Appendix Q

Bird and Bat Conversation Strategy

Bird and Bat Conservation Strategy

Philip Wind Project

Haakon County, South Dakota

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1 INTRODUCTION

1.1 Background

Philip Wind Partners, LLC (Philip Wind) is considering development of the Philip Wind Project (Project) in central South Dakota. Philip Wind contracted Western EcoSystems Technology, Inc. (WEST) to develop this site-specific Conservation Strategy (BBCS) for the Project.

When Invenergy Wind Development LLC (Invenergy) acquired Philip Wind Partners, LLC from the previous developer in September 2019, the land area encompassed approximately 71,000 acres and was designed with a layout focused on maximizing energy production. Since acquisition, Philip Wind has modified the Project Area to avoid, minimize, and mitigate potential adverse impacts to environmental resources based on collected field data and to address comments from regulatory agencies and the public (Figure 1.1). For the purposes of this BBCS, the current Project Area defined in August 2022 is referred to as the Project Area in all figures, tables, and references unless otherwise stated. This BBCS includes a summary of the results of relevant environmental studies conducted near or within the current Project Area.

1.2 Purpose and Objectives

This BBCS was developed to provide a written record of the Project's efforts to characterize avian and bat resources within the Project Area, assess potential impacts to these resources, and to document conservation measures that have been or will be taken to avoid, minimize, and/or mitigate for those potential impacts. The studies followed a tiered approach consistent with the 2012 *Land-Based Wind Energy Guidelines* (WEG; USFWS 2012) to inform these efforts. Table 1.1 explains links between the BBCS and WEG tiers.

Table 1.1 Relationship between Philip Wind Project Bird and Bat Conservation Strategy (BBCS) sections and U.S. Fish and Wildlife Service (USFWS) *Land-based Wind Energy Guidelines* sections.

BBCS	USFWS Wind Energy Guidelines
Section 2: Tier 1 and 2 Site Characterization	Tier 1: Preliminary Site Evaluation/Tier 2: Site Characterization
Section 3: Field Studies Section 4: Potential Impacts to Birds and Bats	Tier 3: Field Studies to Document Site Wildlife and Habitat and Predict Project Impacts
Section 5: Avoidance and Minimization Measures	Best Management Practices
Section 6: Post-construction Avian and Bat Monitoring	Tier 4: Post-construction Studies to Estimate Impacts

