

Appendix G

Avian and Bat Protection Plan

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Plum Creek Wind Project: Avian and Bat Protection Plan

Cottonwood, Murray, and Redwood Counties, Minnesota



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APPENDICES

Appendix A Agency Correspondence/Natural Heritage Information System

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1 INTRODUCTION

Plum Creek Wind Farm, LLC, (Plum Creek) a subsidiary of Geronimo Energy, is developing the Plum Creek Wind Project (Project) in Cottonwood, Murray, and Redwood counties in Minnesota (Map Exhibit 1). This Avian and Bat Protection Plan (ABPP) provides strategies for avoiding, minimizing, and mitigating risks to birds, bats, and species of special concern during the construction and operation phases of the Project. Additionally, the ABPP outlines a post-construction monitoring program and an adaptive management framework to be implemented during operation.

This document has been developed for the Project to ensure compliance with the regulatory framework outlined in Section 1.2 of this document. It incorporates recommendations made by the US Fish and Wildlife Service (USFWS), Minnesota Department of Commerce (MDOC), and the Minnesota Department of Natural Resources (MNDNR; Appendix A [Agency Correspondence]). It further provides (1) guidance on avoiding, minimizing, and mitigating the risks to birds and bats during the construction and operation of the Project, and (2) incorporates a framework for complying with federal and state laws and meeting the proposed conditions of the Project's site permits under consideration by the Minnesota Public Utilities Commission (MPUC). The processes and procedures set forth are designed to ensure:

- Avian and bat fatalities and secondary effects on wildlife are minimized at the Project
- Project-related actions comply with federal and state wildlife regulations
- If wildlife-related conditions are contained in the MPUC site permits, they will be fulfilled
- Ongoing surveys, monitoring, and management efforts are undertaken to avoid and minimize adverse wildlife impacts throughout all phases of the Project
- Bird and bat injuries and fatalities are effectively documented to provide a basis for ongoing development of avian and bat protection procedures
- Adequate implementation training is provided to the Construction Contractor and Operations and Maintenance staff
- Coordination between the Project developers and operators, MDOC Energy Environmental Review & Analysis (EERA) Staff, and the MPUC is effective and continuous

1.1 Project Description

The Project comprises approximately 72,958 acres (ac) at the intersection of Cottonwood, Murray, and Redwood counties in southwestern Minnesota, east of the South Dakota border (Map Exhibit 1). The Project is located less than one mile south and east of Walnut Grove and 2.5 miles east of Currie; Westbrook is approximately one mile to the southeast, and the town of Dovray is located just outside the southwestern portion of the Project (Map Exhibit 2).

1.1.1 Project Design

Plum Creek continues to assess the options for turbine models and placement at the Project. The Project will have a nameplate capacity of up to 414 megawatts (MW) of wind energy capacity and associated infrastructure (i.e., turbine pads, access roads, underground collection system, a Project substation, and an operations and maintenance facility). Plum Creek is evaluating wind turbines with rated power outputs ranging from 2.8 MW to 5.6 MW, which would result in the installation of between 74 and 110 wind turbines. This draft of the ABPP provides an evaluation of turbines that are typical of the environmental impacts that may be associated with turbines in this nameplate capacity range. Once the turbine type and layout is finalized, this ABPP will be updated accordingly.

The Project's permanent facilities will include:

- Wind turbines and related equipment
- New gravel access roads and improvements to existing roads
- Underground electrical collection and communication lines
- Transmission line (approximately 345 kV)
- Operations and maintenance facility
- Project substation facilities
- Interconnection facilities
- Up to 4 permanent meteorological towers (height dependent on the final turbine hub height)
- Sonic or Light Range detecting unit (SoDAR or LiDAR)
- A temporary batch plant and staging/laydown area for construction of the Project

1.2 Regulatory Framework

1.2.1 Environmental Law Compliance

Federal, state, and local environmental regulations that govern the Project are described below. The developers and operators of the Project intend to comply with all of these regulations. This document is a guide by which construction and operations staff will be able to determine whether they are in compliance with these regulations. The State of Minnesota's Wind Siting Act (Minnesota Statutes Chapter 216F), discussed in Section 1.2.2 below, is of particular importance to development of the Project. This Act provides that the site permit is the environmental document for the wind farm, with no other environmental document required by state or local governments (i.e., an Environmental Assessment, Environmental Assessment Worksheet, or an Environmental Impact Statement). The site permit will be the source of most of the operational conditions and protocols that define standard procedures at the Project, including condition 5.2, which requires compliance with the construction practices, operation and maintenance practices, and material specifications described in the site permit application for the Project.

1.2.2 *State of Minnesota Site Permitting*

The Minnesota Wind Siting Act requires that a developer obtain a permit from the MPUC to build and operate a large wind energy conversion system (LWECS). LWECS is defined as “any combination of [wind energy conversion systems] with a combined nameplate capacity of 5,000 kilowatts or more” (Minnesota Statutes § 216F.01). According to the statute, the siting of a LWECS must be compatible with environmental preservation, sustainable development, and the efficient use of resources (Minnesota Statutes § 216F.03). Further, the criteria considered by the MPUC in designating LWECS sites must include the impact of the LWECS on humans and the environment (Minnesota Statutes § 216F.05).

1.2.3 *Endangered Species Act*

Federal law protects endangered (FE) and threatened (FT) species under the Endangered Species Act of 1973 (ESA; 16 United States Code [USC] §§ 1531 et seq., as amended). The ESA defines and lists species as “endangered” or “threatened” and provides regulatory protection for the listed species. The ESA establishes a program for conservation and recovery of threatened and endangered species, and ensures the conservation of designated critical habitat that the USFWS has determined is required for the survival and recovery of listed species. Section 9 of the ESA prohibits the “take” of species listed by USFWS as threatened or endangered. Section 3 defines take as follows: “to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.” Section 10(a) of the ESA includes provisions for take that is incidental to, but not the purpose of, otherwise lawful activities. An incidental take permit may be issued under Section 10(a)(1)(B) if incidental take could occur at a project and if this take does not jeopardize the survival and recovery of the species.

One federally listed threatened bat species, the northern long-eared bat (NLEB; *Myotis septentrionalis*), occurs in Minnesota. On January 14, 2016, the USFWS posted the final ESA 4(d) rule for NLEB in the Federal Register. This rule largely establishes an exemption for development and operation of wind energy facilities from needing to obtain any take coverage for NLEB, unless the Project would directly impact a known hibernation or maternity-roost site.

1.2.4 *Migratory Bird Treaty Act*

The Migratory Bird Treaty Act of 1918 (MBTA; 16 USC §§ 703-711) prohibits the taking of migratory birds, their eggs, parts, and nests, except when specifically permitted by regulations. This includes over one thousand species of raptors, diurnal migrants, and passerine migratory birds. The MBTA only regulates direct takings, not habitat modifications. Due to the potential for resident and migratory birds within the Project, compliance with the MBTA has been considered in the development of this ABPP. The level of direct taking by a wind energy facility that would invoke prosecution under the MBTA has not been established, and there is currently no mechanism to grant permits for incidental take under the MBTA. Furthermore, on December 22, 2017, the US Department of the Interior (USDOI) issued a memorandum finding that the MBTA’s prohibitions apply, “only to affirmative actions that have as their purpose the taking or killing of migratory birds, their nests, or their eggs” (USDOI 2017).

1.2.5 Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act of 1940 (BGEPA; 16 USC 668–668c, as amended) is administered by the USFWS. The BGEPA protects bald and golden eagles (*Haliaeetus leucocephalus* and *Aquila chrysaetos*, respectively), their nests, eggs, and parts (e.g., feathers or talons). The BGEPA states that no person shall take, possess, sell, purchase, barter, offer for sale, transport, export, or import any bald or golden eagle alive or dead, or any part, nest or egg without a valid permit to do so. Take is defined by the BGEPA as an action “to pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb.” Disturb is defined in the BGEPA 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” (50 Code of Federal Regulations [CFR] § 22.3). In addition to immediate impacts, this definition also covers impacts that result from human-caused alterations initiated around a previously used nest site during a time when eagles were not present.

In September 2009, the USFWS established rules (see 50 CFR Parts 13 and 22) authorizing limited legal take of bald and golden eagles and their nests “when the take is associated with, but not the purpose of, an otherwise lawful activity, and cannot practicably be avoided.” Such authorization is provided in the form of a take permit issued by the USFWS, consistent with the regulatory criteria. As part of the 2009 Eagle Permit Rule (USFWS 2009), thresholds of take were established, under which a regional population of bald eagles, or an Eagle Management Unit (EMU), would maintain stable or increasing eagle populations. Regulations under 50 CFR 22.26 distinguish take that might result from short-term or one-time actions from take that might result from ongoing, long-term actions (programmatic take).

In 2013, the USFWS finalized the *Eagle Conservation Plan Guidance: Module 1 – Land-based Wind Energy, Version 2* (ECPG; USFWS 2013; 78 FR 25758). The ECPG provides a means of compliance with the BGEPA by providing recommendations and in-depth guidance for:

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

The ECPG interprets and clarifies the permit requirements in the regulations at 50 CFR 22.26 and 22.27, and does not impose any binding requirements beyond those specified in the regulations. However, if eagle risk is identified at a project, developers are strongly encouraged to follow the ECPG. The ECPG describes specific actions that are recommended to achieve compliance with the statutory requirements of the BGEPA for an eagle take permit, as described in 50 CFR 22.26 and 22.27. It provides a framework for assessing and mitigating risk specific to eagles through development of Eagle Conservation Plans (ECP) and issuance of permits for non-purposeful take of eagles at wind facilities.

On December 16, 2016, the USFWS issued a revised Eagle Permit Rule that includes changes to the regulations for eagle incidental take permits and eagle nest take permits. The revisions to the 2009 Eagle Permit Rule went into effect on January 17, 2017, and include changes to permit issuance criteria, duration (including a maximum permit term of 30 years), compensatory mitigation standards, and permit application requirements. The Eagle Permit Rule authorizes take of bald eagles and golden eagles where take: (1) is compatible with the preservation of the bald and golden eagle; (2) is associated with and not the purpose of an otherwise lawful activity; and (3) cannot practicably be avoided (50 CFR § 22.26).

1.2.6 Minnesota Threatened and Endangered Species Laws

Minnesota's Endangered Species Statute (Minnesota Statutes § 84.0895) requires the MNDNR to adopt rules designating species meeting the statutory definitions of Endangered, Threatened, and Special Concern Species. The resulting List of Endangered, Threatened, and Special Concern Species is codified as Minnesota Rules, Chapter 6134. The Endangered Species Statute also authorizes the MNDNR to adopt rules that regulate treatment of species designated as endangered and threatened. These regulations are codified as Minnesota Rules, Parts 6212.1800 to 6212.2300. MNDNR defines endangered, threatened, and special concern species as follows:

- *Endangered* – a plant or animal species that is threatened with extinction throughout all or a significant portion of its range in Minnesota.
- *Threatened* – a plant or animal species that is likely to become endangered within the foreseeable future throughout all or a significant portion of its range in Minnesota.
- *Special Concern* – species that are not endangered or threatened, but are extremely uncommon in Minnesota, or have unique or highly specific habitat requirements and deserve careful monitoring of their status. Species on the periphery of their range that are not listed as threatened may be included in this category along with those species that were once threatened or endangered but now have increasing or protected, stable populations.

1.2.7 State and Federal Wind Energy Guidelines

Guidance, recommendations, and regulations regarding wind-project development and wildlife impacts are being developed and constantly changing at federal, state and local levels. On March 23, 2012, the USFWS released final Land-Based Wind Energy Guidelines (WEG) to mitigate impacts to wildlife and their habitats related to land-based wind energy facilities (USFWS 2012). The WEG outlines a tiered research approach that includes searches of existing literature and data to identify potential issues of concern, field studies to provide additional data where necessary, and post-construction mortality studies to identify and quantify impacts. This guidance document recommends that wind developers voluntarily adhere to these guidelines and communicate with the USFWS as part of their due diligence process in order to avoid, minimize, and mitigate impacts to species protected under the BGEPA and MBTA. In turn, the USFWS will “regard a developer's or operator's adherence to these Guidelines, including communication with the Service, as appropriate means of identifying and implementing reasonable and effective measures to avoid the take of species protected under the MBTA and BGEPA” (USFWS 2012).

Previously, the USFWS had published Interim Voluntary Guidelines (USFWS 2003) that outlined recommendations for site and turbine design and operations, and presented a quantitative method for initial site evaluation. The 2003 guidelines were not widely used, and the 2012 WEG replaced them.

The WEG targets “species of concern” and “species of habitat fragmentation concern.” The guidelines define a species of concern as “For a particular wind energy project, any species which 1) is either a) listed as an endangered, threatened or candidate species under the ESA, subject to the MBTA or BGEPA; b) is designated by law, regulation, or other formal process for protection and/ or management by the relevant agency or other authority; or c) has been shown to be significantly adversely affected by wind energy development, and 2) is determined to be possibly affected by the project” (USFWS 2012). It defines species of habitat fragmentation concern as those, “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 area. Habitat fragmentation from a wind energy project may create significant barriers for such species” (USFWS 2012).

Additional federal involvement in wind energy projects may be triggered through the Clean Water Act (1972), National Historic Preservation Act (1966), and the National Environmental Protection Act (NEPA). The US Army Corps of Engineers (USACE) has permitting authority over proposed impacts to federally protected Waters of the United States, including many wetlands. Wetlands are also protected at the state level by the Minnesota Board of Water and Soil Resources. Cultural resources are protected at the state level by the State Historic Preservation Office (SHPO) in collaboration with the federal Advisory Council on Historic Preservation. Federal permitting through the USACE, USFWS, or SHPO may trigger NEPA review of a proposed wind project.

The *Minnesota Department of Natural Resources Guidance for Commercial Wind Energy Projects*, which was updated in July of 2018 (MNDNR 2011), outlines the necessary issues to consider when applying for commercial wind energy permits in Minnesota. Additionally, in June 2014, the state issued the *Avian and Bat Survey Protocols for Large Wind Energy Conversion Systems in Minnesota* (*Avian and Bat Survey Protocols*; Mixon et al. 2014). This document outlines the recommended pre- and post-construction surveys for avian and bat species for large-scale wind projects in the state.

2 SITE CHARACTERIZATION

As part of this Project, Plum Creek followed the WEG and conducted Tier 1 and Tier 2 site characterization studies, which included analyzing available data in the literature and soliciting information from expert sources. These analyses were used to identify broader environmental and site-development issues. Detailed information from these analyses are found in the Western EcoSystems Technology, Inc. (WEST) Site Characterization Study (Trana et al. 2019). Findings and concerns from these studies are summarized briefly below.

2.1 Habitat and Land Cover

The Project lies within the Western Corn Belt Plains (47) Level III ecoregion and the Des Moines Lobe (47b) Level IV ecoregion (US Environmental Protection Agency 2017). The Western Corn Belt Plains ecoregion is a flat to gently rolling landscape of glacial till. The region is characterized by tallgrass prairie, riparian forests, oak-prairie savanna, and wetlands. Recent wetland and tallgrass prairie restoration efforts offer suitable habitat for waterfowl nesting and migration. The Des Moines Lobe is a geologically young landscape with gentle rolling till plains and poorly defined drainage. A few scattered lakes and a mix of row crops are present in this region and within the Project itself.

Land cover within the Project is primarily cultivated crops (90.9%; Table 1, Map Exhibit 2). Other land cover types within the Project include developed space, primarily in the form of roads, which accounts for approximately 4.5% of the Project, emergent herbaceous wetlands (1.6%), and herbaceous land (1.4%). The remaining land cover types within the Project (hay/pasture, deciduous forest, open water, woody wetlands, and barren land) each compose less than 1% of the Project (Table 1, Map Exhibit 2).

Table 1. Land cover types present within the Plum Creek Wind Project.

Land Cover	Project Acres	% Total
Cultivated Crops	66,310	90.9%
Developed-Classes Merged	3,299	4.5%
Emergent Herbaceous Wetlands	1,190	1.6%
Herbaceous	1,029	1.4%
Hay/Pasture	535	0.7%
Deciduous Forest	473	0.7%
Open Water	52	0.1%
Woody Wetlands	50	0.1%
Barren Land	20	<0.1%
Total	72,958	100

Source: US Geological Survey National Land Cover Database 2011, Homer et al. 2015.

Land within the Project is mostly privately owned, but there are several protected areas and conservation easements within the Project. These include National Wildlife Refuges (NWRs), and Reinvest in Minnesota conservation easements (Map Exhibit 3, Map Exhibit 4). Some of these protected lands overlap with parcels identified by the MNDNR as designated native plant communities or Minnesota Biological Survey-identified Sites of Biodiversity Significance (Figure 6), which can be designated on either protected (regulated/managed) lands or private lands, and are discussed further below.

The MBS is an effort by the MNDNR that “systematically collects, interprets, and delivers baseline data on the distribution and ecology of rare plants, rare animals, native plant communities, and functional landscapes needed to guide decision making” (MNDNR 2018). Biodiversity significance ranks include outstanding, high, moderate, and below. Within the Project, several small areas have been evaluated for their biodiversity significance by the MBS. All MBS sites within the Project

are ranked as “below” or “moderate”; and there are no sites of “high” or “outstanding” biodiversity significance within the Project. There are also areas of MBS-mapped native plant communities within the Project including dry hill prairie, southern west mesic hardwood forest, basswood-bur oak forest, prairie wetland complexes, and mesic prairie, all of which are associated with sites ranked as having “moderate” biodiversity significance (Map Exhibit 4). The MNDNR Natural Heritage Information System (NHIS) database search identified a record of southern dry hill prairie in the northwest portion of the Project near the confluence of Willow and Plum Creeks. Sites with a rank of “moderate” 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. Sites ranked “below” lack occurrences of rare species or do not meet MBS standards for other rankings (MNDNR 2018). As development continues, Plum Creek will consult with MNDNR to seek advice from department personnel on survey recommendations and/or permit requirements related to listed species, native plant communities, and areas of biodiversity significance.

2.2 Federally Listed Species

The USFWS county distribution list (USFWS 2018, USFWS 2019b), USFWS Information Planning and Consultation (IPaC) Environmental Conservation Online System (ECOS), MNDNR county distribution lists (MNDNR 2019), and the MNDNR NHIS (Appendix A) database indicate that there are five federally listed species that are known or have the potential to occur in or near the Project. These include the NLEB (FT), Poweshiek skipperling (*Oarisma Poweshiek*; FE), Dakota skipper (*Hesperia docatae*; FT), prairie bush clover (*Lespedeza leptostachya*; FT), and Topeka shiner (*Notropis topeka*; FE; Table 2).

Although the majority of the Project is composed of cultivated cropland, the NLEB desktop habitat assessment identified 840 ac of suitable habitat (approximately 1.1% of the Project), concentrated primarily around the streams that flow through the site. However, the majority of the Project does not contain suitable summer habitat for the NLEB and forested areas within the Project are isolated patches that are relatively small. Therefore, while the NLEB may pass through the Project during migration, its potential presence in the Project during the summer is anticipated to be limited to connected riparian corridors. Ongoing site-specific NLEB surveys will help to inform the level of risk for this species.

