds/Orioles	*0*	*1.75*	*2.26*	*1.27*	*0*	*25.2*	*30.7*	*22.4*	*0*	*41.7*	*52.0*	*12.8*
red-winged blackbird	0	0.50	0.67	0.39	0	7.2	9.2	6.9	0	25.0	20.7	2.0
bobolink	0	0.08	0.20	0	0	1.2	2.7	0	0	5.6	8.8	0
Brewer's blackbird	0	0	0.03	0	0	0	0.4	0	0	0	2.8	0
Baltimore oriole	0	0	0.09	0	0	0	1.2	0	0	0	8.6	0
brown-headed cowbird	0	0.33	0.38	0	0	4.8	5.1	0	0	16.7	20.5	0
common grackle	0	0.47	0.44	0	0	6.8	6.0	0	0	13.9	32.3	0
eastern meadowlark	0	0	0.03	0	0	0	0.4	0	0	0	3.0	0
western meadowlark	0	0.11	0.28	0.13	0	1.6	3.8	2.3	0	5.6	8.6	4.3
unidentified meadowlark	0	0.06	0	0	0	0.8	0	0	0	5.6	0	0
European starling	0	0.19	0.06	0.02	0	2.8	0.8	0.3	0	13.9	5.8	2.0
unidentified blackbird	0	0	0.08	0.73	0	0	1.1	12.9	0	0	5.6	4.5
Creepers/Nuthatches	*0*	*0*	*0*	*0.04*	*0*	*0*	*0*	*0.7*	*0*	*0*	*0*	*2.0*
white-breasted nuthatch	0	0	0	0.04	0	0	0	0.7	0	0	0	2.0
Finches/Crossbills	*0*	*0.14*	*0.53*	*0.06*	*0*	*2.0*	*7.2*	*1.1*	*0*	*8.3*	*28.0*	*6.3*
house finch	0	0.03	0	0	0	0.4	0	0	0	2.8	0	0
American goldfinch	0	0.11	0.53	0.06	0	1.6	7.2	1.1	0	8.3	28.0	6.3
Flycatchers	*0*	*0*	*0.09*	*0*	*0*	*0*	*1.2*	*0*	*0*	*0*	*8.6*	*0*
eastern kingbird	0	0	0.09	0	0	0	1.2	0	0	0	8.6	0
Grassland/Sparrows	*2.02*	*4.42*	*1.37*	*2.77*	*97.7*	*63.6*	*18.6*	*49.0*	*25.7*	*44.4*	*63.6*	*18.4*
American pipit	0	0	0	0.91	0	0	0	16.1	0	0	0	1.5
Lapland longspur	0	0.03	0	0.78	0	0.4	0	13.9	0	2.8	0	2.0
horned lark	2.02	3.92	0.03	0.70	97.7	56.4	0.4	12.3	25.7	30.6	3.0	5.4
dark-eyed junco	0	0.06	0	0	0	0.8	0	0	0	2.8	0	0
song sparrow	0	0.06	0.23	0	0	0.8	3.1	0	0	5.6	17.2	0
house sparrow	0	0.11	0.12	0	0	1.6	1.6	0	0	2.8	3.0	0
Savannah sparrow	0	0.08	0.06	0	0	1.2	0.8	0	0	8.3	2.8	0
vesper sparrow	0	0.03	0.06	0	0	0.4	0.8	0	0	2.8	6.1	0
dickcissel	0	0.06	0.68	0	0	0.8	9.3	0	0	5.6	40.4	0
clay-colored sparrow	0	0.03	0	0	0	0.4	0	0	0	2.8	0	0
chipping sparrow	0	0.06	0.03	0	0	0.8	0.4	0	0	5.6	2.8	0
American tree sparrow	0	0	0	0.08	0	0	0	1.4	0	0	0	2.0
Harris' sparrow	0	0	0	0.23	0	0	0	4.0	0	0	0	1.5

Appendix B2. Mean small bird use (number of small birds/100-meter plot/10-minute survey), percent of total use (%), and frequency of occurrence (%) for each small bird type and species by season recorded during fixed-point bird use surveys at the Walleye Wind Energy Project from January 29 – December 17, 2018.