Source: USFWS 2012

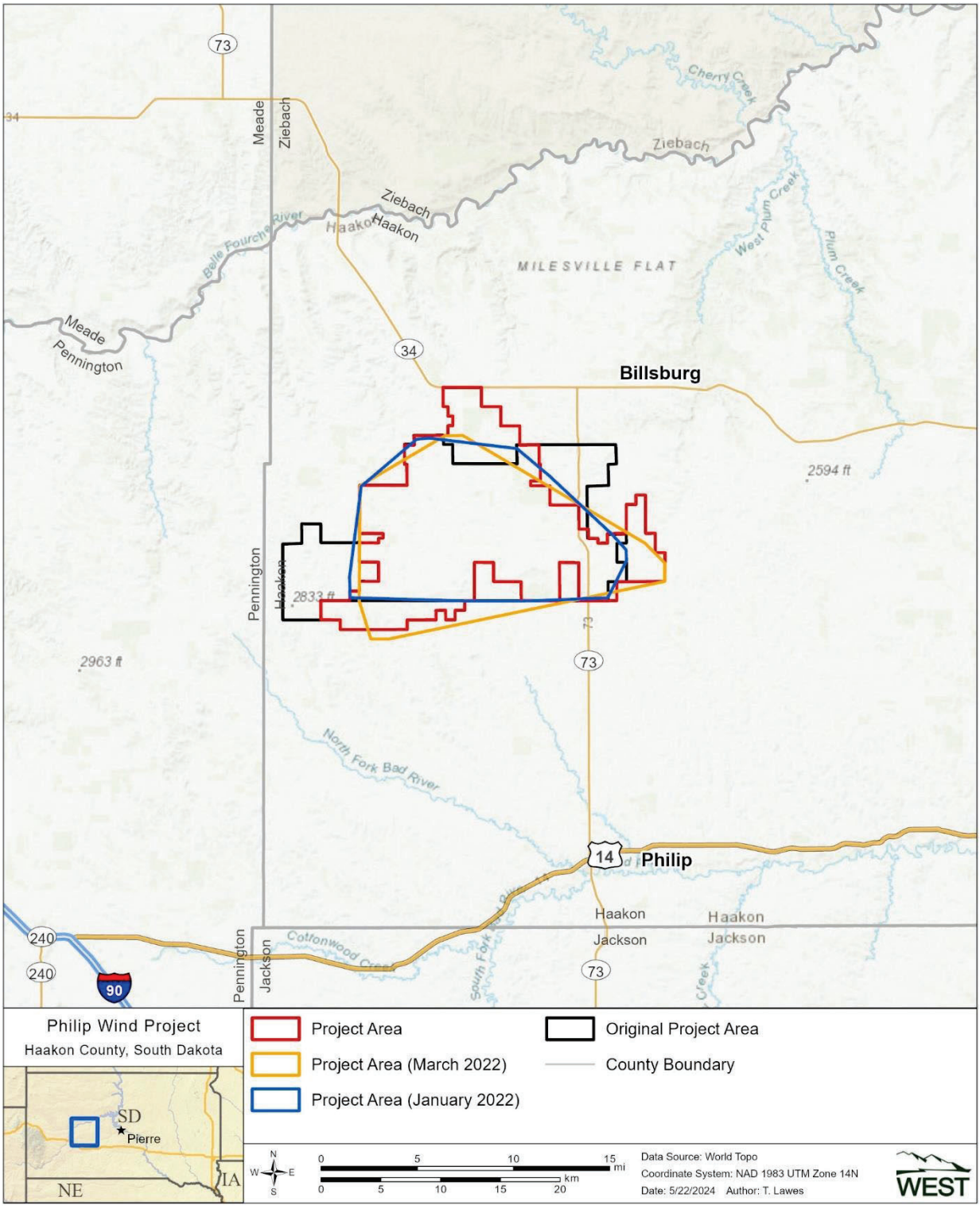

Figure 1.1 Project Area location and changes of the Philip Wind Project in Haakon County, South Dakota, in 2022.

The objectives of the BBCS are as follows:

1) Summarize the results of the Project's habitat evaluation and bird and bat surveys and its progression through the WEG, data collection following the *Eagle Conservation Plan Guidance* (ECPG), and agency coordination.
2) Assess potential impacts to birds and bats from the Project.
3) Identify measures that, when implemented during construction, operation, maintenance, and decommissioning at the Project, will avoid and minimize potential impacts to birds and bats.
4) Describe post-construction monitoring and adaptive management procedures to evaluate and then avoid or minimize potential impacts to species of special concern as defined in Section 2.1.3.

This BBCS is a living document that will evolve throughout the life of the Project, as needed, in response to changing conditions. Additional information from avian and bat survey results, changes in our understanding of how birds and bats interact with wind turbines, or new minimization measures could be included in updated versions. Thus, the BBCS is current at the time of writing, and modifications will be noted in the Document Version Tracking table presented earlier. This BBCS will cover the anticipated 30-year functional life of the Project and potential extended operations and/or decommissioning period. Should the Project be re-powered, the BBCS will remain in effect until decommissioning occurs.

1.3 Project Description

The Project is located approximately 14 miles (mi) north of the city of Philip in Haakon County, South Dakota (Figure 1.1). The current Project Area encompasses approximately 68,300 acres (ac) within two Level IV ecoregions: the Sub-humid Pierre Shale Plains and the Rivers Breaks (U.S. Environmental Protection Agency [USEPA] 2012). These ecoregions, historically dominated by grasslands, have been extensively converted for agricultural use (e.g., row crops and livestock grazing; USEPA 2012), and contain semi-permanent and seasonal wetlands.

Topography within the Project Area is gently rolling to flat (U.S. Geological Survey [USGS] 2020). The primary land cover within the Project Area is grassland/herbaceous and cultivated crops (National Land Cover Database [NLCD] 2019). Wetlands are relatively evenly dispersed throughout the Project Area (USFWS National Wetlands Inventory [NWI] 2023) and are primarily classified as freshwater emergent and freshwater pond (USFWS NWI 2023).