NHIS records show the Poweshiek skipperling was last recorded in the southwest portion of the Project in 1975. According to the MBS ranking and characterization of habitat (MNDNR 2018) and confirmations of suitable habitat made during the site visit conducted by biologists in 2018, there is potential habitat for the Poweshiek skipperling within the Project in small areas designated as native plant communities along Plum, Pell, Dutch Charley, and Highwater creeks (Map Exhibit 3). No records of the Dakota skipper were identified through the NHIS review and this species is unlikely to occur within the Project due to overall lack of grassland habitat and the dominance of cultivated crops; however, this species could occur in remnant prairie areas. Habitats that could support the prairie bush clover may occur in the Project, generally isolated within sections of remnant prairie on slopes observed at the Project; however, no NHIS records of the prairie bush clover were identified. If impacts to suitable habitat to these prairie-dependent species (wet

meadows and dry and mesic prairies with native forbs and grasses) are proposed to occur, further assessment and field surveys will help to determine the risk to the butterflies and prairie bush clover.

The Topeka shiner is a small minnow species that is restricted to small prairie streams that are tributaries of the Missouri River. Murray County contains critical habitat for the Topeka shiner, with the closest designated critical habitat approximately 16 miles (mi; 26 kilometers [km]) south of the Project in Chanarambie Creek. The Project is located entirely in the Minnesota River watershed, not the Missouri River watershed, and therefore, this species would not be anticipated to occur in waterbodies within the Project.

Table 2: Federally listed species known to occur or have potential to occur in or near the Plum Creek Wind Project in Cottonwood, Murray, and Redwood counties, Minnesota.

Species	Federal Status	Habitat
Northern long-eared bat (<i>Myotis septentrionalis</i>)	Threatened	Mature forest interior and riparian areas. May roost in old buildings. Typically avoids open habitats. Hibernates in caves. The Project may provide some suitable summer habitat for this species limited to mostly isolated forest patches that are relatively small and some wooded riparian areas along streams primarily in the northern portion of the Project. Northern long-eared bats may also migrate through the Project.
Poweshiek skipperling (<i>Oarisma poweshiek</i>)	Endangered	Wet to dry native prairie, but not sand prairie, dominated by native grass. The Project may contain suitable habitat for this species. Due to the dominance of cultivated crops and the overall lack of grassland habitat, this species is expected to occur in low abundance if present within isolated remnant prairies in the Project.
Dakota skipper (<i>Hesperia docatae</i>)	Threatened	Native dry-mesic to dry prairie with mid-height grasses such as little bluestem (<i>Schizachyrium scoparium</i>), prairie dropseed (<i>Sporobolus heterolepis</i>), and side-oats grama grass (<i>Bouteloua curtipendula</i>). Due to the dominance of cultivated crops and the overall lack of grassland habitat, this species is expected to occur in low abundance if present within isolated remnant prairies in the Project.
Topeka shiner (<i>Notropis topeka</i>)	Endangered	Slow moving, small to mid-size prairie streams with sand, gravel, or rubble bottoms within the Missouri River watershed. Prefer pool and oxbow areas outside main river channels. The closest designated critical habitat is approximately 16 miles south of the Project (Chanarambie Creek) and is isolated to the Missouri River watershed; The Project is in the Minnesota River watershed, therefore the species is not expected to occur.
Prairie bush clover (<i>Lespedeza leptostachya</i>)	Threatened	Tallgrass prairie near the Des Moines River Valley. Often grows on steep slopes where cultivation is not possible. During the site visit, slopes with native prairie grasses were observed; therefore, it is possible that habitat for this species occurs in isolated remnant prairies in the Project.

Sources: NatureServe 2019, MNDNR 2019, USFWS 2018, USFWS 2019b

2.3 State-Listed Species

According to the USFWS county distribution list, MNDNR county distribution list, WEST's Site Characterization Study (Trana et al. 2019), and the results of the MNDNR NHIS database search (Appendix A and Trana et al. 2019), six state-listed endangered species (SE), eight state-listed threatened species (ST), and five state "special concern" species have the potential to occur in or near the Project (SC; Table 3).

Table 3. State-listed species that have been recorded or have the potential to occur in or near the Plum Creek Wind Project in Cottonwood, Murray, and Redwood Counties, Minnesota.

Species	State Status
Vertebrate Animals	
Loggerhead shrike (<i>Lanius ludovicianus</i>)	Endangered
Henslow's sparrow (<i>Ammodramus henslowii</i>)	Endangered
Burrowing owl (<i>Athene cunicularia</i>)	Endangered
Wilson's phalarope (<i>Phalaropus tricolor</i>)	Threatened
Blanding's turtle (<i>Emydoidea blandingii</i>)	Threatened
Eastern spotted skunk (<i>Spilogale putorius</i>)	Threatened
Great Plains toad (<i>Anaxyrus cognatus</i>)	Special Concern
Northern grasshopper mouse (<i>Onychomys leucogaster</i>)	Special Concern
Northern long-eared bat (<i>Myotis septentrionalis</i>)	Special Concern
Trumpeter swan (<i>Cygnus buccinators</i>)	Special Concern
Topeka shiner (<i>Notropis topeka</i>)	Special Concern
Invertebrate Animals	
Poweshiek skipperling (<i>Oarisma poweshiek</i>)	Endangered
Dakota skipper (<i>Hesperia docatae</i>)	Threatened
Ottoe skipper (<i>Hesperia ottoe</i>)	Threatened
Vascular Plants	
Wolf's spikerush (<i>Eleocharis wolfii</i>)	Endangered
Eared false foxglove (<i>Agalinis auriculata</i>)	Endangered
Waterhyssop (<i>Bacopa rotundifolia</i>)	Threatened
Short-pointed umbrella sedge (<i>Cyperus acuminatus</i>)	Threatened
Prairie bush clover (<i>Lespedeza leptostachya</i>)	Threatened

Sources: MNDNR 2019, USFWS 2018, USFWS 2019b

The Poweshiek skipperling is the only state-listed endangered species with MNDNR NHIS records within one mile of the Project. Only one state-listed threatened species, Wilson's phalarope (*Phalaropus tricolor*; last recorded in 2006), was identified through NHIS records within one mile of the Project. Two state special concern species also have MNDNR NHIS records within one mile of the Project: Great Plains toad (*Anaxyrus cognatus*; last recorded in 2008), and trumpeter swan (*Cygnus buccinator*; last recorded in 2006). One additional MNDNR watchlist species, the upland sandpiper (*Bartramia longicauda*), also had NHIS records of occurrence in the northwest portion of the Project, with occurrences as recent as 2007.

Loggerhead shrike (*Lanius ludovicianus*; SE), Henslow's sparrow (*Ammodramus henslowii*; SE), Dakota skipper (ST), Ottoe skipper (*Hesperia ottoe*; ST), eared false foxglove (*Agalinis auriculata*; SE), and prairie bush clover (ST) are associated with prairie or grassland habitat and therefore have the potential to occur within the Project. Blanding's turtle (*Emydoidea blandingii*; ST), Wolf's spikerush (*Eleocharis wolfii*; SE), short-pointed umbrella sedge (*Cyperus acuminatus*; ST), and waterhyssop (*Bacopa rotundifolia*; ST) are associated with wetlands, ponds, or lakes and have the potential to occur within the Project. As stated above, NLEB (SC) has limited potential to occur at the Project and further site-specific NLEB surveys will help to inform the level of risk for this species; the Topeka shiner (SC) is isolated to the Missouri River watershed and is not expected to occur in the Project.

Burrowing owl (*Athene cunicularia*; SE) and eastern spotted skunk (*Spilogale putorius*; ST) are both associated with open lands and have the potential to occur within the Project. However, eastern spotted skunks are suspected to be largely extirpated from the state, and burrowing owls are suspected to be extirpated from Cottonwood, Murray, and Redwood counties (Trana et al. 2019). Therefore, there is low potential for these two species to occur at the Project.

Consultation with the MNDNR regarding state-listed species will aid in Project siting to avoid MNDNR-indicated areas that are important for these species to the extent practicable. Final locations of access road and collections systems will also consider these locations and attempts will be made to avoid these habitats. If they cannot be avoided, additional consultation with the MNDNR may be warranted.

2.4 Eagles and Migratory Birds

Eagles and other migratory birds may occur within the Project. The Project is located along the border between the Mississippi and Central Flyways, two of the four major migration corridors in North America, and migrating birds may use the lakes and wetlands in and around the Project as stopover habitat. Additionally, the Project is within the Prairie Pothole Region, which contains an abundance of native grassland and wetland habitats suitable for migratory birds. There are few wooded areas within the Project that could support raptor (including eagle) nests; however, more suitable nesting habitat is present outside the Project. No dramatic topographic features such as rim and bluff edges that may increase raptor use and migration are present within the Project. The Upper Minnesota River Valley Important Bird Area (IBA) is a known raptor migration corridor approximately 25 miles northeast of the Project and comprises a mix of high-quality habitat that offers suitable nesting and stopover sites along the Minnesota River migration route.

Golden eagle observations are rare near the Project, and are most likely to occur as rare passing migrants within the Project. Bald eagles are more likely to occur year-round at the Project. There are multiple lakes within and adjacent to the Project that may provide suitable nesting and wintering habitat for bald eagles.

General avian migration through the Project is likely to occur in a broad-front fashion. Migrating birds passing through the Project may use the forested areas, grasslands, riparian corridors and wetlands as stopover habitat. Several additional IBAs are near the Project, the closest being the

Heron Lake State IBA located approximately 5 miles south of the Project and provides habitat for water and marsh birds. The Des Moines River State IBA is adjacent to the Heron Lake IBA and hosts a variety of grassland, wetland, and forest habitat resulting in high avian species diversity. Approximately 15 miles west of the Project is the Prairie Coteau Complex State IBA, which provides habitat for grassland and marsh birds.

Risk to waterbirds and waterfowl is expected to be relatively low throughout the Project based on studies suggesting these species groups are able to detect and avoid wind turbines (Erickson et al. 2001; National Research Council 2007). Waterbird and waterfowl use will likely be greatest near WMAs and WPAs, particularly during spring, with increased risk likely during inclement weather when visibility is poor. However, avian habituation to turbines is likely to occur, reducing the impact of the Project's operations over time. Wind development can reduce breeding densities of grassland bird species through habitat displacement, and some grassland specialist bird species are known or suspected to be susceptible to this effect, perhaps because of their behavioral aversion to trees and other tall structures (Strickland et al. 2011; Shaffer and Buhl 2016). Large and clustered grassland habitats should be avoided when siting turbines specifically to avoid the displacement and avoidance risk for grassland species. Most existing habitat within the Project is already heavily fragmented, and thus no significant adverse impacts to grassland birds are expected. Further field studies, including avian use and wetland use surveys, will help to further identify higher use areas and seasons.

3 FIELD STUDIES

Based on the results of the Tier 1 and Tier 2 assessments, Plum Creek contracted with WEST to conduct USFWS Tier 3 field studies to obtain additional data on birds and bats. The field studies in 2018 were conducted using the original Project boundary, and subsequent studies in 2019 were conducted using the updated Project boundary. These activities serve to inform Plum Creek of the types and extent of wildlife present within and adjacent to the Project. Survey results will also inform Project infrastructure siting, as well as the extent of ongoing surveys to comply with regulatory programs such as the ESA, MBTA, and BGEPA. These surveys include the following:

- 2018 – 2020 general avian and eagle use surveys
- 2018/2019 raptor and eagle nest surveys, including nest monitoring surveys
- 2019 general acoustic bat surveys
- 2019 northern long-eared acoustic bat surveys

This ABPP will be updated with the results of these surveys as they become available.

3.1 Birds

3.1.1 General Avian and Eagle Use Surveys

WEST began avian use surveys in June 2018, using point-count methodology outlined within the WEG (USFWS 2012). The objective of the fixed-point avian use surveys was to provide

information regarding levels of use by birds, including small birds and large birds (e.g., bald eagles and other large bird species). The fixed-point avian use surveys consisted of counts of bird use within circular plots (100-meter [m] radius for small bird surveys, 800-m radius for large bird/eagle surveys) around fixed observation points following methods similar to Reynolds et al. (1980). Small bird observations were recorded during the first 10 minutes at each survey point. After the 10-minute small bird survey, the survey shifted to a separate 1-hour survey that focused only on large birds and eagles. The large bird/eagle surveys consisted of 60-minute surveys during which the observer focused on eagles if/when they were observed. From June 2018 through November 2018, the above protocol was followed at 47 points to cover 30% of a 70,661-ac initial Project boundary. In December 2018 the Project boundary expanded to 99,668-ac, which required adding 14 additional survey points to provide at least 30% coverage of the area. Additional changes were made in 2019 to account for the revised 72,958-ac Project boundary and to get 30% coverage of the minimum convex polygons associated with two potential turbine arrays; these changes resulted in an overall drop of 14 points (removal of points 2, 26, 27, 32, 35, 48, 49, 50, 51, 52, 53, 57, 59, 61) from December 2018 (Map Exhibit 5).

The date, start, and end time of observation period, plot number, species or best possible identification, number of individuals, sex and age class (if possible), distance from plot center when first observed, closest distance, height above ground, activity, and habitat were recorded. Weather information recorded for each survey point included temperature, wind speed, wind direction, precipitation, and cloud cover. Estimated distance to each raptor observed were recorded to the nearest five meters. Landmarks were located to aid in estimating distances to each bird. Flight or movement paths for eagles were mapped and given corresponding unique observation numbers. The map indicated whether the bird was within or outside the survey plot based on reference points at known distances from the plot center. If time allowed and it did not distract from eagle observation work during the large bird survey portion of the surveys, the WEST biologist also recorded the flight paths of other large birds such as other raptors, cranes, and waterfowl.

Bird behavior and habitat were recorded for each bird observation. For bald eagle or golden eagle observations, additional behavior and habitat data were recorded during each 1-minute interval the bird is within view, per the USFWS ECPG. Behavior categories included soaring flight, flapping-gliding, hunting, kiting-hovering, stooping/diving at prey, stooping or diving in an antagonistic context with other bird species, perched, being mobbed, undulating/territorial flight, auditory, and other behaviors (noted in comments). The initial flight patterns and habitat types (at first observation) were uniquely identified on the data sheet and subsequent patterns and habitats were recorded. The flight direction of observed birds was also recorded on the data sheet map. Approximate flight height at first observation was recorded to the nearest five meters; the approximate lowest and highest flight heights observed was also recorded. Any comments or unusual observations were noted in the comments section.

Plot surveys were conducted throughout daylight hours. During a set of surveys, each plot was visited once. A pre-established schedule was developed prior to the field surveys to ensure that each station was surveyed approximately the same number of times, to spread survey times throughout the day, and to minimize travel time between plots.

Avian Use Surveys Year 1

Six hundred forty-three large bird use surveys were conducted at the Project from June 11, 2018 – May 29, 2019, with 49 large bird species observed (Dernovsek and Trana 2019). A total of 6,304 large bird observations were recorded in 1,132 separate groups. Large bird mean use was highest during fall (18.18 observations/800-m plot/60-min survey), followed by spring (15.01), winter (3.07), and summer (2.87). Overall, large bird mean use was 9.71 observations/800-m plot/60-min survey across seasons. Waterfowl composed the majority of use during the fall (64.1%) and spring (50.1%), while shorebirds were the majority during summer (44.2%), and upland game accounted for the majority of use in winter (43.3%), followed by doves/pigeons (33.3%). Mean large bird flight heights ranged from 1.88 m for upland game birds to 72.10 m for waterbirds. Waterbirds, vultures, and waterfowl were recorded most frequently within the rotor swept height (RSH) range; however, most bird types were observed below the RSH and no bird types were primarily observed above the RSH. Mean large bird use was highest at Point 57 (89.60 observations/800-m plot/60-min survey) and ranged from 0.27 to 62.50 at the other survey points.

For eagles specifically, 47 bald eagle observations were recorded during surveys and 20 observations were recorded incidentally at the Project. No golden eagles have been recorded at the Project. Bald eagle use was highest during spring (0.12 observations/800-m plot/60-min survey), followed by fall (0.11), and winter (0.05); no use was recorded during summer. One hundred five bald eagle exposure minutes were recorded based on the 47 bald eagle observations recorded during surveys. Bald eagles were observed more frequently in the western portion of the Project (Dernovsek and Trana 2019).

Six hundred forty-four small bird use surveys were conducted at the Project from June 11, 2018 – May 29, 2019, with 55 small bird species observed (Dernovsek and Trana 2019). A total of 3,295 small bird observations were recorded in 633 separate groups. Small bird mean use was highest during spring (9.70 observations/100-m plot/10-min survey), followed by fall (4.97), summer (3.48), and winter (1.25). Overall, small bird mean use was 4.80 observations/100-m plot/10-min survey, and passerines accounted for the majority (99.0%) of use across all seasons. Small bird use was highest at Point 21 (39.08 observations/100-m plot/10-min survey) and ranged from 0.00 (Point 61) to 21.58 at the other survey points.

Avian Use Surveys Year 2

A second year of avian use surveys is currently underway at the Project and will continue through May 2020. From surveys conducted from June 4 – September 14, 2019, 10 bald eagle observations have been recorded during surveys, and one additional bald eagle was observed incidentally at the Project. This ABPP will be updated when the results and analysis of the second full year of avian use surveys at the Project are available.

3.1.2 Raptor and Eagle Nest Surveys

Aerial Nest Surveys 2018

WEST conducted an aerial nest survey from March 27th – 29th, 2018. The principal objective of the survey was to document the presence of bald eagle nests within the initial 70,660-ac Project boundary and 10-mile buffer area in compliance with the ECPG. The survey also documented the

presence of other raptor stick nests within the Project and 1-mile buffer area (Kreger 2018a). WEST detected 43 raptor nests representing three identified raptor species. Fourteen occupied active bald eagle nests, nine occupied active red-tailed hawk (*Buteo jamaicensis*) nests, one occupied inactive red-tailed hawk nest, two occupied active great-horned owl (*Bubo virginianus*) nests, and seventeen inactive unknown raptor nests were identified (Map Exhibit 6a). One inactive unknown raptor nest was consistent in size and shape with a bald eagle nest. None of the occupied active bald eagle nests were within the initial surveyed 2018 Project boundary or the current Project boundary (Map Exhibit 6a).

Aerial Nest Surveys 2019

WEST conducted additional aerial raptor and eagle nest surveys March 25 – March 26, 2019 to accommodate the expanded December 2018 Project boundary. As in 2018, a 1-mile buffer was surveyed for all raptor nests (Foo et al. 2019). For eagles, a 2-mile buffer of the expanded Project boundary was surveyed, plus all areas within 10 miles of the expanded Project boundary that were not surveyed in 2018. All previously documented eagle nests within the 10-mile buffer were also surveyed in 2019. WEST detected 47 raptor nests representing two identified species. Eighteen occupied active bald eagle nests were documented during the 2019 surveys. Four inactive nests of unidentified species were consistent in size and structure with bald eagle nests. Additional nests documented during the survey included seven occupied active red-tailed hawk (*Buteo jamaicensis*) nests, one occupied inactive red-tailed hawk nest, four occupied inactive raptor nests of unidentified species, and 13 inactive nests of unidentified species (not consistent in size and structure with bald eagle nests; Map Exhibit 6b). There are no active occupied bald eagle nests within the current Project boundary; five active occupied bald eagle nests were recorded within a 2-mile buffer of the current Project boundary (Map Exhibit 6b).