	Mean Use				% of Use				% Frequency			
Type/Species	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**
unidentified sparrow	0	0	0.17	0.08	0	0	2.3	1.3	0	0	8.3	6.1
Mimids	*0*	*0*	*0.03*	*0*	*0*	*0*	*0.4*	*0*	*0*	*0*	*2.8*	*0*
brown thrasher	0	0	0.03	0	0	0	0.4	0	0	0	2.8	0
Swallows	*0*	*0.33*	*1.76*	*0.03*	*0*	*4.8*	*23.9*	*0.5*	*0*	*16.7*	*39.6*	*2.8*
barn swallow	0	0.19	0.45	0.03	0	2.8	6.1	0.5	0	16.7	28.3	2.8
cliff swallow	0	0.03	1.22	0	0	0.4	16.6	0	0	2.8	22.5	0
bank swallow	0	0.03	0	0	0	0.4	0	0	0	2.8	0	0
tree swallow	0	0.08	0.03	0	0	1.2	0.4	0	0	8.3	2.8	0
unidentified swallow	0	0	0.06	0	0	0	0.8	0	0	0	5.6	0
Tanagers	*0*	*0*	*0.03*	*0*	*0*	*0*	*0.4*	*0*	*0*	*0*	*2.8*	*0*
indigo bunting	0	0	0.03	0	0	0	0.4	0	0	0	2.8	0
Thrushes	*0*	*0.17*	*0.43*	*0.44*	*0*	*2.4*	*5.9*	*7.9*	*0*	*8.3*	*26.0*	*10.1*
American robin	0	0.17	0.43	0.44	0	2.4	5.9	7.9	0	8.3	26.0	10.1
Warblers	*0*	*0*	*0.14*	*0*	*0*	*0*	*2.0*	*0*	*0*	*0*	*14.4*	*0*
common yellowthroat	0	0	0.14	0	0	0	2.0	0	0	0	14.4	0
Wrens	*0*	*0*	*0.11*	*0*	*0*	*0*	*1.5*	*0*	*0*	*0*	*8.6*	*0*
sedge wren	0	0	0.03	0	0	0	0.4	0	0	0	2.8	0
house wren	0	0	0.09	0	0	0	1.2	0	0	0	5.8	0
Corvids	*0*	*0.11*	*0.08*	*0.03*	*0*	*1.6*	*1.1*	*0.5*	*0*	*2.8*	*2.8*	*1.5*
blue jay	0	0.11	0.08	0.03	0	1.6	1.1	0.5	0	2.8	2.8	1.5
Swifts/Hummingbirds	**0**	**0.03**	**0**	**0**	**0**	**0.4**	**0**	**0**	**0**	**2.8**	**0**	**0**
chimney swift	0	0.03	0	0	0	0.4	0	0	0	2.8	0	0
Woodpeckers	**0.02**	**0**	**0.03**	**0.02**	**0.9**	**0**	**0.4**	**0.3**	**2.0**	**0**	**2.8**	**1.5**
northern flicker	0	0	0	0.02	0	0	0	0.3	0	0	0	1.5
red-headed woodpecker	0	0	0.03	0	0	0	0.4	0	0	0	2.8	0
downy woodpecker	0.02	0	0	0	0.9	0	0	0	2.0	0	0	0
Unidentified Birds	**0**	**0**	**0.03**	**0.06**	**0**	**0**	**0.4**	**1.0**	**0**	**0**	**2.8**	**2.0**
unidentified bird (small)	0	0	0.03	0.06	0	0	0.4	1.0	0	0	2.8	2.0
Small Birds Overall[a]	**2.07**	**6.94**	**7.37**	**5.66**	**100**	**100**	**100**	**100**				

[a] Sums of values may not add to total value shown due to rounding

Appendix C. Flight Height Characteristics and Species Exposure Indices for Large and Small Birds Recorded during Fixed-Point Bird Use Surveys at the Walleye Wind Energy Project Study Area from January 29 – December 17, 2018

Appendix C1. Flight characteristics for each large bird species[a] recorded during fixed-point[b] bird use surveys at the Walleye Wind Energy Project Study Area from January 29 – December 17, 2018.

Species	# Groups Flying	Overall Mean Use	% Flying	% Flying within RSH Based on Initial Obs	Exposure Index	% Within RSH at anytime
American crow	34	1.27	77.1	17.3	0.17	25.3
rock pigeon	33	1.15	83.8	7.9	0.08	17.0
turkey vulture	10	0.08	100	50.0	0.04	66.7
American white pelican	1	0.04	100	100	0.04	100
red-tailed hawk	12	0.09	76.5	53.8	0.04	61.5
Franklin's gull	1	0.03	100	100	0.03	100
Canada goose	3	0.11	100	25.0	0.03	25.0
mourning dove	17	0.23	75.0	8.3	0.01	8.3
Swainson's hawk	8	0.07	80.0	12.5	<0.01	75.0
American kestrel	1	<0.01	100	100	<0.01	100
unidentified buteo	2	0.01	100	50.0	<0.01	50.0
bald eagle	1	<0.01	100	100	<0.01	100
Eurasian collared-dove	3	0.04	66.7	0	0	0
ring-necked pheasant	3	0.08	46.2	0	0	0
short-eared owl	1	<0.01	100	0	0	0
unidentified raptor	1	<0.01	100	0	0	0
northern harrier	3	0.02	75.0	0	0	33.3
broad-winged hawk	1	<0.01	100	0	0	0
sharp-shinned hawk	1	<0.01	100	0	0	0
Cooper's hawk	3	0.02	100	0	0	33.3
ring-billed gull	2	0.01	100	0	0	0
killdeer	7	0.07	80.0	0	0	0
upland sandpiper	1	0.02	33.3	0	0	0
unidentified shorebird	1	0.14	100	0	0	0
snow goose	2	0.62	100	0	0	0
common goldeneye	1	<0.01	100	0	0	100
mallard	1	0.02	100	0	0	0
great blue heron	1	<0.01	100	0	0	0
unidentified gamebird	0	0.04	0	0	0	0
unidentified accipiter	0	<0.01	0	0	0	0

RSH: The likely "rotor-swept heights" for potential collision with a turbine blade, or 25-150 meters (82-492 feet) above ground level.

[a] 800-meter radius plot

[b] per 20-minute survey

Note: obs = observations

Appendix C2. Flight characteristics for each small bird species[a] recorded during fixed-point[b] bird use surveys at the Walleye Wind Energy Project Study Area from January 29 – December 17, 2018.