The Project will consist of up to 91 turbines being installed, representing an overestimation of build-out with a planned commercial operation date of 2026 (Figure 1.2). Three turbine models are being considered, with each turbine rated up to a maximum of 6.1 megawatts (MW), though the number and model of turbines selected will not exceed a total nameplate generation capacity of 300 MW (Table 1.2). Infrastructure at the Project will include up to 91 wind turbines, 44 mi of new access roads, 109 mi of underground electrical collector lines and cables, a facility substation, an interconnection substation, an approximately 7-mi generation tie (gen-tie)

transmission line, three permanent meteorological (met) towers, three ADLS towers, one operations and maintenance facility, and additional associated facilities. Construction of the Project is scheduled to begin in 2025, and commercial operation is anticipated to begin in 2026.

Table 1.2. Wind turbine specifications for the Philip Wind Project Area in Haakon County, South Dakota.

Manufacturer	Hub Height (m)	Rotor Diameter (m)	Tip Height (m)	Megawatt Rating
General Electric 140	102	140	172	3.4
Vestas 166	113	166	196	6.1
Vestas 163	113	163	194	4.5

m = meter

1.4 Regulatory Context

1.4.1 Endangered Species Act

The federal Endangered Species Act of 1973 (ESA; 16 U.S. Code [USC] §§ 1531 et seq. [1973]) provides for the listing, conservation, and recovery of endangered and threatened species. The USFWS implements the ESA to conserve terrestrial species and resident fish species. Section 9 of the ESA prohibits the unauthorized take of listed species. Under the ESA, "take" is defined as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect" a listed species (ESA § 3(19), 16 USC 1532 [1973]). The term "harm" has been further defined in agency regulations to mean habitat modification that kills or injures a federally listed species.

1.4.2 Migratory Bird Treaty Act

The federal regulatory framework for protecting birds includes the Migratory Bird Treaty Act of 1918 (MBTA; 16 USC §§ 703-712 [1918]). In the U.S., the MBTA is the cornerstone of migratory bird conservation and protection. The MBTA implements four treaties that provide international protection of migratory birds. The take prohibition for MBTA states:

> "Unless and except as permitted by regulations…[1] it shall be unlawful at any time, by any means, or in any manner to pursue, hunt, take, capture, kill… possess, offer for sale, sell …purchase … ship, export, import …transport or cause to be transported… any migratory bird, any part, nest, or eggs of any such bird ….[The Act] prohibits the taking, killing, possession, transportation, import and export of migratory birds, their eggs, parts, and nests, except when specifically authorized by the Department of the Interior."

[1] 16 U.S. Code 703.