2018 Nest Monitoring Surveys

Plum Creek contracted WEST to conduct eagle nest monitoring surveys for occupied active bald eagle nests within two miles of the original Project boundary (Map Exhibit 6c). These surveys were conducted to document nesting success and flight or use patterns associated with these nests during the 2018 nesting season near the Project (Kreger 2018b).

Nest 2010 – This nest was located 0.83 miles west of the original Project boundary but is now located approximately 0.4 miles north of the current Project boundary (Map Exhibit 6c). This nest was recorded as an occupied active bald eagle nest in 2018 (Kreger 2018a). Nest monitoring surveys occurred from May 31 – July 23, 2018 for a total of 23 survey hours over 6 survey visits. Based on the continued presence of eagles throughout the survey period, and the confirmed fledging of at least one juvenile, this nest was successful in 2018 (Kreger 2018b).

Nest 2011 – This nest was located 1.48 miles west of the original Project boundary but is now located just outside (0.08 miles south) the current Project boundary (Map Exhibit 6c). This nest was recorded as an occupied active bald eagle nest in 2018 (Kreger 2018a). Five nest monitoring surveys were completed for a total of 19 survey hours from May 31 – July 11, 2018. Based on the continued presence of eagles throughout most of the survey period, and the confirmed fledging of at least one juvenile (potentially two), this nest was successful in 2018 (Kreger 2018b).

Nest 2023 – This nest was located 0.72 miles south of the original Project boundary but is now located 1.1 miles southwest of the current Project boundary (Map Exhibit 6c). This nest was recorded as an occupied active bald eagle nest in 2018 (Kreger 2018a). Three nest monitoring surveys were completed for a total of 12 survey hours from May 25 – June 21, 2018. One adult bald eagle was observed in the distance during the first monitoring survey, and no eagles were observed in the two subsequent surveys; therefore, this nest was unsuccessful in 2018 (Kreger 2018b).

Nest 2028 – This nest was located 0.61 miles south of the original Project boundary but is now located 1.7 miles southeast of the current Project boundary (Map Exhibit 6c). This nest was recorded as an occupied active bald eagle nest in 2018 (Kreger 2018a). Four nest monitoring surveys were completed for a total of 15 survey hours from May 25 – July 18, 2018. Based on the continued presence of eagles throughout the survey period, and the confirmed fledging of two juveniles, this nest was successful in 2018 (Kreger 2018b).

2019 Nest Monitoring Surveys

Plum Creek contracted WEST to conduct eagle nest monitoring surveys for occupied active bald eagle nests within two miles of the Project boundary in 2019; five nests were monitored during the 2019 nest surveys (Map Exhibit 6c). These survey efforts were conducted to document the eagles' spatial distribution and intensity of use associated with the nest during the breeding season near the Project (Foo and Trana 2019).

Nest 2010 – This nest was located within the December 2018 Project boundary but is now located approximately 0.4 miles north of the current Project boundary (Map Exhibit 6c). This nest was recorded as an occupied active bald eagle nest in both 2018 and 2019 (Kreger 2018a, Foo and Kreger 2019). Nest monitoring surveys occurred from May 14 – June 26, 2019 for a total of 24 survey hours over 7 survey visits. Both adult and nestling bald eagles were recorded during nest monitoring surveys conducted from May 14th - June 16th. On surveys conducted from June 23rd - June 26th no adult or nestling eagles were observed so monitoring was discontinued. The view of the nest was also partially obscured by foliage during surveys, so nest success was inconclusive for nest 2010 in 2019 (Foo and Trana 2019).

Nest 15569 – This nest is located just outside (0.01 miles west) the current Project boundary (Map Exhibit 6c; previously located 0.3 miles southwest of the December 2018 Project boundary). This nest was not documented during the 2018 or 2019 aerial surveys, but was detected during the follow-up survey for an inactive nest (Nest 2033) consistent in size and structure with a bald eagle nest in 2019 (Foo and Kreger 2019). Nest monitoring surveys occurred from May 13 – August 14, 2019 for a total of 46 survey hours over 11 survey visits. Based on the continued presence of eagles throughout the survey period, and the confirmed fledging of one juvenile, this nest was successful in 2019 (Foo and Trana 2019).

Nest 2011 – This nest is located just outside (0.08 miles south) the current Project boundary (Map Exhibit 6c; previously located 0.5 miles west of the December 2018 Project boundary). This nest was recorded as an occupied active bald eagle nest in both 2018 and 2019 (Kreger 2018a, Foo and Kreger 2019). Sixteen nest monitoring surveys were completed for a total of 64 survey hours

from May 14 – August 14, 2019. Based on the continued presence of eagles throughout the survey period, and the confirmed fledging of one juvenile, this nest was successful in 2019 (Foo and Trana 2019).

Nest 2023 – This nest is located 1.1 miles southwest of the current Project boundary (Map Exhibit 6c; previously located 0.7 miles southeast of the December 2018 Project boundary). This nest was recorded as an occupied active bald eagle nest in both 2018 and 2019 (Kreger 2018a, Foo and Kreger 2019). Six nest monitoring surveys were completed for a total of 24 survey hours from May 15 – June 26, 2019. Both adult and nestling bald eagles were recorded during nest monitoring surveys; however, no eagles were observed during two consecutive surveys in June, and monitoring was discontinued. Because the last observation of nestlings was recorded on June 15 and there were no observations of the nestlings stretching their wings or branching out, this nest was likely unsuccessful in 2019 (Foo and Trana 2019).

Nest 2028 – This nest is located 1.7 miles southeast of the current Project boundary (Map Exhibit 6c; previously located 0.6 miles south of the December 2018 Project boundary). This nest was recorded as an occupied active bald eagle nest in both 2018 and 2019 (Kreger 2018a, Foo and Kreger 2019). Fifteen nest monitoring surveys were completed for a total of 60 survey hours from May 15 – August 14, 2019. Based on the continued presence of eagles throughout the survey period, and the confirmed fledging of two juveniles, this nest was successful in 2019 (Foo and Trana 2019).

Impacts to sensitive species resulting from wind energy development are of greatest concern; these species are already known to be at risk because unrelated factors impact the stability of their populations. In monitoring and analyses, WEST biologists use native species as a broad indicator of wind-project impacts and sensitive species as a specific indicator of potential effects to already at-risk species. Sensitive species vary by ecological region, based on the abundance and population trends of each species.

Sensitive species are similar to the USFWS species of concern; however, the WEST-defined sensitive species emphasize the conservation significance of a species. Minnesota species of greatest conservation need (SGCN) and species protected by the Minnesota Endangered Species Statute will likely fall under this designation. For example, the mourning dove is protected by the MBTA and some state game laws, but its population is large and at low risk from wind energy development. Consequently, it is a “species of concern” to the USFWS, but not a “sensitive species” in the WEST analysis.

During the first year of avian use surveys completed from June 2018 through May 2019 (a second year of surveys is currently ongoing), WEST observed 104 different species of birds at or near the Project. Of these, 22 species (21%) were classified as sensitive by criteria described above: American kestrel (*Falco sparverius*; SGCN), American white pelican (*Pelecanus erythrorhynchos*; SC; SGCN), bald eagle (BGEPA; SGCN), belted kingfisher (*Megaceryle alcyon*; SGCN), bobolink (*Dolichonyx oryzivorus*; SGCN), brown thrasher (*Toxostoma rufum*; SGCN), common merganser (*Mergus merganser*; SGCN), common nighthawk (*Chordeiles minor*; SGCN), dickcissel (*Spiza americana*; SGCN), field sparrow (*Spizella pusilla*; SGCN), Franklin's gull (*Leucophaeus pipixcan*;

SC; SGCN), greater yellowlegs (*Tringa melanoleuca*; SGCN), northern harrier (*Circus hudsonius*; SGCN), northern pintail (*Anas acuta*; SGCN), northern rough-winged swallow (*Stelgidopteryx serripennis*; SGCN), red-headed woodpecker (*Melanerpes erythrocephalus*; SGCN), sedge wren (*Cistothorus platensis*; SGCN), Swainson's hawk (*Buteo swainsoni*; SGCN), trumpeter swan (*Cygnus buccinator*; SC, SGCN), upland sandpiper (*Bartramia longicauda*; SGCN), western meadowlark (*Sturnella neglecta*; SGCN), and yellow-headed blackbird (*Xanthocephalus xanthocephalus*; SGCN).

The natural habitats at the Project, including the wildlife refuge within the Project boundary and the WMAs and WPAs near the Project, tend to be most important to sensitive species. Placing turbines in cropland at a distance from these features is likely to reduce risk to sensitive bird species. These preliminary conclusions will be reevaluated after all avian use surveys are completed and the data is analyzed.

3.2 Bats

3.2.1 General Bat Acoustic Monitoring Survey

Plum Creek contracted with WEST to conduct acoustic surveys within the Project designed to partially characterize general bat activity levels by season. Bat activity monitoring started at the Project on May 3, 2019 and will continue through October 31, 2019. Ground-based (1.5 meter [m]) and raised detectors (45 m) were paired at two meteorological towers within the Project (PC3 and PC4; Map Exhibit 7); and two additional ground units (1.5 m) were placed within the Project (PC1 and PC2; Map Exhibit 7) for a total of four detectors (6 microphones).

Bat activity data is being collected using full spectrum acoustic monitoring and data logging platforms (Song Meter SM3, Wildlife Acoustics, Inc., Concord, MA, USA). Echolocation calls will be classified into two frequency categories, high frequency (HF; > 30 kHz) and low frequency (LF; <30 kHz), and identified to species or to the *Myotis* species group whenever possible. The complete season of data will be analyzed and reported following the end of the survey season and this ABPP will be updated with the results (Map Exhibit 7).

3.2.2 Northern Long-eared Bat Acoustic Monitoring Surveys

Plum Creek contracted with WEST to evaluate the potential presence of the federally threatened NLEB at the Project following the 2019 Range-Wide Indiana Bat Summer Survey Guidelines (USFWS Guidelines; USFWS 2019a). This evaluation included a desktop review of potential NLEB habitat and acoustic surveys to assess the potential presence of the NLEB within the Project. The evaluation of potential NLEB habitat involved quantifying the percent cover of woodland habitat types within the Project and a 2.5-mile buffer zone; and identifying potential foraging, roosting, and commuting habitats – this included consideration of woodland patches (separated from other habitats by at least 1,000 feet [ft]) that are unlikely to be suitable given their isolation.

The WEST desktop habitat assessment identified 694 acres of suitable forested habitat within the Project (Map Exhibit 8; Hyzy and Trana 2019). Acoustic summer presence/absence surveys were

conducted from July 2 – July 10, 2019 at 14 paired survey sites (for 28 detector locations) and these were surveyed for 4 nights each (112-detector nights) to exceed the USFWS Guidelines (Map Exhibit 8). Bats were surveyed using full-spectrum SM4 detectors, and bat calls were identified using the USFWS-approved Automated Acoustic Bat ID Software Program, Kaleidoscope Pro (version 5.1.0, Wildlife Acoustics, Inc.), with NLEB calls examined and verified by a qualified biologist.

Kaleidoscope recognized 22,666 bat calls and identified 19,303 calls to species (Hyzy and Trana 2019). Hoary bat (*Lasiurus cinereus*; 7,874 calls [34.7%]) was the most commonly identified species, followed by big brown bat (*Eptesicus fuscus*; 7,195 calls [31.7%]), and eastern red bat (*Lasiurus borealis*; 2,746 calls [12.1%]). All other bat species detected by Kaleidoscope (silver-haired bat [*Lasionycteris noctivagans*; 4.1%], little brown bat [*Myotis lucifugus*; 1.7%], NLEB, and tri-colored bat [*Perimyotis subflavus*; both <1%] represented less than 5% of bat calls, and 14.8% of calls were not identifiable.

Kaleidoscope identified one call file as a potential NLEB call at site 7A (Map Exhibit 8). The maximum likelihood estimator p-value for this call met the USFWS Guidelines criteria for NLEB presence ($p < 0.05$), indicating there was initial acoustic evidence to determine presence. However, this call was reviewed and reclassified as a low-frequency approach phase call by a big brown bat (Hyzy and Trana 2019). Results of acoustic analyses indicate that NLEB are likely absent within the Project during the summer maternity season, and no additional mist-netting or telemetry surveys were proposed or conducted.

3.2.3 Bat Collision Risk

Bat activity level and patterns at the Project will be re-assessed when data collection and analysis for the general acoustic surveys is complete. Based on information from other wind energy projects in Minnesota, impacts are likely to be greatest during the peak migration (July 15 – September 15), and at low wind speeds or associated with the passage of weather fronts.

3.3 Summary of Potential Impacts

Issues discussed in this report are ranked below with the assumption of no avoidance, minimization, or mitigation. The level of concern would decrease if avoidance, minimization, and mitigation were employed. Rankings are:

- High – Without avoidance, minimization, or mitigation, the Project is likely to pose a significant risk to the topic of concern.
- Moderate – Without avoidance, minimization, or mitigation, the Project is likely to pose a moderate risk to the topic of concern.
- Low – Without avoidance, minimization, or mitigation, the Project is likely to pose a low risk to the topic of concern.
- Minor – Without avoidance, minimization, or mitigation, the Project is likely to pose minimal risk to the topic of concern.

Once Tier 3 surveys are complete, the results will be analyzed to update the potential impacts of the proposed Project.

3.3.1 High Level of Concern

There are no identified issues of high concern.

3.3.2 Moderate Level of Concern

Subject: Migratory Bats

Regulatory Framework: ESA and State Endangered Species Statute

The Project may contain suitable habitat for migratory bat species. It is likely that bat mortality will occur at the Project, and that mortality will be similar to other wind energy projects in agricultural regions of the Midwest. Once Tier 3 studies are complete, the risk to migratory bats will be reevaluated.

Subject: Bald Eagle

Regulatory Framework: BGEPA, MBTA

Under Plum Creek's estimation, there is a moderate level of risk to bald eagles at the site. The bald eagle is protected under the BGEPA and listed under the MBTA. Fourteen occupied and active bald eagle nests were identified within a 10-mile buffer of the original Project boundary during the raptor nest surveys in 2018.. In 2019, eighteen occupied active bald eagle nests were documented within a 10-mile buffer of the December 2018 Project boundary (Map Exhibit 6b). No occupied active bald eagle nests are located within the current Project boundary and five occupied active bald eagle nests are within two miles of the current Project boundary. All occupied active bald eagle nests documented in 2018 and 2019 remain within 10 miles of the current Project boundary (Map Exhibit 6a, Map Exhibit 6b).

Seventy-eight bald eagle observations have been recorded within the Project during avian use surveys or incidentally through September 2019. Once Tier 3 studies are complete, the risk to bald eagles will be reevaluated.

3.3.3 Low Level of Concern

Subject: Listed Butterflies

Regulatory Framework: ESA and State Endangered Species Statute

The federally and state-listed threatened Dakota skipper, federally and state-listed endangered Poweshiek skipperling, and the state-listed threatened Ottoe skipper have the potential to occur or have been documented in Cottonwood, Murray, and Redwood counties, and may occur within the Project. Due to the dominance of cultivated crops and the overall lack of grassland and prairie habitat, these species are unlikely to occur within the Project, and impacts to these habitats will be avoided and minimized to the greatest extent feasible by layout design.

Subject: State-listed Threatened and Endangered Bird Species

Regulatory Framework: State Endangered Species Statute, MBTA

The Project Area is highly fragmented and 91% cultivated crops, which provide limited habitat to avian species. Pre-construction avian surveys have identified several species of birds, one of which is state-listed (Henslow's sparrow; state-listed endangered and observed incidentally). Risk to state-listed threatened and endangered bird species will be re-evaluated once data from the two years of Tier 3 studies are complete.

Subject: Northern Long-eared Bat

Regulatory Framework: ESA

NLEB is a federally listed threatened species under the ESA that is experiencing steep population declines in Minnesota due to White Nose Syndrome (MNDNR 2019). This species is known to occur throughout Minnesota, although it prefers forested habitat in the summer, which is generally limited to isolated patches and a few riparian corridors in the Project. Presence/probable absence surveys conducted in 2019 did not identify any NLEB calls at the Project indicating that NLEB is likely absent from the Project during the summer maternity season. However, there is still potential for NLEB to migrate through the Project, similar to any Project in the species range. Turbines will be programmed to be locked or feathered at wind speeds up to the manufacturer's standard cut-in speed, from one-half hour before sunset to one-half hour after sunrise, from April 1 to October 31 of each year. Although NLEB is a threatened species, the USFWS established a 4(d) rule in January 2016 exempting wind energy facilities (including development and operation) from needing to obtain any take coverage for NLEB unless the Project would directly impact a known hibernation or maternity site, neither of which are documented in or near the Project. For these reasons, risk to NLEB is considered low at the Project.

Subject: Migratory Passerine Birds

Regulatory Framework: MBTA

Passerine bird mortality during spring and fall migration is typically the greatest source of bird mortality at wind energy developments. Migratory passerine use of the site is likely typical of Midwestern agricultural habitats based on avian use surveys conducted at the Project to date, and mortality for these species is anticipated to be similar to that at other Midwestern wind energy developments. Risk to migratory passerine birds will be reevaluated once all Tier 3 studies are complete.

Subject: Breeding Bird Collision

Regulatory Framework: MBTA

Breeding bird collision is an issue of low concern due to the small numbers of at-risk species present in cropland where turbines will likely be placed. Mortality of breeding birds is expected to be low, and similar to other Midwestern wind energy projects. Risk to breeding birds will be reassessed once all Tier 3 studies are complete.

Subject: Waterfowl and Waterbirds

Regulatory Framework: MBTA

Southwestern Minnesota is known for significant activity during waterfowl migration. Collision risk is low for waterfowl and waterbird species because studies and observations indicate that waterfowl and waterbirds can see and avoid turbines during flight (Erickson et al. 2001; National Research Council 2007). Risk to waterfowl and waterbirds will be evaluated once all Tier 3 avian use studies are complete.

Subject: Raptor Collision Risk

Regulatory Framework: MBTA

There are no known raptor migration routes near the site. Due to the general low raptor use in this part of the state and typical raptor mortality rates, it is unlikely that significant numbers of raptors would be killed at the Project. Overall risk to raptors is likely low, with highest risk during the spring and fall migration periods. Raptor collision risk will be reevaluated once all Tier 3 studies are completed.

Subject: SGCN and State-designated Special Concern (SC) Bird Species

Regulatory Framework: MBTA

Risk to SGCN and SC bird species will be evaluated once all Tier 3 studies are completed at the site.

Subject: Minnesota Biological Survey Sites of Moderate Biodiversity Significance

Regulatory Framework: None

The Minnesota Biological Survey (MBS) has identified multiple sites of potential biological diversity within the Project. All MBS sites within the Project are ranked as “below” or “moderate,” and there are no sites of “high” or “outstanding” biodiversity significance within the Project. There are also areas of MBS-mapped native plant communities within the Project including dry hill prairie, southern west mesic hardwood forest, basswood-bur oak forest, prairie wetland complexes, and mesic prairie, all of which are associated with sites identified as “moderate” biodiversity.