Species	# Groups Flying	Overall Mean Use	% Flying	% Flying within RSH Based on Initial Obs	Exposure Index	% Within RSH at anytime
horned lark	23	1.67	76.4	30.4	0.39	35.3
common grackle	21	0.23	96.9	38.7	0.09	38.7
European starling	7	0.07	90.0	55.6	0.03	55.6
red-winged blackbird	18	0.39	73.8	11.1	0.03	11.1
American goldfinch	6	0.18	30.8	50.0	0.03	50.0
barn swallow	20	0.17	100	12.5	0.02	12.5
western meadowlark	6	0.13	33.3	28.6	0.01	28.6
eastern meadowlark	1	<0.01	100	100	<0.01	100
eastern kingbird	2	0.02	66.7	50.0	<0.01	50.0
bobolink	3	0.07	30.0	33.3	<0.01	33.3
chimney swift	1	<0.01	100	100	<0.01	100
tree swallow	4	0.03	100	25.0	<0.01	25.0
house finch	1	<0.01	100	100	<0.01	100
Lapland longspur	1	0.20	2.4	100	<0.01	100
unidentified bird (small)	2	0.02	100	0	0	0
northern flicker	1	<0.01	100	0	0	0
blue jay	1	0.06	22.2	0	0	0
American robin	14	0.26	83.0	0	0	0
bank swallow	1	<0.01	100	0	0	0
cliff swallow	20	0.32	100	0	0	0
unidentified swallow	2	0.01	100	0	0	0
Harris' sparrow	3	0.06	100	0	0	0
chipping sparrow	1	0.02	33.3	0	0	0
dickcissel	4	0.19	19.2	0	0	0
song sparrow	1	0.07	10.0	0	0	0
American pipit	2	0.23	100	0	0	0
unidentified sparrow	4	0.06	36.4	0	0	0
unidentified meadowlark	2	0.01	100	0	0	0
brown-headed cowbird	14	0.18	92.0	0	0	0
Brewer's blackbird	1	<0.01	100	0	0	0
unidentified blackbird	4	0.20	72.5	0	0	0
unidentified passerine	12	0.36	18.7	0	0	0
downy woodpecker	0	<0.01	0	0	0	0
red-headed woodpecker	0	<0.01	0	0	0	0
house wren	0	0.02	0	0	0	0
sedge wren	0	<0.01	0	0	0	0
common yellowthroat	0	0.04	0	0	0	0
indigo bunting	0	<0.01	0	0	0	0
brown thrasher	0	<0.01	0	0	0	0
American tree sparrow	0	0.02	0	0	0	0
clay-colored sparrow	0	<0.01	0	0	0	0
vesper sparrow	0	0.02	0	0	0	0
Savannah sparrow	0	0.04	0	0	0	0
house sparrow	0	0.06	0	0	0	0
dark-eyed junco	0	0.01	0	0	0	0
white-breasted nuthatch	0	<0.01	0	0	0	0
Baltimore oriole	0	0.02	0	0	0	0

Appendix C2. Flight characteristics for each small bird species[a] recorded during fixed-point[b] bird use surveys at the Walleye Wind Energy Project Study Area from January 29 – December 17, 2018.

Species	# Groups Flying	Overall Mean Use	% Flying	% Flying within RSH Based on Initial Obs	Exposure Index	% Within RSH at anytime

RSH: The likely "rotor-swept heights" for potential collision with a turbine blade, or 25-150 meters (82-492 feet) above ground level.

[a] 100-meter radius plot

[b] per 10-minute survey

Note: obs = observations

Appendix D. Mean Use by Point for All Birds, Major Bird Types, and Diurnal Raptor Subtypes Recorded during Fixed-Point Bird Use Surveys at the Walleye Wind Energy Project Study Area from January 29 – December 17, 2018

Appendix D1. Mean use (number of birds/plot[a]/survey[b]) by point for all birds, major bird types, and diurnal raptor subtypes observed at the Walleye Wind Energy Project Study Area during fixed-point bird use surveys from January 29 – December 17, 2018.

	Survey Point											
Bird Type	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Waterbirds	0	0	0	0	0	0	0	0	0.60	0	0	0
Waterfowl	3.17	0.09	0	0.33	0	1.10	5.00	0	0.40	0	0	0
Shorebirds	0	0.09	0.08	0.33	1.67	0.10	0	0	0.30	0	0.30	0
Gulls/Terns	0	0.09	0	0.33	0	0.10	0	0	0	0	0	0
Diurnal Raptors	0.17	0.09	0.50	0.25	0.25	0.20	0.50	0	0.20	0.20	0.60	0
Accipiters	*0*	*0.09*	*0.08*	*0*	*0.08*	*0.10*	*0.10*	*0*	*0*	*0*	*0*	*0*
Buteos	*0.17*	*0*	*0.42*	*0.17*	*0.17*	*0.10*	*0.40*	*0*	*0.20*	*0.20*	*0.30*	*0*
Northern Harrier	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0.10*	*0*
Eagles	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0.10*	*0*
Falcons	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0.10*	*0*
Other Raptors	*0*	*0*	*0*	*0.08*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Owls	0	0.09	0	0	0	0	0	0	0	0	0	0
Vultures	0	0	0	0	0.33	0	0.20	0.30	0	0.10	0.20	0
Upland Game Birds	0	0.09	0	0.25	0.08	0.50	0	0.20	0	0	0.10	0
Doves/Pigeons	0.42	0.36	0.08	0.42	0.83	0.20	3.90	1.60	4.40	1.30	0.50	0.90
Large Corvids	0.08	1.18	0.08	0.17	0.17	2.30	0.30	3.60	6.30	0.70	4.40	0
All Large Birds[c]	**3.83**	**2.09**	**0.75**	**2.08**	**3.33**	**4.50**	**9.90**	**5.70**	**12.20**	**2.30**	**6.10**	**0.90**
Passerines	10.92	4.55	2.83	8.00	5.25	3.30	5.80	2.80	5.30	3.90	7.60	3.90
Swifts/Hummingbirds	0.08	0	0	0	0	0	0	0	0	0	0	0
Woodpeckers	0	0	0.08	0.08	0	0	0	0	0	0	0	0
Unidentified Birds	0	0	0	0	0	0	0	0	0	0.10	0	0
All Small Birds[c]	**11.00**	**4.55**	**2.92**	**8.08**	**5.25**	**3.30**	**5.80**	**2.80**	**5.30**	**4.00**	**7.60**	**3.90**

[a] 800-meter (m) radius plot for large birds, 100-m for small birds

[b] per 20-minute (min) survey for large birds; per 10-min survey for small birds

[c] Sums of values may not add to total value shown due to rounding.

Appendix D1 (*continued*). Mean use (number of birds/plot[a]/survey[b]) by point for all birds, major bird types, and diurnal raptor subtypes observed at the Walleye Wind Energy Project Study Area during fixed-point bird use surveys from January 29 – December 17, 2018.