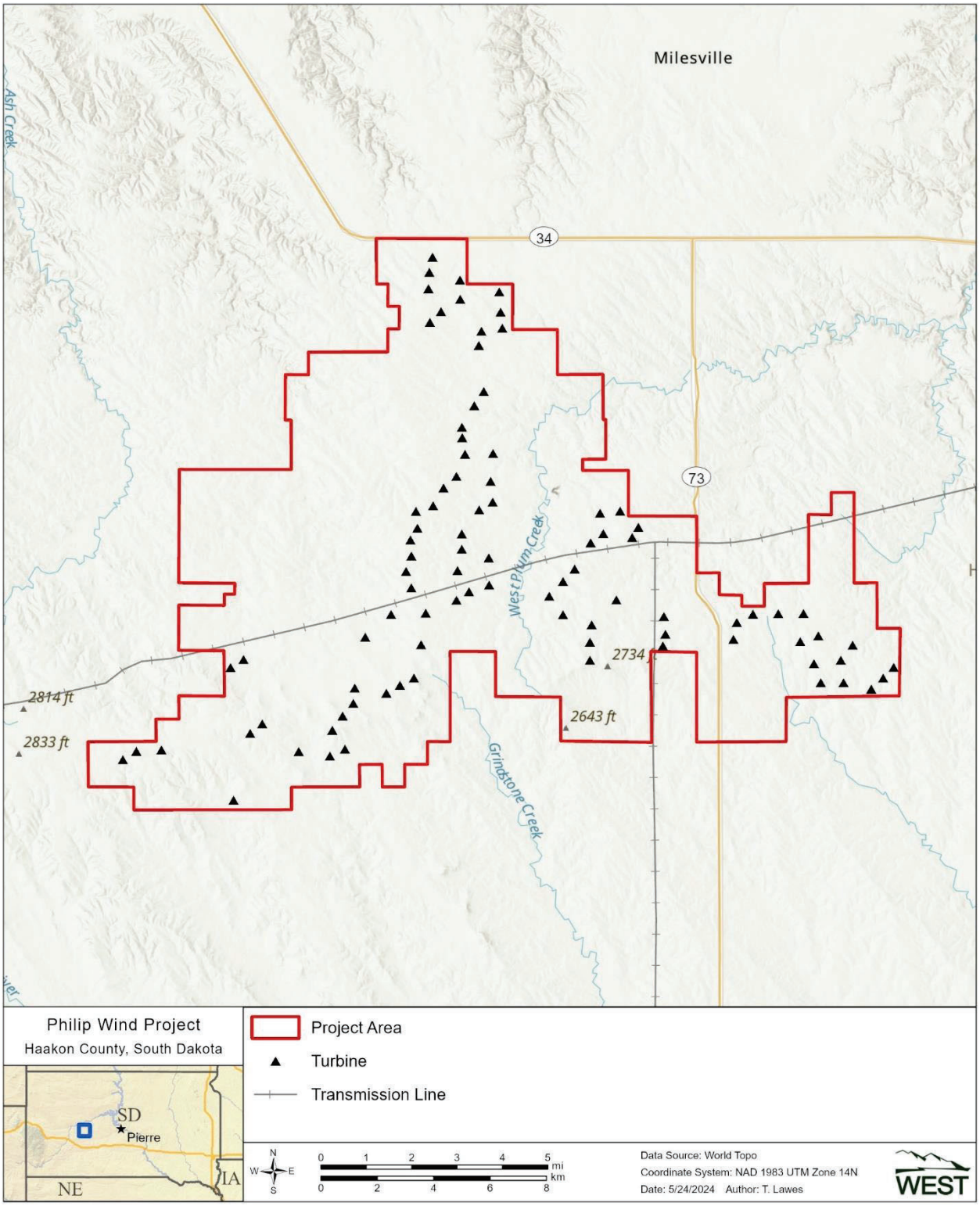

Figure 1.2. Proposed turbine layout for the Philip Wind Project Area in Haakon County, South Dakota.

The word “take” is defined by regulation as “to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to pursue, hunt, shoot, wound, kill, trap, capture, or collect.”[2] The USFWS maintains a list of all species protected by the MBTA.[3] This list includes more than one thousand species of migratory birds, including eagles and other raptors, waterfowl, shorebirds, seabirds, wading birds, and passerines. Bald eagles (*Haliaeetus leucocephalus*) and golden eagles (*Aquila chrysaetos*) are protected under the MBTA.

1.4.3 Bald and Golden Eagle Protection Act

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

In 2024, the USFWS revised the permit regulations for incidental take of eagles under 50 CFR 22. The Permits for Incidental Take of Eagles and Eagle Nests (2024 Eagle Rule; USFWS 2024b) included the creation of a general permit option (50 CFR 22 Subpart E § 22.250) for authorizing incidental take at a wind facility “that occur frequently enough for the Service to have developed a standardized approach to permitting and ensure permitting is consistent with the preservation standard.” To be eligible for a general permit, a wind facility must 1) be in an area with relative abundance below the seasonal thresholds identified by the USFWS for both eagle species, and 2) not have a golden eagle nest within 2 miles or a bald eagle nest within 660 feet of turbine blades or other turbine infrastructure (USFWS 2024b). Project proponents who desire to obtain incidental take authorization but are ineligible for a general permit may apply for a “specific permit” (50 CFR § 22.200) in much the same way as permits were issued under the 2016 Eagle Rule. However, the 2024 Eagle Rule also created a tiered process for specific permit applications (and associated permit fees) based on the level of complexity and anticipated processing times associated with an application. For all eagle incidental take permits, the USFWS continues to require implementation of all practicable avoidance and minimization measures to reduce the likelihood of take.

1.4.4 National Environmental Policy Act

The National Environmental Policy Act (NEPA) of 1969 (NEPA; 42 USC 4321 et seq. [1970]) establishes national environmental policies and goals for the protection, maintenance, and enhancement of the environment, and provides a process for implementing these goals within federal agencies. The act ensures potential environmental impacts of federal actions and appropriate mitigation for those impacts are fully considered through a systematic interdisciplinary

[2] 50 Code of Federal Regulations (CFR) 10.12.