Based on coordination with the MNDNR, the Project will be designed to avoid impacts to areas of moderate biodiversity significance. Therefore, no impacts to these areas are anticipated.

Subject: Federally and State-listed Plant Species

Regulatory Framework: ESA and State Endangered Species Statute

Federally and state-listed and special concern plant species in this part of the state are typically associated with prairie remnants and wetlands that have not been degraded by agricultural activity. The Project will be designed to minimize impacts on wetlands, lakes, and potential native prairies; therefore, impacts to these plant species are not anticipated.

3.3.4 Minor Level of Concern

Subject: Blanding's Turtle and Great Plains Toad

Regulatory Framework: State Endangered Species Statute

The Blanding's turtle is associated with a variety of riparian or wetland types and adjacent agricultural lands, and in this part of Minnesota can be found even in small stream complexes (MNDNR 2019). The Project will be designed to minimize impacts to wetlands, lakes, streams, and adjacent sandy uplands, including adjacent agricultural fields.

The Great Plains toad is widespread throughout western states, and the Project is located at the eastern extent of the species range (MNDNR 2019). This species can be found in a variety of habitats including grasslands and agricultural areas, both of which are present in the Project. The Project will be designed to minimize impacts to the Great Plains toad, and species-appropriate BMPs will be implemented during construction. Impacts to this species are therefore unlikely.

Consultation with the MNDNR regarding these species will continue and layout design and siting of facilities will take habitats for these species into consideration.

4 AVOIDANCE AND MINIMIZATION MEASURES

4.1 Pre-construction Siting and Design

Information gathered from the Tier 1, 2, and 3 studies will be used for turbine and infrastructure siting to minimize impacts to birds, bats, species of concern, and their habitats. Additionally, wind turbines and associated facilities for the Project will be sited with consideration for the efficiency of selected turbine models and minimizing impacts to area residents. Prior to designing the facility layout, the operator will have incorporated setback and constraint information from literature reviews, Tiers 1, 2, and 3 studies, and agency recommendations.

4.1.1 Project Siting Measures Used to Reduce Impacts

- The boundary, layout, and design of the Project will maximize energy generation while minimizing impacts to the land and surrounding community.
- The Project will be designed with consideration of the MPUC General Wind Turbine Permit Setbacks and Standards for LWECS permitted pursuant to Minnesota Statute § 216F.08 and the setback requirements of Cottonwood, Murray, and Redwood counties.
- The Project will be designed in an environmentally conscientious manner, with input from wildlife agencies and relevant site-specific information gathered during avian surveys.
- To minimize adverse impacts to avian and bat species, nearly all wind turbines and associated facilities will be sited on cropland.
- Access roads, wind turbine locations, and the underground collector system will not require significant cut and/or fill.

4.1.2 Project Design Measures Used to Reduce Impacts

- Wind turbines designed with tubular towers and no external ladders or platforms on the towers or nacelles will be used to minimize bird perching and nesting opportunities.

- The number of turbines with visibility lighting will be minimized, within Federal Aviation Administration (FAA) requirements.
- FAA-approved lighting will use the shortest allowable flash duration, the minimum allowed flashes per minute, and all lights will flash at the same time so they do not disorient nocturnal migrating birds.
- The Project design for electrical facilities will be based upon the Avian Power Line Interaction Committee's (APLIC) suggested practices for minimizing risk of electrocution of birds from power lines.
- To the extent practicable, the collector system will be placed underground, thereby eliminating the risk of electrocution and minimizing impacts on existing farm operations. Any disruption to drainage tile will be avoided to the extent possible during construction and any damage to tile as a result of construction activities will be repaired.

4.2 Construction

4.2.1 Avoidance of Native Plant Communities and Wetlands

The Project turbines will be located entirely within agricultural lands, minimizing or eliminating most construction-related wildlife impacts. Native plant communities (e.g., native prairies and MBS sites of moderate biodiversity significance) will be avoided during siting and construction of all Project infrastructure. To the extent possible, the Project layout will be developed to use the existing public and private road network and to minimize clearing forests and disturbing other natural habitats (e.g., wetlands and grasslands) during Project construction.

Impacts to wetlands and waterbodies will be avoided to the extent practicable through siting and the use of low-impact construction methods. Collection power lines will be installed across waterbodies within the Project using the horizontal directional drill method or other environmentally sensitive construction methods. If wetland avoidance is not feasible, impacts will be minimized and mitigated by complying with the provisions of the Clean Water Act (1972) and Minnesota Wetland Conservation Act.

4.2.2 Minimizing Temporary Disturbance

Areas of construction and temporary ground-disturbance activities will be minimized to the extent practicable. The majority of this work will occur within tilled and cultivated agricultural fields, thereby minimizing habitat fragmentation and impacts to high quality habitat. In areas where temporary ground-disturbance activities occur, such as temporary crane paths or the installation of underground infrastructure, preconstruction vegetation will be restored.

Management measures will be implemented to restore areas that are impacted due to temporary construction activities. After all practicable avoidance measures are taken to reduce temporary impacts to vegetated areas, any temporarily disturbed areas will be re-vegetated to blend with existing vegetation. Further measures will be taken to minimize disturbance from construction activities. Construction teams will be informed of invasive species and take measures to prevent their propagation via the movement of people, materials and equipment into and out of the site.

Control measures include washing off any soil, dirt, and debris on vehicles, equipment, and personal clothing and footwear prior to construction activities or moving equipment over native prairies and sites of moderate biodiversity significance, as soil may be embedded with roots or seeds of invasive plant species.

Any use of pesticides, herbicides, fertilizers, and other chemicals will be in accordance with federal and state laws. An integrated pest management plan will be developed to ensure that applications will use only pesticides registered with the U.S. Environmental Protection Agency. Pesticide use will be limited to non-persistent, immobile pesticides and will only be applied in accordance with label and application permit directions and stipulations for terrestrial and aquatic applications. This measure reduces the risk of fatal poisoning of wildlife and consequently reduces the potential occurrence of avian and other scavengers that may be attracted by poisoned carcasses.

The Project's Storm Water Pollution Prevention Plan (SWPPP) will be utilized to ensure control measures are taken to prevent erosion and runoff during construction of the Project. Of particular concern is runoff into sensitive habitats as well as into streams and roadside ditches. The measures within the SWPPP will comply with the requirements of the MPCA General Permit for Storm Water Associated with Construction Activity under the National Pollutant Discharge Elimination System / State Disposal System Permit Program. These rules are reflected in the construction erosion and sediment control BMPs described below.

- Disturbed areas will be minimized and silt fence will be installed at the down-gradient edge of disturbed areas prior to disturbance to limit sediment flow and pollution to natural areas outside the construction zone.
- If streams are within the area of construction, additional silt fence must be placed along the edge of the stream 10 ft from the edge of the channel, if possible, as a primary sediment break. If natural vegetation along the stream edge is to be disturbed, silt curtain must be placed at the stream edge parallel to the direction of flow, as a secondary precaution. If natural vegetation is not to be disturbed then it should provide necessary filtration to preclude the need of silt curtain in the stream.
- If soil is disturbed outside of the agricultural till area, the soil must be stabilized within 14 days after continuous disturbance ceases. If said area is along special or impaired water (PWI waters) the area must be stabilized within seven (7) days of disturbance. Ditch bottoms 200 ft from edge of surface water or property must be stabilized within 24 hours. If soil is disturbed around a culvert or other water discharge location, the area must be stabilized within 24 hours of disturbance.
- Erosion and sediment control devices require weekly inspections to ensure that they are staying effective. In the event of a half inch ($\frac{1}{2}$ ") or greater rainfall, inspection must occur within 24 hours.
- If failures are found, any discharge associated with said failure must be cleaned up as soon as possible and no later than seven (7) days from time of discovery.

- Any track-out from vehicles traveling through the site onto roadways must be cleaned up within 24 hours.
- Upon construction completion, disturbed areas must be stabilized within 14 days.
- Material stockpiling will be kept to specified areas and will be surrounded with silt fence at least eight (8) ft from the edge of the stockpile to provide a barrier for potential erosion and sediment run off from the stockpile yard. Hazardous material will be handled per the individual material guidelines as well as on-site spill kits.

4.2.3 Site Maintenance

Proper caution and safety measures will be exercised to minimize risks to bird and bat populations near and at the Project. To minimize the risk of wildfire that could destroy bird and bat habitat, or that could be hazardous to construction personnel, the contractor will be responsible for maintaining a clean and orderly site. Flammable chemicals, petroleum, and other materials with the potential for combustion will be handled and stored in a safe manner. All trash and food-related waste will be placed in self-closing containers and removed daily from the site so as not to attract birds and bats. The Site Manager will be responsible for enforcement of BMPs that focus on reducing impacts to birds and bats, as well as the implementation of this document.

4.2.4 Training

All construction personnel will be trained to identify potential wildlife conflict situations and proper responses. This training will include awareness of nesting birds and other wildlife that may be encountered. For example, if an unidentified raptor nest is encountered by construction personnel, they will be instructed to stop work in the area and contact the Site Manager. The Site Manager will assess the situation and work with construction personnel to implement a plan for continuing construction to avoid or minimize impact to the nest. If other protected wildlife resources are encountered, a similar course of action will be followed; construction will cease until the Site Manager can determine an appropriate plan to allow construction to continue without causing an adverse impact. Additionally, training will include education on the standard measures to be followed during construction to minimize wildlife impacts, including:

- Industry-standard best management practices will be implemented to protect topsoil and adjacent resources and to minimize soil erosion.
- All surface-disturbed areas will be restored to the approximate original contour and reclaimed in accordance with easement agreements.
- Removal or disturbance of vegetation will be minimized through site management (e.g., by utilizing previously disturbed areas, designating limited equipment/materials storage yards and staging areas, scalping) and reclaiming all disturbed areas not required for operations.
- Speed limits on Project access roads (25 miles per hour) will be followed to minimize wildlife mortality due to vehicle collisions.

- Travel will be restricted to designated roads and no off-road travel will be allowed except in emergencies.
- All areas that are identified as avoidance areas in the LWECS Site Permit (such as native prairie) or other regulations such as state and federal wetland regulations will be identified on maps and no impacts will occur unless specifically allowed by the LWECS Site Permit or USACE/Wetland Conservation Act permit. Any conditions that are required as part of permitted crossings shall be followed, including minimization of the disturbance footprint, reseeding using approved seed mixtures, etc.
- Construction activities will be performed using standard construction best management practices to minimize the potential for accidental spills of solid material, contaminants, debris, and other pollutants. Excavated material or other construction materials will not be stockpiled or deposited near or on stream banks.
- No burning or burying of waste materials will occur at the Project. All contaminated soil and construction debris will be removed and disposed of in approved landfills in accordance with appropriate environmental regulations.
- All employees and contractors will follow federal and state measures for handling toxic substances to minimize contamination of water and wildlife resources.
- Parts and equipment that may be used as cover by prey will not be stored for longer than 30 days near wind turbines to the extent practicable.
- Carrion will be monitored for and quickly removed to the extent practicable (e.g., big game, domestic cattle, road kill) from the wind energy facility to avoid attracting predators/scavengers such as raptors and vultures.

4.2.5 Wildlife Concerns

The contractor and subcontractors will work to implement BMPs to construct the Project in a way that minimizes impacts to avian and bat species on site. This includes maintaining flexibility in the construction of components where feasible, as well as encouraging the education of construction teams on site-specific environmental and faunal concerns. Education may also include training in the identification of birds, bats, and other species of wildlife, which may be accomplished by utilizing posters that identify sensitive species, and which are posted at the construction trailer facility. Site personnel will be required to receive training on wildlife awareness.

The contractor will be required to have a proper safety program in place and to ensure that construction and operations crews have been adequately trained. To minimize the risk of wildfire that could destroy bird and bat habitat, or that could be injurious to construction personnel, construction crews will exercise proper caution and safety measures while handling and storing flammable chemicals, petroleum, and other materials with the potential for combustion. Operations and maintenance staff will be trained on this document, and training on avian protection planning and practices external to this document is highly encouraged.

In the event of permit noncompliance issues, the contractor will take the measures necessary to correct the situation and maintain compliance. A stop work order may be issued if an emergency occurs, or if a violation is not corrected in a reasonable time. The contractor will designate a Project representative responsible for notifying and documenting issues of noncompliance with the permit.

Avian Species. The primary concern for avian species during the construction phase is related to disturbance of state-designated species of special concern and SGCN species. Construction personnel will be trained to identify potential nesting habitat in grasslands and wetlands and to contact the Site Manager prior to disturbance. The Site Manager will coordinate any necessary special avoidance methods with the environmental inspector, and will notify the construction personnel when construction can continue.

Bat Species. The primary concern for bats during the construction phase will be the destruction of occupied roosting and breeding habitat for big brown bats (e.g., large trees, old buildings). Between April 1 and October 15, if construction will remove large trees, old buildings, or directly impact potential roosting or breeding habitat, construction personnel will be directed to halt activities and a trained biologist will search the area to ensure no bats are present. This searching can consist of visual inspection of trees, old buildings, and cavities where bats may exist, or of watching for bats departing these areas at dusk or returning at dawn. Construction personnel will be trained to identify potential habitat and required to contact the Site Manager prior to disturbance. The Site Manager will coordinate the searches with the environmental inspector and will notify the construction personnel when construction can continue. If areas are disturbed before April 1 or after October 15, these measures are not necessary. Presence/probable absence surveys conducted in 2019 did not identify any NLEB calls, indicating the probable absence of NLEB at the Project during the summer maternity season, and no further avoidance/minimization measure are required during construction for this species. If any future observations indicate summer presence of NLEB, Plum Creek will consider implementing avoidance/minimization measures in accordance with the ESA 4(d) rule (50 CFR 17 2016).

General Wildlife Resources. Construction personnel will be trained to identify and avoid impacts to wildlife in general. During construction, personnel will visually inspect each open trench or pit daily to determine if any animal has become trapped in the trench or pit. If an animal has become trapped, the Site Manager will be notified and appropriate action taken to safely remove and release the animal. Training in general wildlife awareness will be required of all construction personnel.

4.3 OPERATIONS AND MAINTENANCE

4.3.1 *Avian and Bat Mortality*

A combination of several factors contributes to avian and bat susceptibility to wind turbine collisions. These factors may include the abundance and composition of avifauna in the area, the way in which avifauna are dispersed across a geographic area, the presence of suitable nesting and foraging habitat, the presence and abundance of prey, the time of the day or night, the season

of the year, and the siting or layout of wind turbines. Predicting the fatality rates for the Project is best understood by utilizing publicly available data that are regionally relevant.

Based on Project-specific data (see Section 3), no significant adverse impacts are anticipated from the Project. The anticipated fatality rate for birds and raptors is expected to be within the overall range for other projects in Minnesota (Table 4). Publicly available studies from Minnesota (for studies conducted after 2005) suggest that estimated fatality rates range from 0.44 to 5.59 bird/MW/study period and 0 to 0.37 raptor/MW/study period. Based on publicly available studies in Minnesota conducted after 2005 (Table 4), the anticipated fatality rate for bats ranges from 0.41 to 37.59 bats/MW/study period. It is important to note that the study period often differs between surveys included in Table 4 (i.e., a study period for a project focusing on bats may be from July through October, or may cover the entire active period [April through early November]). As described further in Section 5.3.1, post-construction mortality monitoring at the Plum Creek Wind Farm will be conducted from March 15 through November 15, following MNDNR survey guidelines.

Table 4. Avian and bat fatality rates at Minnesota wind farms from publicly available data for studies conducted after 2005

Location	Project Name	Adjusted Fatalities Rates (Fatalities/Megawatt/Study Period)			Reference
		All Birds	Raptors	Bats	
Minnesota	Big Blue	0.60	0	2.04	Fagen Engineering 2014, 2015
Minnesota	Black Oak Getty	4.37	0	13.03	Pickle et al. 2018
Minnesota	Black Oak Getty*	3.50 – 5.22	0 – 0.6	21.00 – 37.59	Pickle et al. 2019
Minnesota	Elm Creek	1.55	0	1.49	Derby et al. 2010a
Minnesota	Elm Creek II	3.64	0	2.81	Derby et al. 2012
Minnesota	Grand Meadow	NA	NA	3.11	Chodachek et al. 2014
Minnesota	Lakefield	2.75	0	19.87	MPUC 2012
Minnesota	Moraine II	5.59	0.37	2.42	Derby et al. 2010b
Minnesota	Odell	4.69	0	6.74	Chodachek and Gustafson 2018
Minnesota	Oak Glen	NA	NA	3.09	Chodachek et al. 2014
Minnesota	Pleasant Valley	0.68	0	1.80	Tetra Tech 2017
Minnesota	Prairie Rose	0.44	0.08	0.41	Chodachek et al. 2015
Minnesota	Red Pine	2.68 – 4.47**	0.10	11.35 – 18.74**	Trana et al. 2019
Range		0.44 – 5.59	0 – 0.37	0.41 – 37.59	

*Fatality estimate ranges represent estimates for both cleared plot and road and pad surveys as well as deterrent (treatment) and control plots.

**Fatality estimate ranges represent estimates for both cleared plot and road and pad surveys.

4.3.2 Operational Procedures

During operations and maintenance, operational procedures will be developed and implemented, including, but not limited to, the following:

1. *Minimize Lighting.* All unnecessary lighting, except those required for safety by the Federal Aviation Administration (FAA) and other lights needed for safety and security purposes, will be turned off. Further, the USFWS recommends the use of minimum intensity, maximum off-phased strobe lights where necessary; constantly lighted sources, such as L-810 obstruction lights, are not recommended. The FAA recommends synchronized flashing or blinking red lights (L864), and generally recommends lighting only the perimeter of the wind farm project with lighting gaps of no more than 0.5 mile between lights, and no more than one mile across turbine clusters, as well as lighting turbines that are isolated from strings or clusters of other turbines. Minimizing the duration of the flash and maximizing the time between flashes is also beneficial. Turbines within the Project will be lighted in compliance with FAA minimum standards. In keeping with the Draft Guidelines, the use of motion- or infrared-activated lights on building facilities will be investigated as a method to reduce attraction of insects, birds, and bats. The use of high-intensity lights such as spotlights, steadily burning bright lights, and sodium vapor lights will be minimized.
2. *Limit Foraging Opportunities.* Foraging opportunities for raptors and other scavengers will be limited by:
 - Regular clearing of road kill or other carcasses around the Project to remove scavenger food sources.
 - Removing rock and brush piles that could create small bird roosting and raptor prey habitat from within 100 ft of turbines.
 - Prohibiting food waste littering by employees.

In addition to these measures, general farming practices such as tilling, harvesting, and mowing will provide another measure that will limit the accumulation of surface water and thereby deter avifauna.
3. *Minimize Risk of Vehicular Collisions.* Project access roads will be posted with a 25-mile-per-hour speed limit.
4. *Overhead Utilities Maintenance.* APLIC (2006) guidelines for overhead utilities maintenance will be followed where possible.
5. *Meteorological Towers.* Temporary met towers and guy-wires will be removed and replaced with permanent lattice towers for meteorological monitoring.
6. *Minimize Fire Risk.* Fire risk will be minimized by utilizing spark arrestors on all electrical equipment, and by restricting smoking to designated site areas.
7. *Proper Hazmat Handling.* Hazardous materials will be handled in accordance with federal and state regulations.
8. *Blade Feathering.* All operating turbines at the Project will be equipped and operated with software enabling adjustment of cut-in speeds. Turbines will be programmed to be locked or feathered at wind speeds up to the manufacturer's standard cut-in speed, from one-half hour before sunset to one-half hour after sunrise, from April 1 to October 31 of each year.