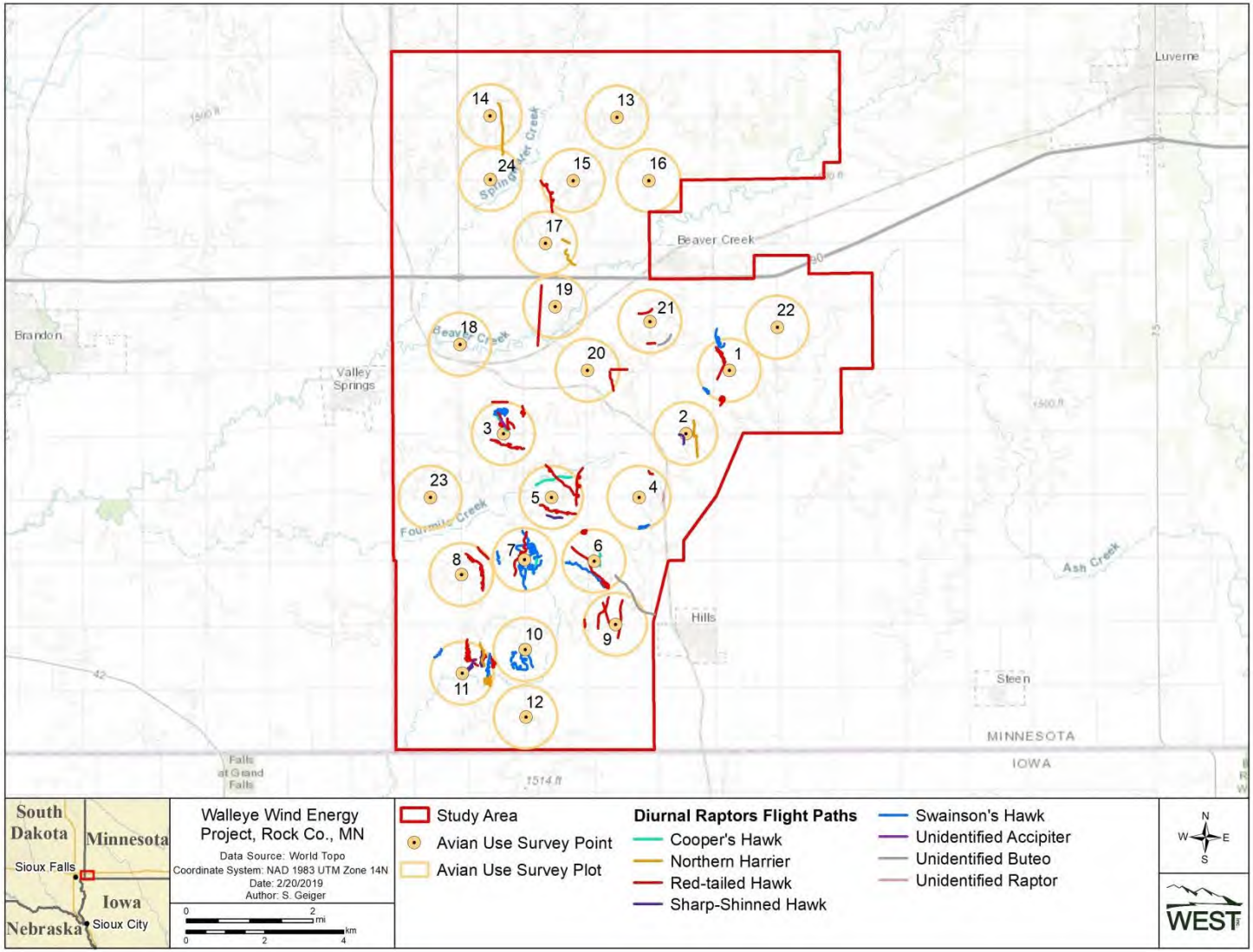
	Survey Point											
Bird Type	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**
Waterbirds	0	0	0.33	0	0	0	0	0	0	0	0	0
Waterfowl	0	0	0	0	0	0	0	0	0	0	0	0
Shorebirds	0	0	0	0	0	0	0	0	0	0	0	0
Gulls/Terns	0	0	0	0	0	0	0	0	0	0	0	0
Diurnal Raptors	0	0.33	0.33	0	0.67	0	0.33	0.67	1.00	0	0	0
Accipiters	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Buteos	*0*	*0*	*0.33*	*0*	*0*	*0*	*0.33*	*0.67*	*1.00*	*0*	*0*	*0*
Northern Harrier	*0*	*0.33*	*0*	*0*	*0.67*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Eagles	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Falcons	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Other Raptors	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Owls	0	0	0	0	0	0	0	0	0	0	0	0
Vultures	0	0	0	0	0	0	0	0	0	0	0	0
Upland Game Birds	0	0	0	0	0	0.33	1.33	0	0	0	0	0
Doves/Pigeons	0	2.00	0	0	0.67	13.00	6.67	1.00	3.67	0	0.50	0
Large Corvids	0	0.33	0.33	0	0	0.67	2.33	0	0	0.67	0	1.00
All Large Birds[c]	**0**	**2.67**	**1.00**	**0**	**1.33**	**14.00**	**10.67**	**1.67**	**4.67**	**0.67**	**0.50**	**1.00**
Passerines	16.67	7.67	0.33	0	1.33	3.33	2.00	17.33	27.00	0	0	0
Swifts/Hummingbirds	0	0	0	0	0	0	0	0	0	0	0	0
Woodpeckers	0	0	0	0	0	0	0.33	0	0	0	0	0
Unidentified Birds	0	0	0	0	0	1.00	0	0	0	0	0	0
All Small Birds[c]	**16.67**	**7.67**	**0.33**	**0**	**1.33**	**4.33**	**2.33**	**17.33**	**27.00**	**0**	**0**	**0**