[3] 50 CFR 10.13.

approach. All federal agencies are required to prepare detailed statements assessing the environmental impact of, and alternatives to, major federal actions potentially affecting the environment. The USFWS considers the issuance of an incidental take permit to constitute a federal action and, thus, requires an assessment of the potential environmental impacts associated with the action and alternatives under the NEPA.

For this Project, Philip Wind is proposing to connect the Project to a Western Area Power Administration (WAPA) interconnection. This interconnection is a federal action and will require NEPA to be carried out. WAPA will evaluate environmental impacts tiering off the Upper Great Plains Programmatic Environmental Impact Statement (PEIS) with the project-specific development of an Environmental Assessment (EA). WAPA will coordinate with USFWS through Section 7 of ESA to evaluate potential impacts to endangered or threatened species with the potential to occur at the Project.

1.4.5 South Dakota State Threatened and Endangered Species

South Dakota's Endangered Species Statute (South Dakota Statutes, Title 34A Chapter 8) requires the South Dakota Game Fish and Parks (SDGFP) and the S.D. Department of Agriculture and Natural Resources (DANR) to perform those acts necessary for the conservation, management, protection, restoration, and propagation of endangered, threatened, and nongame species of wildlife. In accordance with this mandate, the SDGFP has drafted a Wildlife Action Plan, which includes a list of Species of Greatest Conservation Need (SGCN; SDGFP 2023a). In addition to endangered and threatened species, the SGCN list includes species that are regionally or globally imperiled (or secure) and for which South Dakota represents an important portion of their remaining range and species with characteristics that make them vulnerable. The resulting List of Endangered and Threatened is promulgated by the SDGFP Commission and reviewed biennially. The Endangered Species Statute also authorizes the Secretary of Agriculture and the Secretary of Game, Fish and Parks to enter cooperative agreements with federal or state agencies or private persons for management of nongame, endangered, or threatened species. The South Dakota Endangered Species Statute defines endangered, nongame, threatened as follows:

- *Endangered (E)* – any species of wildlife or plants which is in danger of extinction throughout all or a significant part of its range other than a species of insects determined by the South Dakota Game, Fish and Parks Commission or the secretary of the U.S. Department of Interior to constitute a pest whose protection under this chapter would present an overwhelming and overriding risk to humans
- *Nongame species (NG)* – any wildlife species not legally classified a game species, fur-bearer, threatened species, or as endangered by statute or regulations of this state
- *Threatened (T)* – any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range

1.5 Agency Consultation

Invenergy maintains a commitment to work cooperatively to minimize adverse impacts to protected bird and bat species. Through the planning stages of the Project, Invenergy and its consultants worked in coordination with federal and state agency personnel regarding necessary wildlife studies and siting considerations to ensure that all parties understand the scope of the Project and potential issues identified and addressed early in the planning process. Invenergy will continue to work with the agencies to implement conservation measures intended to avoid, minimize, and/or mitigate potential impacts to bird and bat species, including those measures identified in this BBCS.

Meetings with USFWS and SDGFP were conducted from 2022 through 2024. Regular, monthly coordination with Western Area Power Administration's (WAPA) biological lead began in September 2022 and will continue through the completion of the Final Environmental Assessment (EA) and signing of the anticipated finding of no significant impacts (FONSI) as part of the NEPA process. Below is a summary of the key communications with USFWS and SDGFP, which specifically oversee bird and bat resources, which included study protocols, study results, and avoidance and minimization measures.

On May 12, 2022, Philip Wind provided an overview of the Project since acquired from a previous developer to USFWS, SDGFP, and WAPA. After reviewing previously collected data, Philip Wind was committed to re-designing the Project to address previously identified bird, bat, and habitat concerns. To begin to address these concerns, the Project was shifted to the south and east, and new studies were proposed to evaluate the updated Project Area. Philip Wind presented the studies that were ongoing or proposed and solicited feedback from SDGFP and USFWS on survey methodologies. SDGFP noted there were anticipated updates to their *Prairie Grouse Management Plan for South Dakota 2017-2021* which was published in July 2017. USFWS provided additional feedback related to the May 12, 2022, meeting on July 1, 2022. This feedback focused primarily on eagle, grassland birds, and bird species of concern. On September 27, 2022, SDGFP provided siting recommendations based on the general location of the Project. After receiving these responses, WEST submitted a data request to the SDGFP Natural Heritage Database on October 7, 2022, and received a reply on October 21, 2022, that there were no records of rare, threatened or endangered species and additionally no records of grouse leks within the Project Area.