9. **Vegetation Maintenance.** During operations, tree trimming will be prioritized over tree removal, all tree trimming will occur in such a manner as to avoid impacting nesting or migrating birds and roosting bats.
10. **Employee Training.** A site-specific worker environmental training plan will be developed and implemented throughout the Project operating life and will include the importance of minimizing light pollution. All employees and contractors working in the field will be required to attend the environmental training session prior to working on site.
11. **Harassment.** Firearms and pets will be prohibited from the Project and workers will be instructed to avoid disturbing or harassing wildlife.

5 POST-CONSTRUCTION AVIAN AND BAT MONITORING

To assess actual direct collision impacts to bird and bat species from the Project, post-construction mortality monitoring will be conducted at the site for up to two years, to be determined once all Tier 3 studies are concluded and pending further coordination with the agencies. These surveys will include searcher efficiency and carcass removal trials, and the overall mortality rate will be adjusted based on the trial results. This protocol is based on guidelines from the USFWS *Land Based Wind Energy Guidelines* (USFWS 2012), the MNDNR *Avian and Bat Survey Protocols* (Mixon et al. 2014) and the National Wind Coordinating Collaborative *Comprehensive Guide to Studying Wind Energy/Wildlife Interactions* (Strickland et al. 2011). Estimates of mortality will follow either the Shoenfeld or Huso method as appropriate per Strickland et al. (2011).

Post-construction mortality data will be compiled on an annual basis on the years when intensive mortality monitoring is conducted and will be reported to the USFWS and MNDNR. Results of the post-construction mortality monitoring will be evaluated based on comparison with other mortality data for similar wind energy projects, and other pertinent factors such as weather events and factors related to wind facility operations, such as lighting. Should a reasonable level of mortality be exceeded, a process of adaptive management will be used to reduce the Project impacts below a reasonable level, and success or failure of these measures will be documented through post-construction mortality surveys.

5.1 Mortality Monitoring

The greatest mortality risks occur during the spring and fall migratory periods for birds and the fall migratory period for bats. Risks are lower during the breeding season and at a minimum during the winter season when passage rates and abundances of birds and bats are at seasonal lows.

Mortality monitoring will provide information on the impact of the Project on birds and bats and give an indication if any specific turbines or Project facilities are responsible for a significant proportion of fatalities. Impacts to avian and bat species are anticipated to be within the overall range of other Minnesota and Midwestern facilities. The objective of the monitoring will be to determine if avian and bat fatality rates measured at the Project are lower, similar to, or higher than estimates in other Minnesota, regional, and national studies.

Mortality monitoring will begin after all the turbines have been commissioned and are fully operational, and will be conducted by a third-party biologist. The duration and intensity of carcass searches, the number of selected turbines, and the levels of searcher efficiency and carcass removal trials will be consistent with general wind industry standard practices and the recommendations from consultation with the MDOC, MNDNR, and USFWS, and will follow the applicable protocols as described in the *Avian and Bat Survey Protocols for Large Wind Energy Conversion Systems in Minnesota* (Mixon et al. 2014).

The turbines selected for post-construction mortality monitoring will be selected by the third-party biologist, and provided to the MNDNR and MDOC at least three months before the planned commercial operation date. The cleared plot turbines will be selected to maximize the spatial extent within the Project layout, and may also take into account turbines that may be located relatively near to preferred habitat features such as riparian or grassland areas.

The objective of the standardized carcass searches is to systematically search plots centered on turbines for bat and bird casualties that are attributable to collision with Project facilities.

At each search turbine, the following data will be recorded: date, start time, end time, observer, and turbine number. When a bat or bird carcass is found during a search, the searcher will place a metal pin flag or similar marker at the carcass and finish searching the plot. After the plot has been completely searched, the searcher will return to each carcass and record information on a fatality data sheet, including date, species, sex and age (when possible), observer name, turbine number, distance from turbine (m), azimuth from turbine, Universal Transverse Mercator [UTM] coordinates, habitat surrounding carcass, visibility class, condition of carcass (i.e., intact, partial, scavenged), and estimated time of death (e.g., <1 day, 2 days). Digital photographs will be taken of all carcasses, any injuries, and surrounding habitat. Rubber gloves will be used to handle all carcasses to eliminate possible transmission of rabies or other diseases and to reduce possible human scent bias for carcasses later used in carcass removal trials.

5.1.1 Searcher Efficiency Trials

The objective of the searcher efficiency trials is to estimate the percentage of casualties that are found by searchers. Searcher efficiency trials will be conducted in the same plots that post-construction mortality monitoring occurs. Trials will be conducted during all seasons. Estimates of searcher efficiency will be used to adjust the total number of carcasses found for those missed by searchers, correcting for detection bias. Searcher efficiency trials will be conducted within both the search plots and on roads and pads.

Searcher efficiency trials will begin when carcass search studies begin and will occur throughout the field season. Personnel conducting carcass searches will not know when trials are conducted or the location of the detection carcasses. A minimum of 100 carcasses per plot type, distributed approximately evenly among size classes, will be used for searcher efficiency trials. Searcher efficiency carcasses will include: commercially available species, such as dark hopper-sized house mice (*Mus musculus*; approximately two- to three-week-old weaned mice) as bat surrogates; house sparrows (*Passer domesticus*) and two-week-old northern bobwhite quail (*Colinus virginianus*) for small birds; rock pigeons (*Columba livia*), chukar partridge (*Alectoris*

chukar), or ring-necked pheasants (*Phasianus colchicus*) for large birds; and possibly turkey decoys with a harness of real feathers for eagle surrogates. If Plum Creek applies for a Special Purpose – Utility permit from the USFWS (form 3-200-81; available online: <http://www.fws.gov/forms/3-200-81.pdf>), and if a permit is obtained and raptor carcasses are found, they will be used in searcher efficiency trials. As bat carcasses can be difficult to obtain, small bird searcher efficiency or mice may be used as surrogates. As the study progresses, if bat carcasses are found they will be incorporated into the searcher efficiency trials for later seasons.

All carcasses will be placed at random locations within areas being searched prior to the carcass search on the same day. Carcasses will be dropped from waist high or higher and allowed to land in a random posture. Each trial carcass will be discreetly marked prior to dropping so that it can be identified as a study carcass after it is found. The number and location of the detection carcasses found during the carcass search will be recorded. The number of carcasses available for detection during each trial will be determined immediately after the trial by the person responsible for distributing the carcasses.

5.1.2 Carcass Persistence Trials

The objective of carcass persistence trials is to estimate the likelihood that a carcass is removed by scavengers as a function of the time (measured in days) since the trial carcasses are placed in the field. Carcass removal includes removal by predation or scavenging, or removal by other means such as being plowed into a field. Estimates of carcass removal will be used to adjust the total number of carcasses found for those removed from the study area, correcting for removal bias.

Carcass removal trials will begin when carcass search studies begin. Approximately 25 bird carcasses will be used each season, along with 50 bat carcasses for summer and fall trials. Bird and bat carcasses will consist of the same species as the searcher efficiency trials species. Carcasses will be placed on a minimum of two dates during each season, spreading the trials throughout the year to incorporate the effects of varying weather, climatic conditions, and scavenger densities.

All carcasses will be placed at random locations within the search area. Carcasses will be dropped from waist high or higher and allowed to land in a random posture. Each trial carcass will be discreetly marked prior to dropping so that it can be identified as a study carcass if it is found by other searchers or wind facility personnel.

Scavenger removal rates will be regularly checked to confirm that removal rates are not exceedingly short. If the removal time is very short, there are means to address this such that additional uncertainty is not added into the analysis unnecessarily. Ways to address very short removal times are to increase search frequency, put out carcasses at night if avian scavengers are suspected of removing carcasses (i.e., some avian predators that are active during the day may cue in on and remove carcasses immediately after placement), or possibly other options. The frequency of the standardized searches may be increased if carcass removal rates by scavengers are so high at the Project that it precludes accurate bird and bat fatality estimates. For example, more frequent searches could be necessary if scavengers are removing a majority

of carcasses from the site within a few hours or days. Based on removal trials at other wind projects in the region, this level of carcass scavenging is not anticipated.

5.1.3 Estimation of Fatality

Fatality estimation is a complex task due to a number of variables present in every study. Fatalities occur at an unknown rate, persist for variable amounts of time, and can be detected with varying levels of success based on carcass characteristics and ground cover. To account for these variables, fatality rate estimation methods have been developed.

Estimates of facility-related fatalities are based on:

- Observed number of carcasses found during standardized searches throughout the monitoring year for which the cause of death is either unknown or is probably facility-related;
- Persistence rates expressed as the estimated average probability a carcass is expected to remain in the study area and be available for detection by the searchers during persistence trials;
- Searcher efficiency expressed as the proportion of planted carcasses found by searchers during searcher efficiency trials; and
- Search area adjustment based on the area searched and carcass density.

Annual and, if necessary, seasonal fatality estimates will be provided for the following groups: all birds; small birds; large birds; raptors; eagles; and bats, if appropriate. The total number of fatalities in each of these groups will be estimated by adjusting for carcass persistence, searcher efficiency rates, and density-weighted search area using a fatality estimator model. Per the MNDNR's recommended post-construction protocol, two estimators will be used to calculate fatality estimates: the Huso and Shoenfeld (or GenEst) estimators, if appropriate.

The per-turbine and/or per-MW fatality rate point estimates will be calculated for the Project. Standard errors and 90% confidence intervals will be calculated using bootstrapping (Manly 1997). Bootstrapping is a computer simulation technique that is useful for calculating point estimates, variances, and confidence intervals for complicated test statistics. A total of 1,000 bootstrap samples are planned to be used. The standard deviation of the bootstrap estimates is the estimated standard error. The lower 5th and upper 95th percentiles of the 1,000 bootstrap samples will be estimates of the lower limit and upper limit of 90% confidence intervals.

5.1.4 Reporting

Mortality results will be compiled and reported quarterly in January, April, July, and October; in the year(s) when intensive mortality monitoring is completed, these lists will include all birds and bats found during searches and incidentally. In all other years, the quarterly reports will consist of a list of any incidentally found bird or bat documented by the Operations and Maintenance staff. Estimated mortality rates for birds and bats per turbine and per MW will be calculated in the

year(s) when intensive mortality monitoring is completed based on the methods described above (see Section 5.3.4). These calculated mortality rates will be compared to mortality data from other wind facilities for similar projects. If a reasonable level of mortality is exceeded, adaptive management strategies will be identified and implemented. These results and analysis will be compiled in a report and provided to the USFWS and MNDNR for each year of mortality surveys at the locations provided below. These reports will include copies of all data forms associated with mortality monitoring.

USFWS

Office of Migratory Bird Permits
5600 America Boulevard West, Suite 990
Bloomington, MN 5437-1458

MNDNR

Minnesota State Salvage Permit
Box 25, 500 Lafayette Road
St. Paul, MN 55155

5.1.5 Post-construction Permitting Efforts

Required wildlife permits will be obtained for the Project from the USFWS and MNDNR for handling dead or injured birds protected by programs such as the MBTA, BGEPA, and state nest relocation permits. Temporary possession, depredation, and salvage permits issued by the USFWS under the BGEPA and MBTA and state salvage permits will be part of the post-construction monitoring efforts and each of these permits will be acquired before monitoring begins.

The ECPG (USFWS 2013) describes a five-stage approach to developing successful ECPs, as described in Section 1.4.5. Eagle-use data collected during pre-construction surveys, as well as the results of post-construction mortality monitoring will be provided and discussed with the USFWS, as well as whether development of an Eagle Conservation Plan is appropriate for the Project.

5.2 Key Resources

This ABPP identifies key resources to address avian protection issues including area USFWS and MNDNR biologists, engineers, planners, and operation personnel who have been trained on avian interaction problems. External organizations such as the National Wind Coordination Committee (NWCC) and APLIC can also serve as helpful resources by providing guidance, workshops, materials, and contacts. The Project personnel will attempt to connect regulators and wildlife experts with Project decision-makers to reduce avian and bat injury or mortality and maintain Project reliability. The Site Manager will be responsible for enforcement of BMPs that focus on reducing impacts to birds and bats, as well as the implementation of this document. Operations and maintenance staff will be trained on this document and provided training on avian

protection planning. Table 5 lists contacts that will serve as key resources during the construction and operations phases of the Project.

Table 5. List of Key Resources

Organization Type	Name	Address	Phone
Rehabilitation Center	The Raptor Center College of Veterinary Medicine, University of Minnesota	1920 Fitch Avenue St. Paul, MN 55108	612-624-4745
Rehabilitation Center	Wildlife Science Center	5463 West Broadway Avenue Forest Lake, MN 55025	651-464-3993
Government Agency	Minnesota Department of Natural Resources	500 Lafayette Road St. Paul, MN 55155	651-296-5484
Government Agency	U.S. Fish and Wildlife Service Twin Cities Field Office	4101 American Boulevard East Bloomington, MN 55425	612-725-3548
Government Agency	Minnesota Department of Commerce Energy Facility Permitting	85 7th Place East, Suite 500 St. Paul, MN 55101	800-657-3794

6 RESEARCH

In addition to Tiers 1 through 4 described above, the WEG contains Tier 5 Other Post-Construction Studies. In general, the studies identified in Tier 5 are research-related and “will not be necessary for most wind energy projects (USFWS 2012).” Results from the Tier 4 studies will be reviewed to determine the necessity for Tier 5 studies; however, these studies are not anticipated for this Project.

7 ADAPTIVE MANAGEMENT

Within the WEG, the USFWS defines adaptive management as “an iterative decision process that promotes flexible decision-making that can be adjusted in the face of uncertainties as outcomes from management actions and other events become better understood. Comprehensively applying the tiered approach embodies the adaptive management process” (USFWS 2012). The WEG further notes that adaptive management at most wind facilities is unlikely to be needed during operation if they are sited in accordance with the tiered approach. Nevertheless, Plum Creek recognizes the value of applying this approach to its Project activities that include some uncertainty. As such, Plum Creek has incorporated an adaptive approach for the conservation of wildlife potentially impacted by the Project.

Findings during post-construction mortality monitoring or operational monitoring may trigger the need for adaptive management actions. Potential triggering events may include:

1. Mortality of an eagle, northern long-eared bat, or species listed as endangered or threatened under the ESA or Minnesota's Endangered Species Statute;
2. A mass mortality event, defined as five or more dead or injured birds or bats found within one search area during intensive mortality surveys or in one day in years when no intensive monitoring occurs (or as defined in the Site Permit); or
3. Significant levels of mortality of other species of birds or bats. Significance will be determined by qualified biologists and will be based on the latest information available, including the most recent data on species' population sizes and trends. For example, even relatively high levels of mortality of the most common species may not be significant. Conversely, lower levels of mortalities of less common species may be of more concern, particularly if these species appear to be at risk (e.g., USFWS's Birds of Conservation Concern).

If one of these triggering events occurs, Plum Creek will report the event as required by state and federal permits, and will initiate an investigation into potential causes of the event. In coordination with MNDNR and USFWS, Plum Creek will: (1) evaluate monitoring data to determine whether the data are indicative of a pattern of fatalities at the Project that should be addressed through additional measures; (2) identify practicable measures to address the impact and minimize fatalities; and (3) determine corrective actions, to the extent possible, to ensure long-term solutions are implemented for the life of the Project.

Another potential event that could trigger the need for adaptive management action is the listing of a new species by USFWS or MNDNR. Should a new species be listed that has the potential to occur at the facility, Plum Creek will meet and confer with USFWS to determine if changes to the turbine operation plan are warranted based on results of monitoring at the Project.