[a] 800-meter (m) radius plot for large birds, 100-m for small birds

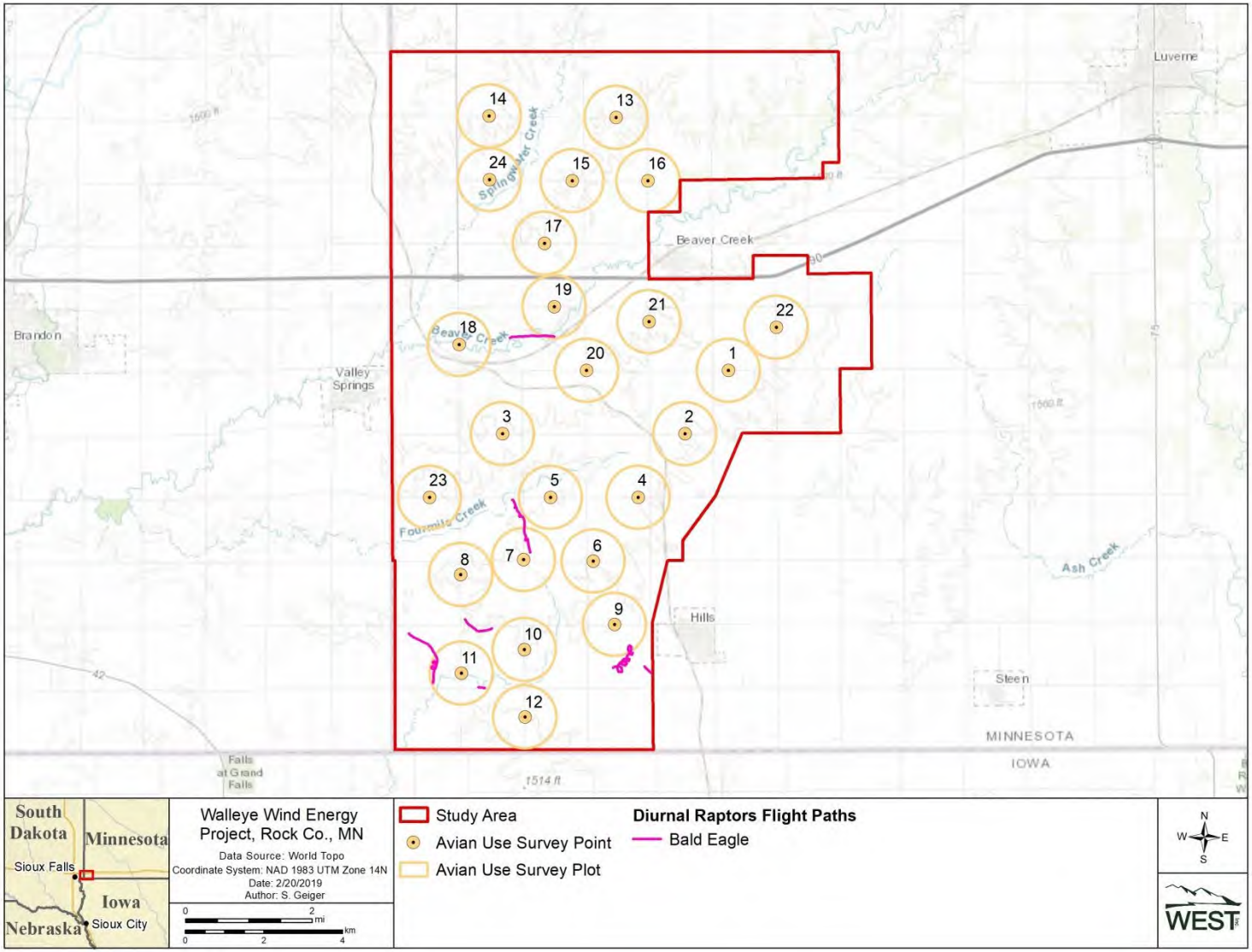
[b] per 20-minute (min) survey for large birds; per 10-min survey for small birds

[c] Sums of values may not add to total value shown due to rounding.

Appendix E. Diurnal Raptor and Eagle Flight Paths Recorded during 20-Minute Large Bird and 60-Minute Eagle Surveys at the Walleye Wind Energy Project Study Area from January 29 – December 17, 2018



Appendix E1. Diurnal raptor (non-eagle) flight paths recorded at the Walleye Wind Energy Project Study Area during 20-minute large bird surveys from January 29 – December 17, 2018.



Appendix E2. Eagle flight paths recorded at the Walleye Wind Energy Project Study Area during 60-minute eagle surveys from January 29 – December 17, 2018.

Appendix F. Fatality Summary Tables for the Midwest Region of North America

Appendix F1. Wind energy facilities in the Midwest region of North America with publicly available and comparable fatality data for all bird species.

Wind Energy Facility	Fatality Estimate[a]	Number. of Turbines	Total Megawatts
Midwest			
Wessington Springs, SD (2009)	8.25	34	51
Blue Sky Green Field, WI (2008; 2009)	7.17	88	145
Cedar Ridge, WI (2009)	6.55	41	67.6
Waverly Wind, KS (2016-2017)	5.95	95	199
Buffalo Ridge, MN (Phase III; 1999)	5.93	138	103.5
Moraine II, MN (2009)	5.59	33	49.5
Barton I & II, IA (2010-2011)	5.5	80	160
Buffalo Ridge I, SD (2009-2010)	5.06	24	50.4
Odell, MN (2016-2017)	4.69	100	200
Black Oak Getty, MN (2017)	4.37	39	78
Buffalo Ridge, MN (Phase I; 1996)	4.14	73	25
Winnebago, IA (2009-2010)	3.88	10	20
Rugby, ND (2010-2011)	3.82	71	149
Cedar Ridge, WI (2010)	3.72	41	68
Elm Creek II, MN (2011-2012)	3.64	62	148.8
Buffalo Ridge, MN (Phase II; 1999)	3.57	143	107.25
Buffalo Ridge, MN (Phase I; 1998)	3.14	73	25
Ripley, ON (2008)	3.09	38	76
Fowler I, IN (2009)	2.83	162	301
Lakefield Wind, MN (2012)	2.75	137	205.5
Buffalo Ridge, MN (Phase I; 1997)	2.51	73	25
Buffalo Ridge, MN (Phase II; 1998)	2.47	143	107.25
PrairieWinds SD1, SD (2012-2013)	2.01	108	162
Buffalo Ridge II, SD (2011-2012)	1.99	105	210
Kewaunee County, WI (1999-2001)	1.95	31	20.46
PrairieWinds SD1, SD (2013-2014)	1.66	108	162
NPPD Ainsworth, NE (2006)	1.63	36	20.5
PrairieWinds ND1 (Minot), ND (2011)	1.56	80	115.5
Elm Creek, MN (2009-2010)	1.55	67	100
Thunder Spirit, ND (2016-2017)	1.49	43	108
PrairieWinds ND1 (Minot), ND (2010)	1.48	80	115.5
Buffalo Ridge, MN (Phase I; 1999)	1.43	73	25
PrairieWinds SD1, SD (2011-2012)	1.41	108	162
Top Crop I & II (2012-2013)	1.35	68 (phase I) 132 (phase (II)	300 (102 [phase I] 198 [phase II])
Prince Wind Farm, ON (2008)	0.89	126	189
Wessington Springs, SD (2010)	0.89	34	51
Rail Splitter, IL (2012-2013)	0.84	67	100.5
Top of Iowa, IA (2004)	0.81	89	80
Pleasant Valley, MN (2016-2017)	0.68	100	200
Big Blue, MN (2013)	0.6	18	36
Grand Ridge I, IL (2009-2010)	0.48	66	99
Prairie Rose, MN (2014)	0.44	119	200
Top of Iowa, IA (2003)	0.42	89	80
Big Blue, MN (2014)	0.37	18	36
Pioneer Prairie I, IA (Phase II; 2011-2012)	0.27	62	102.3
Prince Wind Farm, ON (2007)	0.26	126	189

[a] Number of bird fatalities/megawatt/year

Appendix F1 (*continued*). Wind energy facilities in the Midwest region of North America with publicly available and comparable fatality data for all bird species.

Data from the following sources:

Wind Energy Facility	Estimate Reference	Wind Energy Facility	Estimate Reference
Barton I & II, IA (2010-2011)	Derby et al. 2011a	NPPD Ainsworth, NE (2006)	Derby et al. 2007
Big Blue, MN (2013)	Fagen Engineering 2014	Odell, MN (2016-2017)	Chodachek and Gustafson 2018
Big Blue, MN (2014)	Fagen Engineering 2015	Pioneer Prairie I, IA (Phase II; 2011-2012)	Chodachek et al. 2012
Black Oak Getty, MN (2017)	Pickle et al. 2018	Pleasant Valley, MN (2016-2017)	Tetra Tech 2017b
Blue Sky Green Field, WI (2008; 2009)	Gruver et al. 2009	Prairie Rose, MN (2014)	Chodachek et al. 2015
Buffalo Ridge I, SD (2009-2010)	Derby et al. 2010d	PrairieWinds ND1 (Minot), ND (2010)	Derby et al. 2011b
Buffalo Ridge II, SD (2011-2012)	Derby et al. 2012a	PrairieWinds ND1 (Minot), ND (2011)	Derby et al. 2012b
Buffalo Ridge, MN (Phase I; 1996)	Johnson et al. 2000	PrairieWinds SD1, SD (2011-2012)	Derby et al. 2012c
Buffalo Ridge, MN (Phase I; 1997)	Johnson et al. 2000	PrairieWinds SD1, SD (2012-2013)	Derby et al. 2013
Buffalo Ridge, MN (Phase I; 1998)	Johnson et al. 2000	PrairieWinds SD1, SD (2013-2014)	Derby et al. 2014
Buffalo Ridge, MN (Phase I; 1999)	Johnson et al. 2000	Prince Wind Farm, ON (2007)	Natural Resource Solutions, Inc. 2008b
Buffalo Ridge, MN (Phase II; 1998)	Johnson et al. 2000	Prince Wind Farm, ON (2008)	Natural Resource Solutions, Inc. 2009
Buffalo Ridge, MN (Phase II; 1999)	Johnson et al. 2000	Rail Splitter, IL (2012-2013)	Good et al. 2013b
Buffalo Ridge, MN (Phase III; 1999)	Johnson et al. 2000	Ripley, ON (2008)	Jacques Whitford 2009
Cedar Ridge, WI (2009)	BHE Environmental 2010	Rugby, ND (2010-2011)	Derby et al. 2011c
Cedar Ridge, WI (2010)	BHE Environmental 2011	Thunder Spirit, ND (2016-2017)	Derby et al. 2018
Elm Creek II, MN (2011-2012)	Derby et al. 2012d	Top Crop I & II (2012-2013)	Good et al. 2013a
Elm Creek, MN (2009-2010)	Derby et al. 2010c	Top of Iowa, IA (2003)	Jain 2005
Fowler I, IN (2009)	Johnson et al. 2010a	Top of Iowa, IA (2004)	Jain 2005
Grand Ridge I, IL (2009-2010)	Derby et al. 2010f	Waverly Wind, KS (2016-2017)	Tetra Tech 2017a
Kewaunee County, WI (1999-2001)	Howe et al. 2002	Wessington Springs, SD (2009)	Derby et al. 2010a
Lakefield Wind, MN (2012)	Minnesota Public Utilities Commission 2012	Wessington Springs, SD (2010)	Derby et al. 2011d
Moraine II, MN (2009)	Derby et al. 2010b	Winnebago, IA (2009-2010)	Derby et al. 2010e

Appendix F2. Wind energy facilities in the Midwest region of North America with publicly-available and comparable use and fatality data for raptors.