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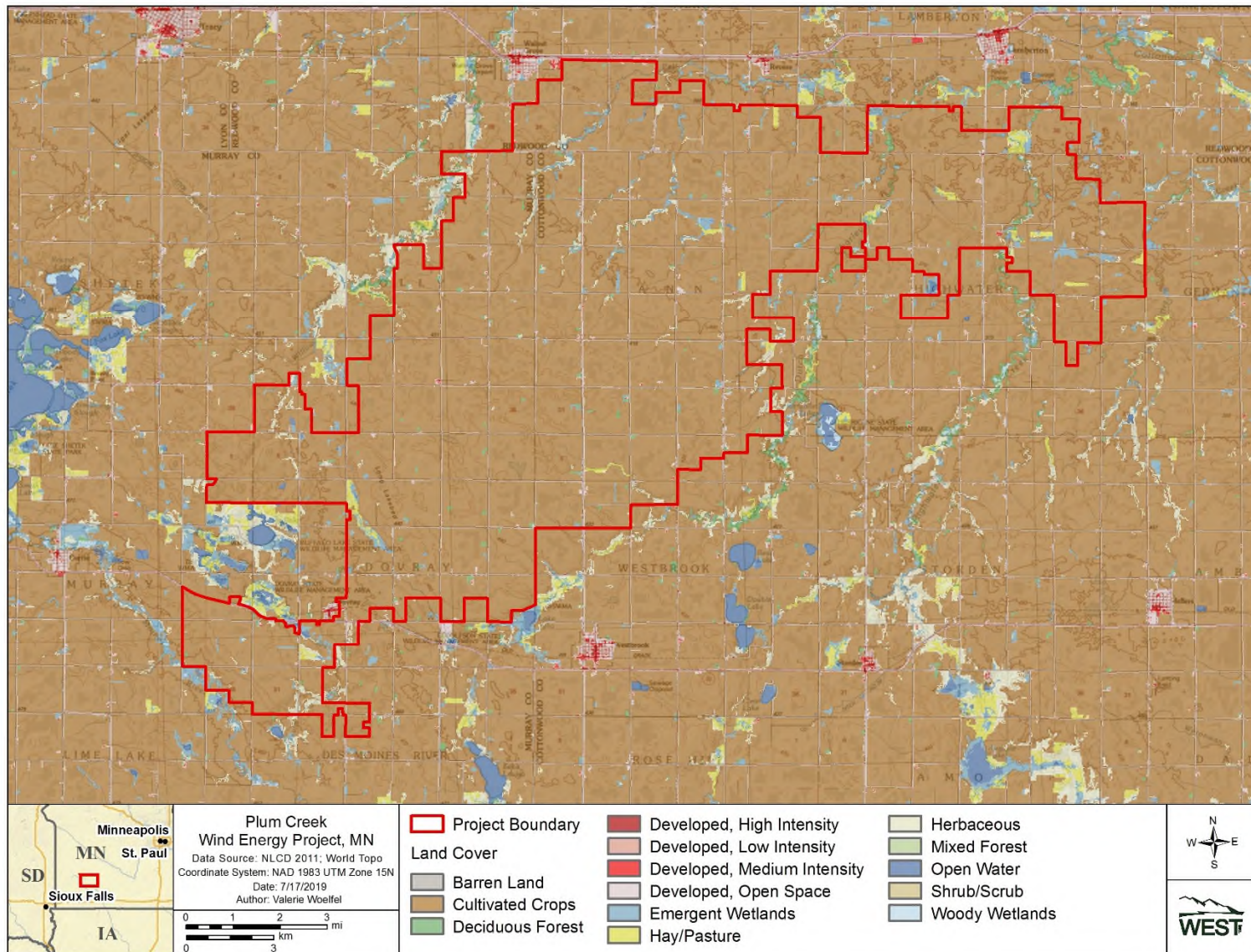
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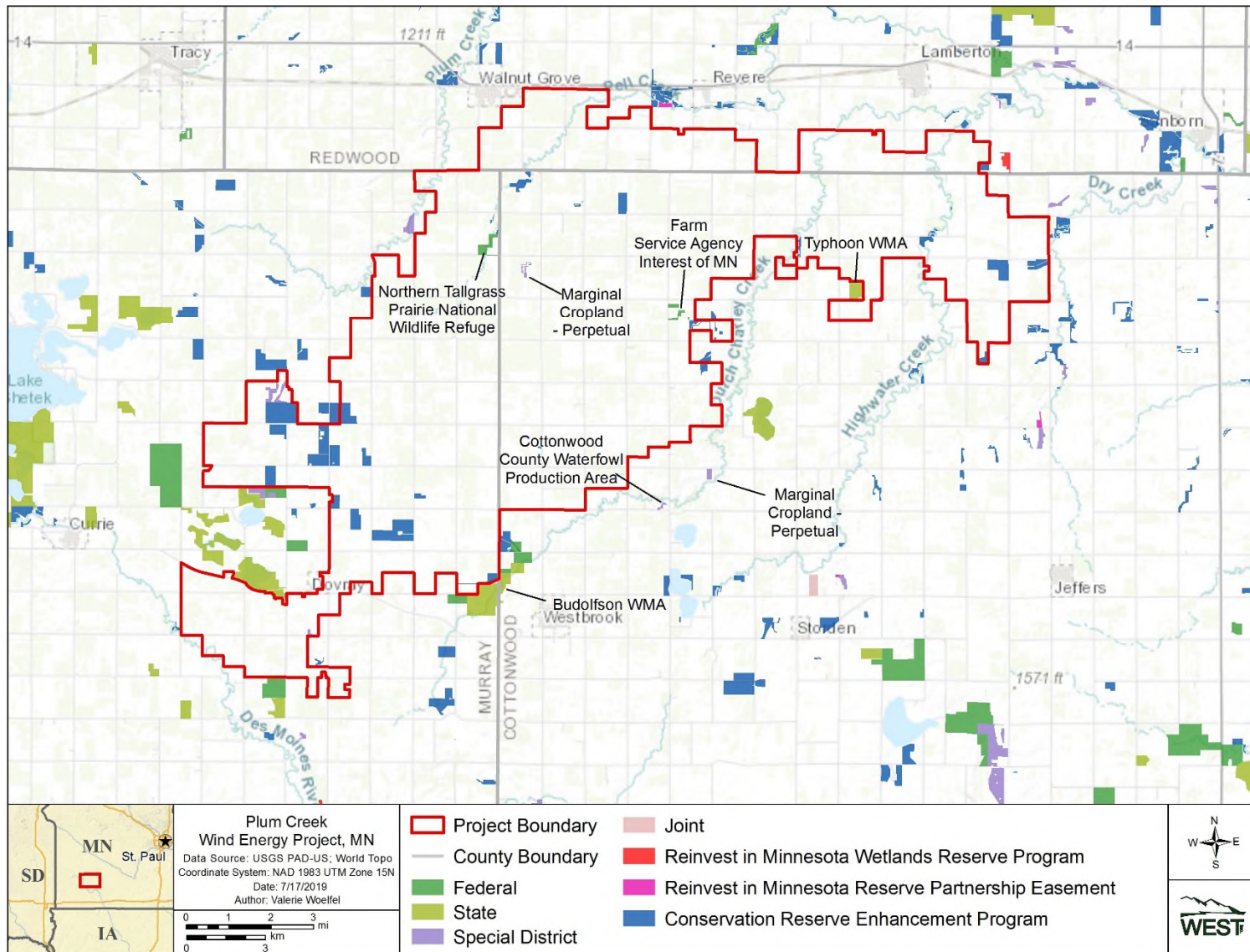
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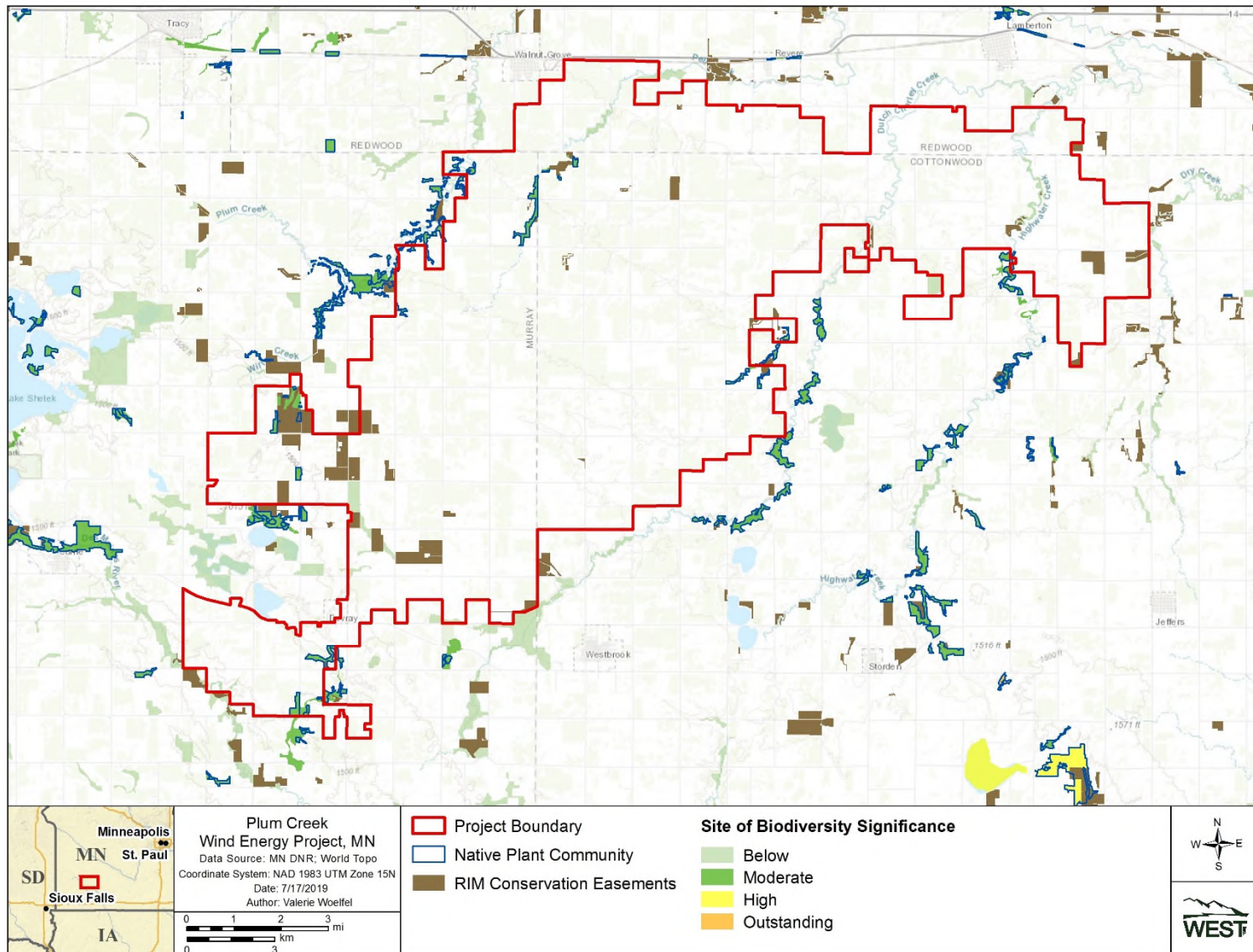
Map Exhibit 2. Land cover types within the Plum Creek Wind Project.



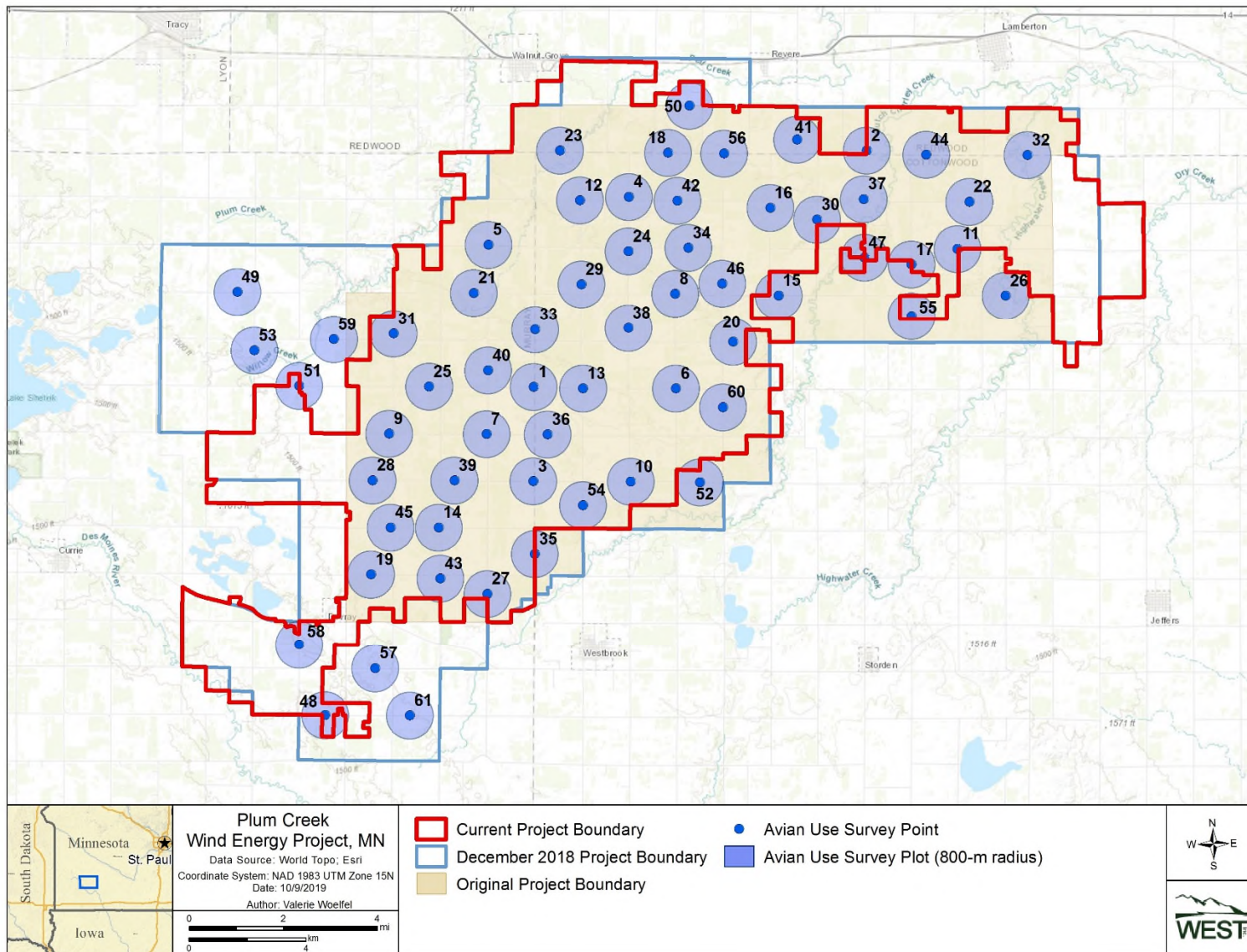
Map Exhibit 3. Protected areas within the Plum Creek Wind Project.



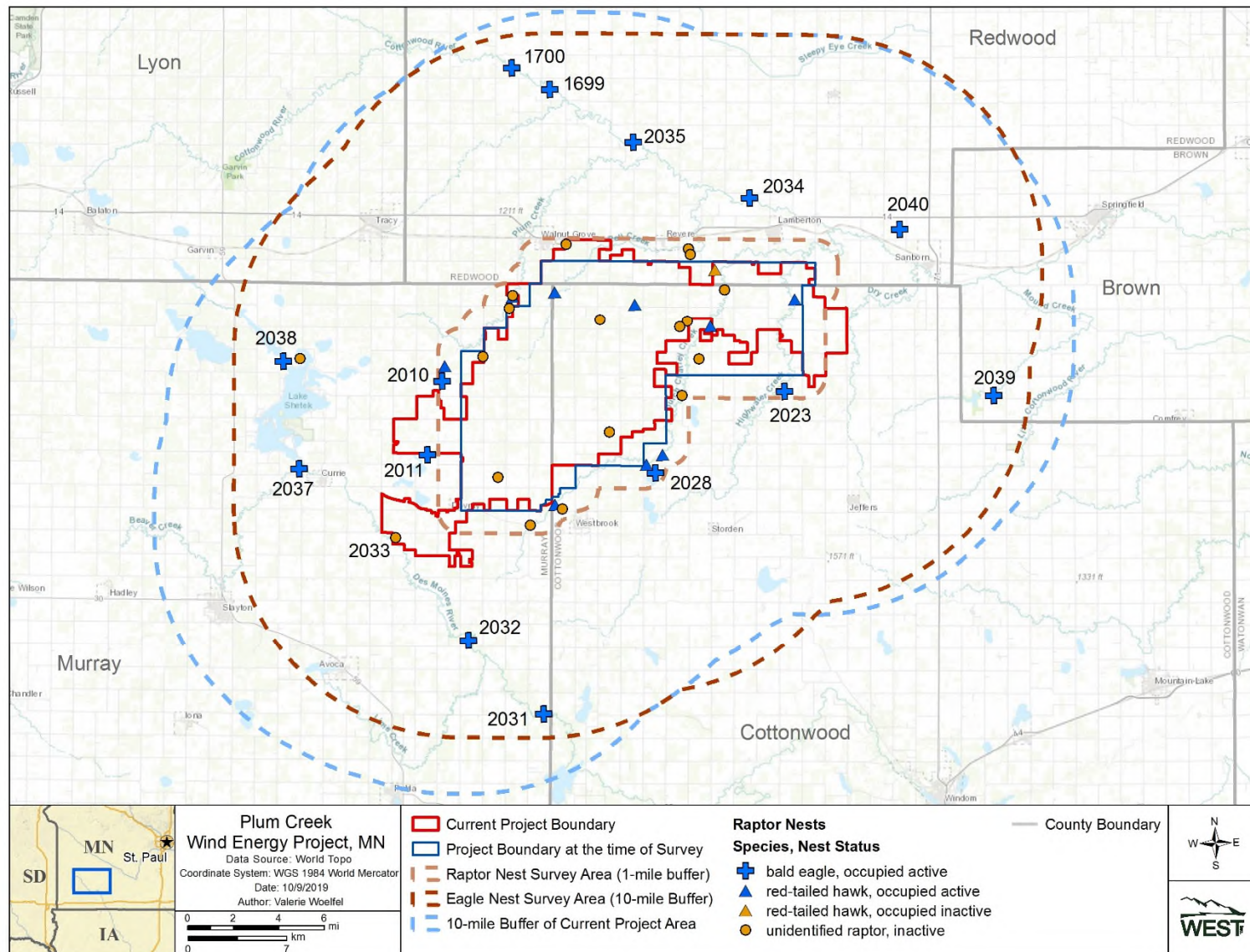
Map Exhibit 4: Minnesota Sites of Biodiversity Significance and Native Plant Communities at the Plum Creek Wind Project in Cottonwood, Murray, and Redwood counties, Minnesota.



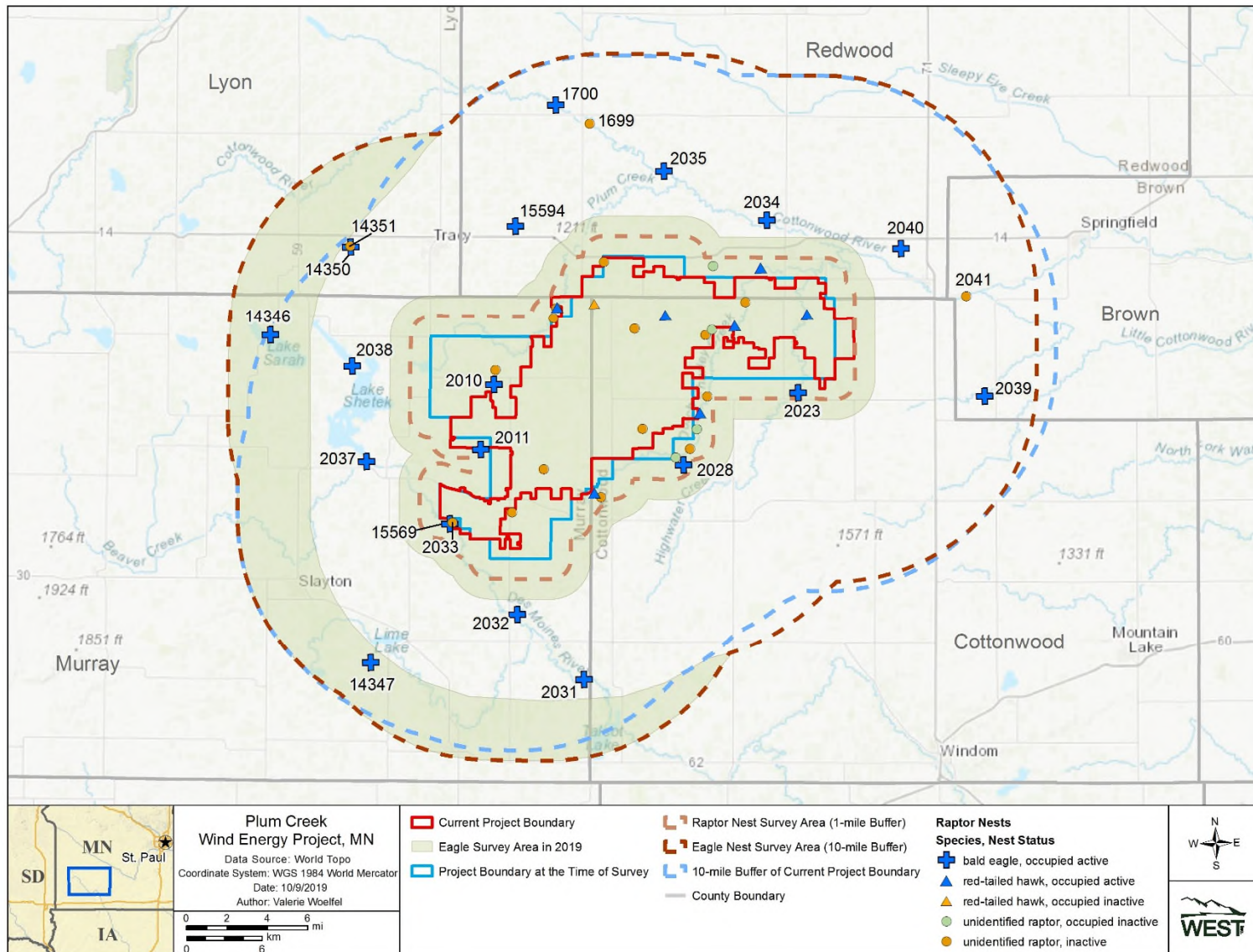
Map Exhibit 5. Avian use survey points and previous and current Project boundaries at the Plum Creek Wind Project.