Wind Energy Facility	Use Estimate[a]	Raptor Fatality Estimate[b]	Number of Turbines	Total Megawatts
Walleye Wind Energy Project, MN	**0.24**	**-**	**-**	**-**
	Midwest			
Buffalo Ridge, MN (Phase I; 1999)	NA	0.47	73	25
Moraine II, MN (2009)	NA	0.37	33	49.5
Winnebago, IA (2009-2010)	NA	0.27	10	20
Buffalo Ridge I, SD (2009-2010)	NA	0.2	24	50.4
Cedar Ridge, WI (2009)	NA	0.18	41	67.6
Thunder Spirit, ND (2016-2017)	NA	0.18	43	108
PrairieWinds SD1, SD (2013-2014)	NA	0.17	108	162
Top of Iowa, IA (2004)	NA	0.17	89	80
Cedar Ridge, WI (2010)	NA	0.13	41	68
Ripley, ON (2008)	NA	0.1	38	76
Prairie Rose, MN (2014)	NA	0.08	119	200
Wessington Springs, SD (2010)	0.232	0.07	34	51
NPPD Ainsworth, NE (2006)	NA	0.06	36	20.5
Rugby, ND (2010-2011)	NA	0.06	71	149
Wessington Springs, SD (2009)	0.232	0.06	34	51
PrairieWinds ND1 (Minot), ND (2010)	NA	0.05	80	115.5
PrairieWinds ND1 (Minot), ND (2011)	NA	0.05	80	115.5
PrairieWinds SD1, SD (2012-2013)	NA	0.03	108	162
Barton I & II, IA (2010-2011)	NA	0	80	160
Big Blue, MN (2013)	NA	0	18	36
Big Blue, MN (2014)	NA	0	18	36
Black Oak Getty, MN (2017)	NA	0	39	78
Blue Sky Green Field, WI (2008; 2009)	NA	0	88	145
Buffalo Ridge II, SD (2011-2012)	NA	0	105	210
Buffalo Ridge, MN (Phase I; 1996)	NA	0	73	25
Buffalo Ridge, MN (Phase I; 1997)	NA	0	73	25
Buffalo Ridge, MN (Phase I; 1998)	NA	0	73	25
Buffalo Ridge, MN (Phase II; 1998)	NA	0	143	107.25
Buffalo Ridge, MN (Phase II; 1999)	NA	0	143	107.25
Buffalo Ridge, MN (Phase III; 1999)	NA	0	138	103.5
Elm Creek II, MN (2011-2012)	NA	0	62	148.8
Elm Creek, MN (2009-2010)	NA	0	67	100
Fowler I, IN (2009)	NA	0	162	301
Grand Ridge I, IL (2009-2010)	0.195	0	66	99
Kewaunee County, WI (1999-2001)	NA	0	31	20.46
Lakefield Wind, MN (2012)	NA	0	137	205.5
Pioneer Prairie I, IA (Phase II; 2011-2012)	NA	0	62	102.3
PrairieWinds SD1, SD (2011-2012)	NA	0	108	162
Rail Splitter, IL (2012-2013)	NA	0	67	100.5
Top of Iowa, IA (2003)	NA	0	89	80

[a] Number of raptors/plot/20-minute survey

[b] Number of fatalities/megawatt/year

Appendix F2 (*continued*). Wind energy facilities in the Midwest region of North America with publicly available and comparable use and fatality data for raptors.

Data from the following sources:

Wind Energy Facility	Use Estimate	Fatality Estimate	Wind Energy Facility	Use Estimate	Fatality Estimate
Barton I & II, IA (2010-2011)		Derby et al. 2011a	Kewaunee County, WI (1999-2001)		Howe et al. 2002
Big Blue, MN (2013)		Fagen Engineering 2014	Lakefield Wind, MN (2012)		Minnesota Public Utilities Commission 2012
Big Blue, MN (2014)		Fagen Engineering 2015	Moraine II, MN (2009)		Derby et al. 2010b
Black Oak Getty, MN (2017)		Pickle et al. 2018	NPPD Ainsworth, NE (2006)		Derby et al. 2007
Blue Sky Green Field, WI (2008; 2009)		Gruver et al. 2009	Pioneer Prairie I, IA (Phase II; 2011-2012)		Chodachek et al. 2012
Buffalo Ridge I, SD (2009-2010)		Derby et al. 2010d	Prairie Rose, MN (2014)		Chodachek et al. 2015
Buffalo Ridge II, SD (2011-2012)		Derby et al. 2012a	PrairieWinds ND1 (Minot), ND (2010)		Derby et al. 2011b
Buffalo Ridge, MN (Phase I; 1996)		Johnson et al. 2000	PrairieWinds ND1 (Minot), ND (2011)		Derby et al. 2012b
Buffalo Ridge, MN (Phase I; 1997)		Johnson et al. 2000	PrairieWinds SD1, SD (2011-2012)		Derby et al. 2012c
Buffalo Ridge, MN (Phase I; 1998)		Johnson et al. 2000	PrairieWinds SD1, SD (2012-2013)		Derby et al. 2013
Buffalo Ridge, MN (Phase I; 1999)		Johnson et al. 2000	PrairieWinds SD1, SD (2013-2014)		Derby et al. 2014
Buffalo Ridge, MN (Phase II; 1998)		Johnson et al. 2000	Rail Splitter, IL (2012-2013)		Good et al. 2013b
Buffalo Ridge, MN (Phase II; 1999)		Johnson et al. 2000	Ripley, ON (2008)		Jacques Whitford 2009
Buffalo Ridge, MN (Phase III; 1999)		Johnson et al. 2000	Rugby, ND (2010-2011)		Derby et al. 2011c
Cedar Ridge, WI (2009)		BHE Environmental 2010	Thunder Spirit, ND (2016-2017)		Derby et al. 2018
Cedar Ridge, WI (2010)		BHE Environmental 2011	Top of Iowa, IA (2003)		Jain 2005
Elm Creek II, MN (2011-2012)		Derby et al. 2012d	Top of Iowa, IA (2004)		Jain 2005
Elm Creek, MN (2009-2010)		Derby et al. 2010c	Wessington Springs, SD (2009)	Derby et al. 2008	Derby et al. 2010a
Fowler I, IN (2009)		Johnson et al. 2010a	Wessington Springs, SD (2010)		Derby et al. 2011d
Grand Ridge I, IL (2009-2010)	Derby et al. 2009	Derby et al. 2010f	Winnebago, IA (2009-2010)		Derby et al. 2010e