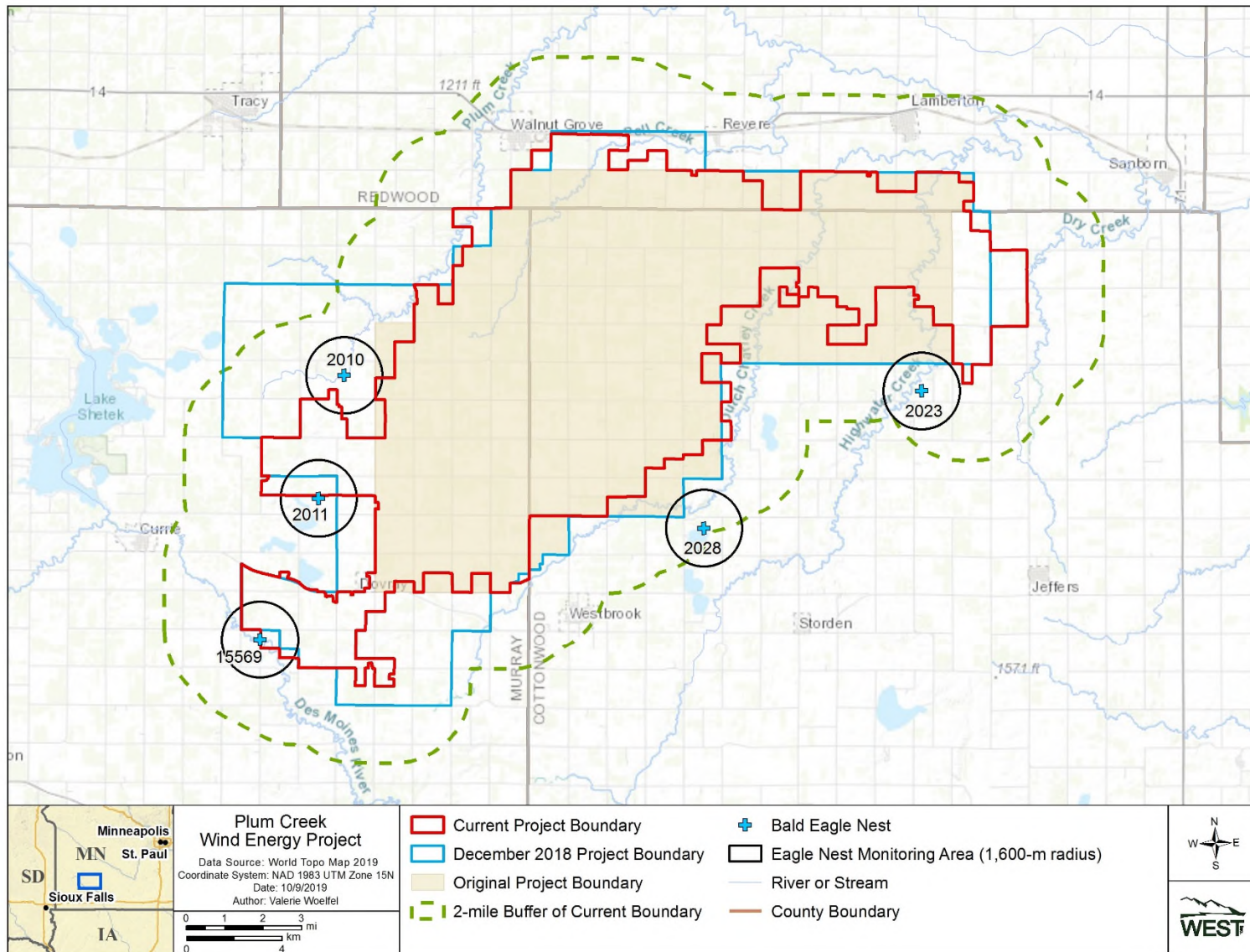
Map Exhibit 6a. Locations of Raptor Nests Identified during the 2018 Raptor Nest Survey at the Plum Creek Wind Project.



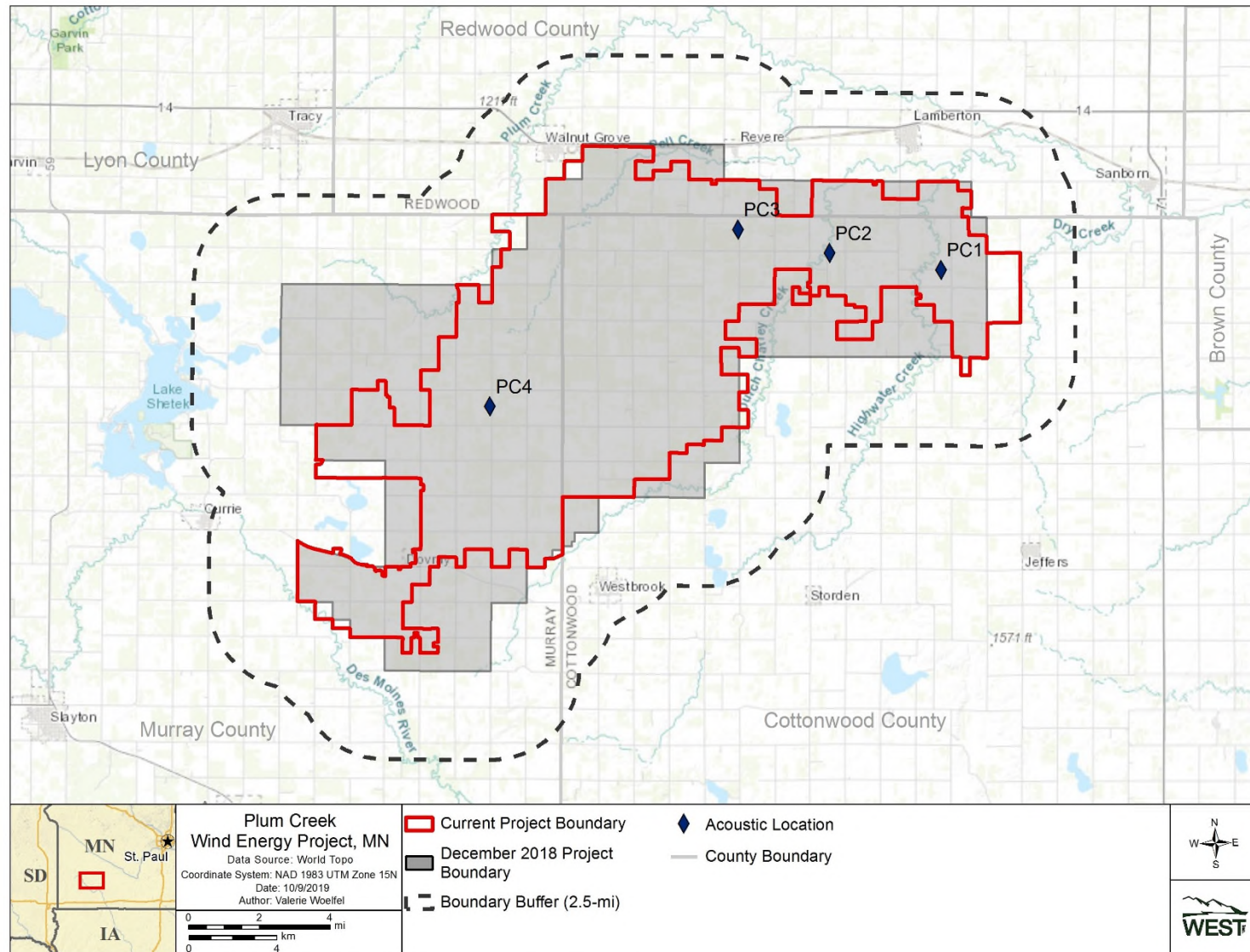
Map Exhibit 6b. Nests documented during the 2019 raptor nest survey near the Plum Creek Wind Project, Cottonwood, Murray, and Redwood counties, Minnesota.



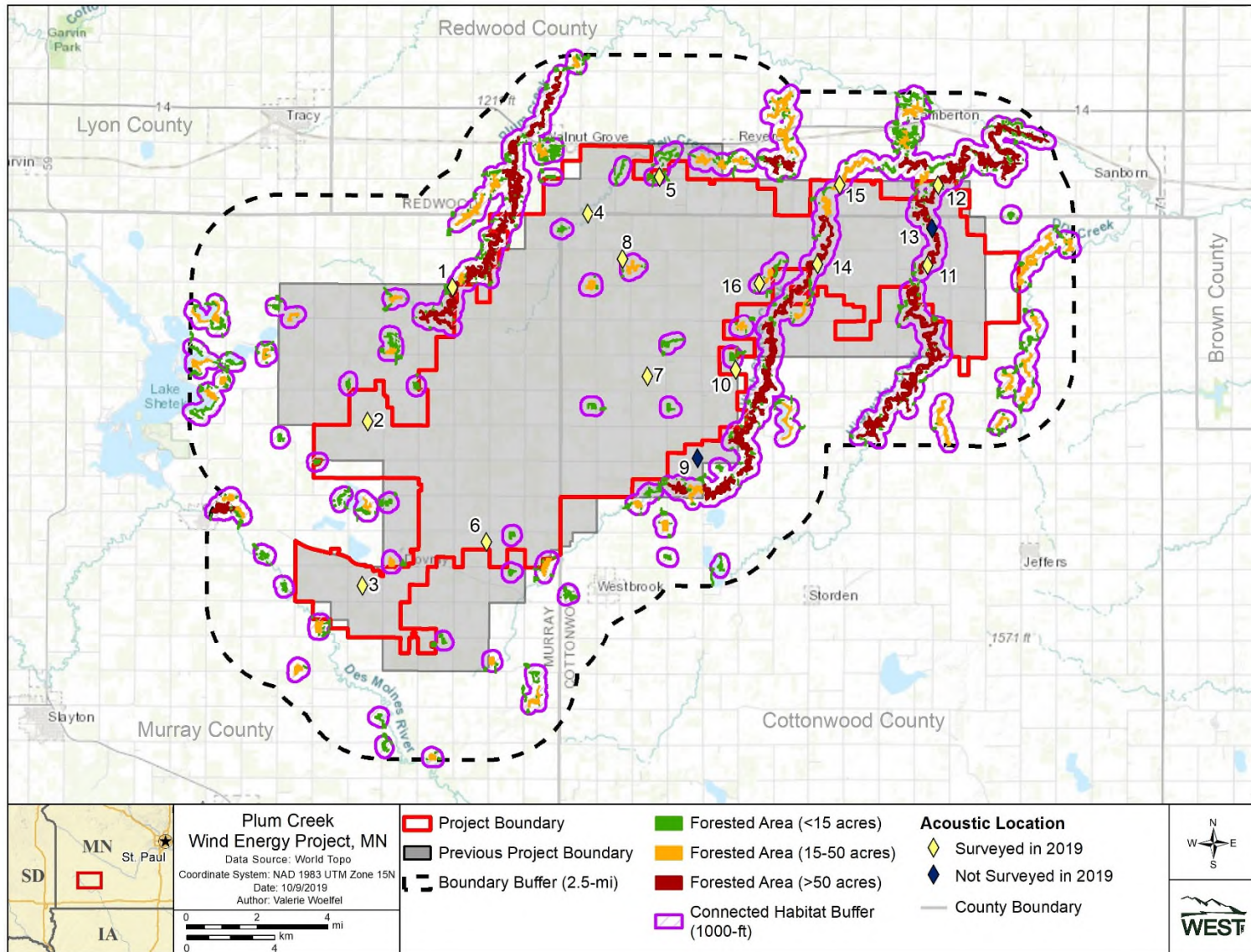
Map Exhibit 6c. Occupied active bald eagle nests within 2.0 miles of the Plum Creek Wind Project, Cottonwood, Murray, and Redwood counties, Minnesota.



Map Exhibit 7. General acoustic survey detector locations at the Plum Creek Wind Project, Cottonwood, Murray, and Redwood counties, Minnesota.



Map Exhibit 8. Results of the northern long-eared bat desktop habitat assessment and acoustic survey site locations for the summer 2019 presence/probable absence surveys at the Plum Creek Wind Project, Cottonwood, Murray, and Redwood counties, Minnesota.



Appendix A
Agency Correspondence/Natural Heritage Information System



Minnesota Department of Natural Resources

Division of Ecological and Water Resources, Box 25

500 Lafayette Road

St. Paul, Minnesota 55155-4025

Phone: (651) 259-5091 E-mail: samantha.bump@state.mn.us

February 15, 2017

Correspondence # ERDB 20170252

Ms. Kara Bakke
Geronimo Energy
7650 Edinborough Way, Suite #725
Edina, MN 55435

RE: Natural Heritage Review of the proposed Plum Creek Wind Farm & Transmission Line,
Redwood & Cottonwood County

Dear Ms. Bakke,

The Minnesota Natural Heritage Information System has been queried to determine if any rare species or other significant natural features are known to occur within an approximate one-mile radius of the proposed project. For the results of this query, please refer to the enclosed database reports (please visit the Rare Species Guide at <http://www.dnr.state.mn.us/rsg/index.html> for more information on the biology, habitat use, and conservation measures of these rare species). Given the preliminary project layout is not available at this time, I am providing the database reports only and have not evaluated the potential for the proposed project to adversely affect these rare features.

Please note that the enclosed reports include records from the Rare Features Database only. For your information, the DNR Native Plant Communities and the MBS Sites of Biodiversity Significance are two other databases available from the Natural Heritage Information System that you may find useful in your conservation planning efforts considering both are found within the project area. GIS shapefiles of these databases can be downloaded from the MN Geospatial Commons website at <https://gisdata.mn.gov/>. Please refer to the below links for Guidelines for help interpreting this data. We recommend that the project be designed to avoid impacts to these ecologically significant sites.

It should be noted that many SGCN are not tracked in the Natural Heritage Information System (NHIS), and the NHIS does not include records of migrating birds. Wind farms can affect birds due to collision mortality, displacement due to disturbance, habitat fragmentation, and habitat loss. Even if collision mortality rates are low, the additional mortality may be significant for rare species. In addition, the results from some studies suggest that grassland birds are deterred from nesting in otherwise appropriate habitat by the presence of tall structures in the vicinity. We recommend post-construction avian mortality monitoring to provide information regarding unexpected impacts, if any, to rare birds. Knowledge of these types of extraordinary events would allow for the implementation of additional measures to minimize disturbance, such as the curtailment of turbine operations during certain conditions. Regional DNR staff may have more recommendations regarding avian surveys based on local knowledge of the project site.

The Natural Heritage Information System (NHIS) tracks bat roost trees and hibernacula plus some acoustic data, but this information is not exhaustive. Although there are no NHIS records for bats in the vicinity of the proposed project, all seven of Minnesota's bats can be found throughout Minnesota. The northern long-eared bat (*Myotis septentrionalis*), tricolored bat (*Perimyotis subflavus*), big brown bat

(*Eptesicus fuscus*), and little brown bat (*Myotis lucifugus*) are all state-listed species of special concern. River corridors and forested areas provide bat habitat and the potential for turbines to cause bat fatalities. Therefore, turbines should be placed an adequate distance from these areas. Actions, such as feather turbine blades below cut-in speeds, can minimize impacts to these species. We recommend conducting pre-construction acoustic bat surveys and post-construction bat fatality monitoring to provide useful information on the impacts to these species. As the U.S. Fish and Wildlife Service (USFWS) has listed the northern long-eared bat as threatened under the Endangered Species Act (ESA), please coordinate with the USFWS regarding this species.

The Natural Heritage Information System (NHIS), a collection of databases that contains information about Minnesota's rare natural features, is maintained by the Division of Ecological and Water Resources, Department of Natural Resources. The NHIS is continually updated as new information becomes available, and is the most complete source of data on Minnesota's rare or otherwise significant species, native plant communities, and other natural features. However, the NHIS is not an exhaustive inventory and thus does not represent all of the occurrences of rare features within the state. Therefore, ecologically significant features for which we have no records may exist within the project area. **If additional information becomes available regarding rare features in the vicinity of the project, further review may be necessary.**

The enclosed results include two Index Reports and two Detailed Reports of records in the Rare Features Database, the main database of the NHIS. To control the release of specific location information, which might result in the destruction of a rare feature, both reports are copyrighted.

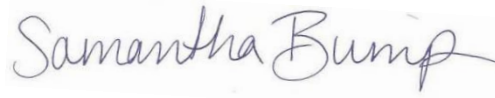
The Index Report provides rare feature locations only to the nearest section, and may be reprinted, unaltered, in an environmental review document (e.g., EAW or EIS), municipal natural resource plan, or report compiled by your company for the project listed above. If you wish to reproduce the index report for any other purpose, please contact me to request written permission. **The Detailed Report is for your personal use only as it may include specific location information that is considered nonpublic data under Minnesota Statutes, section 84.0872, subd. 2. If you wish to reprint or publish the Detailed Report for any purpose, please contact me to request written permission.**

For environmental review purposes, the results of this Natural Heritage Review are valid for one year; the results are only valid for the project location (noted above) and the project description provided on the NHIS Data Request Form. Please contact me if project details change or for an updated review if construction has not occurred within one year.

The Natural Heritage Review does not constitute review or approval by the Department of Natural Resources as a whole. Instead, it identifies issues regarding known occurrences of rare features and potential effects to these rare features. To determine whether there are other natural resource concerns associated with the proposed project, please contact your DNR Regional Environmental Assessment Ecologist (contact information available at http://www.dnr.state.mn.us/eco/ereview/erp_regioncontacts.html). Please be aware that additional site assessments or review may be required.

Thank you for consulting us on this matter, and for your interest in preserving Minnesota's rare natural resources. Please include a copy of this letter in any state or local license or permit application. An invoice will be mailed to you under separate cover.

Sincerely,

A handwritten signature in blue ink that reads "Samantha Bump". The signature is fluid and cursive, with the first name "Samantha" being larger and more prominent than the last name "Bump".

Samantha Bump
Natural Heritage Review Specialist

enc. Rare Features Database: Index Report (2)
 Rare Features Database: Detailed Report (2)
 Rare Features Database Reports: An Explanation of Fields

Links: MBS Sites of Biodiversity Significance
 http://www.dnr.state.mn.us/eco/mcbs/biodiversity_guidelines.html
 DNR Native Plant Communities
 <http://www.dnr.state.mn.us/npc/index.html>

Cc: Cynthia Warzecha
 Kevin Mixon

Minnesota Natural Heritage Information System
Index Report of records within 1 mile radius of:
ERDB #20170252 - Plum Creek Transmission Line
Multiple TRS
Redwood & Cottonwood Counties

Rare Features Database:

Element Name and Occurrence Number	Federal Status	MN Status	Draft Status	SGCN Status	State Rank	Global Rank	Last Obs Date	EO ID #
Vertebrate Animal								
<u>Anaxyrus cognatus</u> (Great Plains Toad) #8 T104N R34W S3, T104N R36W S5, T107N R37W S35, T107N R37W S4, T [...]; Watonwan, Brown, Jackson, [...] County		SPC		SGCN	S3	G5	1944-07-19	39444
<u>Haliaeetus leucocephalus</u> (Bald Eagle) #2675 T110N R38W S34, T110N R38W S35; Redwood County		Watchlist			S3B,S3N	G5	2007-FA	34473
Invertebrate Animal								
<u>Actinonaias ligamentina</u> (Mucket) #233 T109N R38W S2, T109N R38W S1; Redwood County		THR		SGCN	S2	G5	2002-PRE	31760
<u>Alasmidonta marginata</u> (Elktoe) #99 T109N R38W S2, T109N R38W S1; Redwood County		THR		SGCN	S2	G4	2002-PRE	31498
<u>Speyeria idalia</u> (Regal Fritillary) #7 T110N R38W S30, T110N R38W S29; Redwood County		SPC		SGCN	S3	G3	1996-07-13	22490
Native Plant Community (This may not represent a complete list. Also see MCBS Native Plant Communities at http://deli.dnr.state.mn.us.)								
<u>Mesic Prairie (Southern) Type</u> #209 T110N R38W S29; Redwood County	(NPC Code: UPs23a)	N/A			S2	GNR	1998-08-26	1306
<u>Wet Prairie (Southern) Type</u> #48 T110N R38W S29; Redwood County	(NPC Code: WPs54b)	N/A			S2	GNR	1998-08-26	423

Records Printed = 7

Minnesota's endangered species law (*Minnesota Statutes*, section 84.0895) and associated rules (*Minnesota Rules*, part 6212.1800 to 6212.2300 and 6134) prohibit the taking of threatened or endangered species without a permit. For plants, taking includes digging or destroying. For animals, taking includes pursuing, capturing, or killing.

An Explanation of Fields:

Element Name and Occurrence Number: The Element is the name of the rare feature. For plant and animal species records, this field holds the scientific name followed by the common name in parentheses; for all other elements it is solely the element name. Native plant community names correspond to Minnesota's Native Plant Community Classification (Version 2.0). The Occurrence Number, in combination with the Element Name, uniquely identifies each record.

Printed January 2017
Data valid for one year

Minnesota Natural Heritage Information System
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Multiple TRS
Redwood & Cottonwood Counties

Federal Status: The status of the species under the U.S. Endangered Species Act: LE = endangered; LT = threatened; LE,LT = listed endangered in part of its range, listed threatened in another part of its range; LT,PDL = listed threatened, proposed for delisting; C = candidate for listing. If null or 'No Status,' the species has no federal status.

MN Status: The legal status of the plant or animal species under the Minnesota Endangered Species Law: END = endangered; THR = threatened; SPC = special concern; NON = tracked, but no legal status. Native plant communities, geological features, and colonial waterbird nesting sites do not have any legal status under the Endangered Species Law and are represented by a N/A.

Draft Status: Proposed change to the legal status of the plant or animal species under the Minnesota Endangered Species Law: END = endangered; THR = threatened; SPC = special concern; Watchlist = tracked, but no legal status.

SGCN Status: SGCN = The species is a Species in Greatest Conservation Need as identified in Minnesota's State Wildlife Action Plan (<http://www.dnr.state.mn.us/cwcs/index.html>). This designation applies to animals only.

State Rank: Rank that best characterizes the relative rarity or endangerment of the taxon or plant community in Minnesota. The ranks do not represent a legal status. They are used by the Minnesota Department of Natural Resources to set priorities for research, inventory and conservation planning. The state ranks are updated as inventory information becomes available. S1 = Critically imperiled in Minnesota because of extreme rarity or because of some factor(s) making it especially vulnerable to extirpation from the state. S2 = Imperiled in Minnesota because of rarity or because of some factor(s) making it very vulnerable to extirpation from the state. S3 = Vulnerable in Minnesota either because rare or uncommon, or found in a restricted range, or because of other factors making it vulnerable to extirpation. S4 = Apparently secure in Minnesota, usually widespread. S5 = Demonstrably secure in Minnesota, essentially ineradicable under present conditions. SH = Of historical occurrence in the state, perhaps having not been verified in the past 20 years, but suspected to be still extant. An element would become SH without the 20-year delay if the only known occurrences in the state were destroyed or if it had been extensively and unsuccessfully looked for. SNR = Rank not yet assessed. SU = Unable to rank. SX = Presumed extinct in Minnesota. SNA = Rank not applicable. S#S# = Range Rank: a numeric range rank (e.g., S2S3) is used to indicate the range of uncertainty about the exact status of the element. S#B, S#N = Used only for migratory animals, whereby B refers to the breeding population of the element in Minnesota and N refers to the non-breeding population of the element in Minnesota.

Global Rank: The global (i.e., range-wide) assessment of the relative rarity or imperilment of the species or community. Ranges from G1 (critically imperiled due to extreme rarity on a world-wide basis) to G5 (demonstrably secure, though perhaps rare in parts of its range). Global ranks are determined by NatureServe, an international network of natural heritage programs and conservation data centers.

Last Observed Date: Date that the Element Occurrence was last observed to be extant at the site in format YYYY-MM-DD.

EO ID #: Unique identifier for each Element Occurrence record.

Element Occurrence: An area of land and/or water in which an Element (i.e., a rare species or community) is, or was, present, and which has practical conservation value for the Element as evidenced by potential continued (or historical) presence and/or regular recurrence at a given location. Specifications for each species determine whether multiple observations should be considered 1 Element Occurrence or 2, based on minimum separation distance and barriers to movement.

Minnesota Natural Heritage Information System
Index Report of records within 1 mile radius of:
ERDB #20170252 - Plum Creek Wind Farm
Multiple TRS
Redwood & Cottonwood Counties

Rare Features Database:

Element Name and Occurrence Number	Federal Status	MN Status	Draft Status	SGCN Status	State Rank	Global Rank	Last Obs Date	EO ID #
Vertebrate Animal								
<u>Anaxyrus cognatus</u> (Great Plains Toad) #2 T108N R36W S5, T109N R36W S16, T109N R36W S3, T109N R36W S4, T [...]; Cottonwood, Redwood County		SPC		SGCN	S3	G5	2008-08-10	38435
<u>Anaxyrus cognatus</u> (Great Plains Toad) #8 T104N R34W S3, T104N R36W S5, T107N R37W S35, T107N R37W S4, T [...]; Watonwan, Brown, Jackson, [...] County		SPC		SGCN	S3	G5	1944-07-19	39444
<u>Anaxyrus cognatus</u> (Great Plains Toad) #22 T105N R40W S26, T105N R40W S7, T105N R41W S11, T105N R41W S12, T [...]; Lyon, Cottonwood, Nobles, Redwood, [...] County		SPC		SGCN	S3	G5	1937-10-17	39458
<u>Bartramia longicauda</u> (Upland Sandpiper) #434 T109N R37W S32, T109N R37W S33, T109N R37W S28; Redwood County		Watchlist		SGCN	S4B	G5	1998-06-12	24258
<u>Phalaropus tricolor</u> (Wilson's Phalarope) #107 T108N R39W S32, T108N R39W S33; Murray County		THR		SGCN	S2B	G5	2006-06-20	33978
Invertebrate Animal								
<u>Oarisma poweshiek</u> (Poweshiek Skipperling) #10 T107N R39W S22, T107N R39W S23, T107N R39W S26, T107N R39W S27; Murray County	LE	END		SGCN	S1	G1	1975-07-05	2680
Native Plant Community (This may not represent a complete list. Also see MCBS Native Plant Communities at http://deli.dnr.state.mn.us.)								
<u>Dry Hill Prairie (Southern) Type</u> #8 T108N R39W S16, T108N R39W S21, T108N R39W S15, T108N R39W S22; Murray County			(NPC Code: UPs13d)	N/A	S2	GNR	1977-09	403

Records Printed = 7

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An Explanation of Fields:

Element Name and Occurrence Number: The Element is the name of the rare feature. For plant and animal species records, this field holds the scientific name followed by the common name in parentheses; for all other elements it is solely the element name. Native plant community names correspond to Minnesota's Native Plant Community Classification (Version 2.0). The Occurrence Number, in combination with the Element Name, uniquely identifies each record.

Printed January 2017
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MN Status: The legal status of the plant or animal species under the Minnesota Endangered Species Law: END = endangered; THR = threatened; SPC = special concern; NON = tracked, but no legal status. Native plant communities, geological features, and colonial waterbird nesting sites do not have any legal status under the Endangered Species Law and are represented by a N/A.

Draft Status: Proposed change to the legal status of the plant or animal species under the Minnesota Endangered Species Law: END = endangered; THR = threatened; SPC = special concern; Watchlist = tracked, but no legal status.

SGCN Status: SGCN = The species is a Species in Greatest Conservation Need as identified in Minnesota's State Wildlife Action Plan (<http://www.dnr.state.mn.us/cwcs/index.html>). This designation applies to animals only.

State Rank: Rank that best characterizes the relative rarity or endangerment of the taxon or plant community in Minnesota. The ranks do not represent a legal status. They are used by the Minnesota Department of Natural Resources to set priorities for research, inventory and conservation planning. The state ranks are updated as inventory information becomes available. S1 = Critically imperiled in Minnesota because of extreme rarity or because of some factor(s) making it especially vulnerable to extirpation from the state. S2 = Imperiled in Minnesota because of rarity or because of some factor(s) making it very vulnerable to extirpation from the state. S3 = Vulnerable in Minnesota either because rare or uncommon, or found in a restricted range, or because of other factors making it vulnerable to extirpation. S4 = Apparently secure in Minnesota, usually widespread. S5 = Demonstrably secure in Minnesota, essentially ineradicable under present conditions. SH = Of historical occurrence in the state, perhaps having not been verified in the past 20 years, but suspected to be still extant. An element would become SH without the 20-year delay if the only known occurrences in the state were destroyed or if it had been extensively and unsuccessfully looked for. SNR = Rank not yet assessed. SU = Unable to rank. SX = Presumed extinct in Minnesota. SNA = Rank not applicable. S#S# = Range Rank: a numeric range rank (e.g., S2S3) is used to indicate the range of uncertainty about the exact status of the element. S#B, S#N = Used only for migratory animals, whereby B refers to the breeding population of the element in Minnesota and N refers to the non-breeding population of the element in Minnesota.

Global Rank: The global (i.e., range-wide) assessment of the relative rarity or imperilment of the species or community. Ranges from G1 (critically imperiled due to extreme rarity on a world-wide basis) to G5 (demonstrably secure, though perhaps rare in parts of its range). Global ranks are determined by NatureServe, an international network of natural heritage programs and conservation data centers.

Last Observed Date: Date that the Element Occurrence was last observed to be extant at the site in format YYYY-MM-DD.

EO ID #: Unique identifier for each Element Occurrence record.

Element Occurrence: An area of land and/or water in which an Element (i.e., a rare species or community) is, or was, present, and which has practical conservation value for the Element as evidenced by potential continued (or historical) presence and/or regular recurrence at a given location. Specifications for each species determine whether multiple observations should be considered 1 Element Occurrence or 2, based on minimum separation distance and barriers to movement.

Rare Features Database Reports: An Explanation of Fields

The Rare Features Database is part of the Natural Heritage Information System, and is maintained by the Division of Ecological and Water Resources, Minnesota Department of Natural Resources (DNR).

Please note that the database reports are copyrighted and may not be reproduced without permission

Field Name: [Full (non-abbreviated) field name, if different]. Further explanation of field.

-E-

Element Name and Occ #: [Element Name and Occurrence Number]. The Element is the name of the rare feature. For plant and animal species records, this field holds the scientific name followed by the common name in parentheses; for all other elements (such as native plant communities, which have no scientific name) it is solely the element name. Native plant community names correspond to Minnesota's Native Plant Community Classification (Version 2.0). The Occurrence Number, in combination with the Element Name, uniquely identifies each record.

EO Data: [Element Occurrence Data]. For species elements, this field contains data collected on the biology of the Element Occurrence* (EO), including the number of individuals, vigor, habitat, soils, associated species, peculiar characteristics, etc. For native plant community elements, this field is a summary text description of the vegetation of the EO, including structure (strata) and composition (dominant/characteristic species), heterogeneity, successional stage/dynamics, any unique aspects of the community or additional noteworthy species (including animals). Note that this is a new field and it has not been filled out for many of the records that were collected prior to conversion to the new database system. Some of the information meeting the field definition may be found in the General Description field.

EO ID#: [Element Occurrence Identification Number]. Unique identifier for each Element Occurrence record.

EO Rank: [Element Occurrence Rank]. An evaluation of the quality and condition of an Element Occurrence (EO) from A (highest) to D (lowest). Represents a comparative evaluation of: 1) quality as determined by representativeness of the occurrence especially as compared to EO specifications and including maturity, size, numbers, etc. 2) condition (how much has the site and the EO itself been damaged or altered from its optimal condition and character). 3) viability (the long-term prospects for continued existence of this occurrence - used in ranking species only). EO Ranks are assigned based on recent fieldwork by knowledgeable individuals.

Extent Known?: A value that indicates whether the full extent of the Element is known (i.e., it has been determined through field survey) at that location. If null, the value has not been determined.

-F-

Federal Status: Status of species under the U.S. Endangered Species Act: LE = endangered; LT = threatened; LE,LT = listed endangered in part of its range, listed threatened in another part of its range; LT,PDL = listed threatened, proposed for delisting; C = candidate for listing. If null or "No Status" the species has no federal status.

First Observed Date: Date that the Element Occurrence was first reported at the site in format YYYY-MM-DD. A year followed by "Pre" indicates that the observed date was sometime prior to the date listed, but the exact date is unknown.

-G-

General Description: General description or word picture of the area where the Element Occurrence (EO) is located (i.e., the physical setting/context surrounding the EO), including a list of adjacent communities. When available, information on surrounding land use may be included. Note that the information tracked in this field is now more narrowly defined than it was in the old database system, and some of the information still in this field more accurately meets the definition of the new EO Data field. We are working to clean up the records so that the information in the two fields corresponds to the current field explanations described herein. Also note that the use of uppercase in sentences in this field is not significant but rather an artifact of transferring data from the old database system to the new system.

Global Rank: The global (i.e., range-wide) assessment of the relative rarity or imperilment of the species or community. Ranges from G1 (critically imperiled due to extreme rarity on a world-wide basis) to G5 (demonstrably secure, though perhaps rare in parts of its range). Global ranks are determined by NatureServe, an international network of natural heritage programs and conservation data centers.

-L-

Last Observed Date: Date that the Element Occurrence was last observed to be extant at the site in format YYYY-MM-DD.

Last Survey Date: Date of the most recent field survey for the Element Occurrence, regardless of whether it was found during the visit. If the field is blank, assume the date is the same as the Last Observed Date.

Location Description: County or Counties in which the Element Occurrence was documented followed by Township, Range, and Section information (not listed in any particular order). Each unique Township, Range, and Section combination is separated by a comma. In some cases, there are too many Township, Range, and Section combinations to list in the field, in which case, the information will be replaced with, "Legal description is too lengthy to fit in allotted space".

-M-

Managed Area(s): Name of the federally, state, locally, or privately managed park, forest, refuge, preserve, etc., containing the occurrence, if any. If this field is blank, the element probably occurs on private land. If "(Statutory Boundary)" occurs after the name of a managed area, the location may be a private inholding within the statutory boundary of a state forest or park.

MN Status: [Minnesota Status]. Legal status of plant and animal species under the Minnesota Endangered Species Law: END = endangered; THR = threatened; SPC = special concern; NON = tracked, but no legal status. Native plant communities, geological features, and colonial waterbird nesting sites do not have any legal status under the Endangered Species Law and are represented by a N/A.

-N-

NPC Classification (v1.5): Native plant community name in Minnesota's Native Vegetation: A Key to Natural Communities (Version 1.5). This earlier classification has been replaced by Minnesota's Native Plant Community Classification (Version 2.0).

-O-

Observed Area: The total area of the Element Occurrence, in acres, which is measured or estimated during fieldwork. If null, the value has not been determined.

Ownership Type: Indicates whether the land on which the Element Occurrence was located was publicly or privately owned; for publicly owned land, the agency with management responsibility is listed, if known.

-S-

Site Name: The name of the site(s) where the Element Occurrence is located. Sites are natural areas of land with boundaries determined and mapped according to biological and ecological considerations.

Survey Site #/Name: The name of the survey site, if applicable, where the Element Occurrence is located. Survey sites are sites that provide a geographic framework for recording and storing data, but their boundaries are not based on biological and ecological considerations. Minnesota County Biological Survey site numbers, if applicable, are also listed in this field.

Survey Type: Information on the type of survey used to collect information on the Element Occurrence.

Surveyor(s): Name(s) of the person(s) that collected survey information on the Element Occurrence.

State Rank: Rank that best characterizes the relative rarity or endangerment of the taxon or plant community in Minnesota. The ranks do not represent a legal status. They are used by the Minnesota Department of Natural Resources to set priorities for research, inventory and conservation planning. The state ranks are updated as inventory information becomes available. S1 = Critically imperiled in Minnesota because of extreme rarity or because of some factor(s) making it especially vulnerable to extirpation from the state. S2 = Imperiled in Minnesota because of rarity or because of some factor(s) making it very vulnerable to extirpation from the state. S3 = Vulnerable in Minnesota either because rare or uncommon, or found in a restricted range, or because of other factors making it vulnerable to extirpation. S4 = Apparently secure in Minnesota, usually widespread. S5 = Demonstrably secure in Minnesota, essentially ineradicable under present conditions. SH = Of historical occurrence in the state, perhaps having not been verified in the past 20 years, but suspected to be still extant. An element would become SH without the 20-year delay if the only known occurrences in the state were destroyed or if it had been extensively and unsuccessfully looked for. SNR = Rank not yet assessed. SU = Unable to rank. SX = Presumed extinct in Minnesota. SNA = Rank not applicable. S#S# = Range Rank: a numeric range rank (e.g., S2S3) is used to indicate the range of uncertainty about the exact status of the element. S#B, S#N = Used only for migratory animals, whereby B refers to the breeding population of the element in Minnesota and N refers to the non-breeding population of the element in Minnesota.

-V-

Vegetation Plot: Code(s) for any vegetation plot data that have been collected within this Element Occurrence (i.e., either Releve Number or the word "RELEVE" indicates that a releve has been collected).

* Element Occurrence – an area of land and/or water in which an Element (i.e., a rare species or community) is, or was, present, and which has practical conservation value for the Element as evidenced by potential continued (or historical) presence and/or regular recurrence at a given location. Specifications for each species determine whether multiple observations should be considered 1 Element Occurrence or 2, based on minimum separation distance and barriers to movement.

Data Security

Locations of some rare features must be treated as sensitive information because widespread knowledge of these locations could result in harm to the rare features. For example, wildflowers such as orchids and economically valuable plants such as ginseng are vulnerable to exploitation by collectors; other species, such as bald eagles, are sensitive to disturbance by observers. For this reason, we prefer that publications not identify the precise locations of vulnerable species. We suggest describing the location only to the nearest section. If this is not acceptable for your purposes, please call and discuss this issue with the Natural Heritage Review Coordinator at 651- 259-5109.