Appendix G. Summary of Publicly Available Studies at Modern North American Wind Energy Facilities in the Midwest that Report Fatality and Species Data for Birds

Appendix G. Summary of publicly available studies at modern North American wind energy facilities in the Midwest that report cumulative fatality and species data for birds by individuals.

Data from the following sources:

Project, Location	Reference	Project, Location	Reference
Barton I & II, IA (2010-2011)	Derby et al. 2011a	Fowler I, II, III, IN (2012)	Good et al. 2013c
Big Blue, MN (2013)	Fagen Engineering 2014	Fowler III, IN (2009)	Johnson et al. 2010b
Big Blue, MN (2014)	Fagen Engineering 2015	Grand Ridge I, IL (2009-2010)	Derby et al. 2010f
Blue Sky Green Field, WI (2008; 2009)	Gruver et al. 2009	Harrow, Ont (2010)	Natural Resource Solutions 2011
Buffalo Ridge, MN (1994-1995)	Osborn et al. 1996, 2000	Heritage Garden I, MI (2012-2013)	Kerlinger et al. 2014
Buffalo Ridge, MN (2000)	Johnson et al. 2000	Heritage Garden I, MI (2013-2014)	Kerlinger et al. 2014
Buffalo Ridge, MN (Phase I; 1996)	Johnson et al. 2000	Kewaunee County, WI (1999-2001)	Howe et al. 2002
Buffalo Ridge, MN (Phase I; 1997)	Johnson et al. 2000	Lakefield Wind, MN (2012)	Minnesota Public Utilities Commission 2012
Buffalo Ridge, MN (Phase I; 1998)	Johnson et al. 2000	Melancthon, Ont (Phase I; 2007)	Stantec Ltd. 2008
Buffalo Ridge, MN (Phase I; 1999)	Johnson et al. 2000	Moraine II, MN (2009)	Derby et al. 2010b
Buffalo Ridge, MN (Phase II; 1998)	Johnson et al. 2004	NPPD Ainsworth, NE (2006)	Derby et al. 2007
Buffalo Ridge, MN (Phase II; 1999)	Johnson et al. 2004	Pioneer Prairie I, IA (Phase II; 2011-2012)	Chodachek et al. 2012
Buffalo Ridge, MN (Phase II; 2001/Lake Benton I)	Johnson et al. 2000	Pioneer Prairie II, IA (2013)	Chodachek et al. 2014
Buffalo Ridge, MN (Phase III; 1999)	Johnson et al. 2004	Pioneer Trail, IL (2012-2013)	ARCADIS 2013
Buffalo Ridge, MN (Phase III; 2001/Lake Benton II)	Johnson et al. 2004	Prairie Rose, MN (2014)	Chodachek et al. 2015
Buffalo Ridge I, SD (2009-2010)	Derby et al. 2010d	PrairieWinds ND1 (Minot), ND (2010)	Derby et al. 2011b
Buffalo Ridge II, SD (2011-2012)	Derby et al. 2012a	PrairieWinds ND1 (Minot), ND (2011)	Derby et al. 2012b
Cedar Ridge, WI (2009)	BHE Environmental 2010	PrairieWinds SD1 (Crow Lake), SD (2011-2012)	Derby et al. 2012c
Cedar Ridge, WI (2010)	BHE Environmental 2011	PrairieWinds SD1 (Crow Lake), SD (2012-2013)	Derby et al. 2013
Crescent Ridge, IL (2005-2006)	Kerlinger et al. 2007	PrairieWinds SD1 (Crow Lake), SD (2013-2014)	Derby et al. 2014
Crystal Lake II, IA (2009)	Derby et al. 2010g	Rail Splitter, IL (2012-2013)	Good et al. 2013b
Elm Creek, MN (2009-2010)	Derby et al. 2010c	Ripley, Ont (2008)	Jacques Whitford 2009
Elm Creek II, MN (2011-2012)	Derby et al. 2012d	Ripley, Ont (Fall 2009)	Golder Associates 2010
Forward Energy Center, WI (2008-2010)	Grodsky and Drake 2011	Rugby, ND (2010-2011)	Derby et al. 2011c

Appendix G. Summary of publicly available studies at modern North American wind energy facilities in the Midwest that report cumulative fatality and species data for birds by individuals.

Data from the following sources:

Project, Location	Reference	Project, Location	Reference
Fowler, IN (2014)	Good et al. 2014	Top Crop I & II, IL (2012-2013)	Good et al. 2013a
Fowler, IN (2015)	Good et al. 2016	Top of Iowa, IA (2003)	Jain 2005
Fowler, IN (2016)	Good et al. 2017	Top of Iowa, IA (2004)	Jain 2005
Fowler I, IN (2009)	Johnson et al. 2010a	Wessington Springs, SD (2009)	Derby et al. 2010a
Fowler I, II, III, IN (2010)	Good et al. 2011	Wessington Springs, SD (2010)	Derby et al. 2011d
Fowler I, II, III, IN (2011)	Good et al. 2012	Winnebago, IA (2009-2010)	Derby et al. 2010e