On November 7, 2022, Philip Wind submitted a request to the Lake Andes Wetland Management District to review all parcels within the Project Area for any existing USFWS easements. A response from USFWS on November 17, 2022, confirmed no USFWS wetland or grassland easements within the Project and the only easement was a Farm Service Agency easement in both Townships 7 and 8.

On January 13, 2023, Philip Wind provided an overview of completed studies to date and a spatial demonstration of how these data were being incorporated into Project design to USFWS, SDGFP, and WAPA. The objective of this spatial demonstration was to demonstrate how preliminary data was being incorporated into the Project's design and to review the Project's proposed approach

to address the Upper Great Plains PEIS species-specific Consistency Evaluation Forms (CEFs). These CEF provide a description of avoidance and minimization measures that, if followed, will result in a determination of either no affect or may affect not likely to adversely affect with existing concurrence from the USFWS through Section 7. Through this demonstration, Philip Wind showed generally low-quality prairie grouse habitat within the Project Area as compared to outside the Project Area using the SDGFP Tiered habitat model. Similarly, whooping crane stopover habitat was limited within the Project Area and was outside of the top four deciles of the Niemuth Model (Niemuth et al. 2018) with limited area within the top fifth decile. There were no recorded whooping crane observations within the Project Area. Philip Wind reviewed prioritization of turbine setbacks with the agencies for active leks, wetlands, eagle nests, and northern long-eared bat habitat. USFWS and Philip Wind discussed ongoing avian and eagle use surveys.

As part of the NEPA process, an agency consultation and coordination scoping meeting was conducted on January 19, 2023. Details of this scoping meeting are provided in the Philip Wind Energy Center Draft EA (SWCA Environmental Consultants [SWCA] 2023). Following this meeting numerous informal discussions occurred between WAPA, USFWS, and Philip Wind to develop a set of species-specific CEF including the piping plover, rufa red knot, whooping crane, and north long-eared bat. Specifically for whooping crane Philip Wind developed a Project-specific monitoring and contingency plan to complete the CEF in addition to compensatory mitigation for 5.0 acres of suitable whooping crane stopover habitat. These CEFs were reviewed and signed by Philip Wind, USFWS, and WAPA on April 4, 2023, closing out the Project's Section 7 consultation under the ESA.

SDGFP provided a support letter to Philip Wind on March 13, 2023, acknowledging the informal discussions with Philip Wind and WEST to modify lek survey protocols provided in the *Management of prairie grouse in South Dakota* and published in September 2022. Due to minimal roads in sections of the Project Area, Philip Wind proposed a hybrid survey approach that included both aerial surveys and ground survey efforts. The modification included three rounds of ground surveys along publicly accessible roads, and one aerial survey conducted during the first two weeks of April focused on large roadless tracts.

On July 25, 2023, Philip Wind provided an overview of the proposed 300 MW Project to the agencies including an update on the ongoing development of the Draft EA and addressing comments from the initial review by WAPA. Philip Wind updated the agencies that it was the second year of Tier 3 surveys being conducted. Philip Wind provided an active review of completed surveys since the last agency meeting through an interactive geospatial platform. A new eagle nest was observed approximately 800 ft to the east of an existing eagle nest and how Philip Wind responded with adjustments to the turbine layout. Philip Wind displayed the results of the 2023 prairie grouse lek surveys and the increase in number and locations of prairie grouse leks. SDGFP noted that the Project is near the edge of the range for GRPC and may account for greater variation. Philip Wind provided a review of removed and adjusted turbine locations based on bird, bat, and habitat surveys including avoiding unbroken grasslands and Tier 1 and 2 priority grouse habitats for either grouse species. The remaining discussion focused on the Draft EA. WAPA stated that the Draft EA needed to include the results of the bird, bat, and habitat surveys

in addition to the avoidance and minimization strategies applied to the Project and any remaining impacts. WAPA and Philip Wind also discussed appropriate locations within the Draft EA to include general minimization strategies and bird and bat specific minimization strategies. There was a follow-up discussion on the proposed listing of the tricolored bat (TCB) under the ESA. Philip Wind acknowledged that they have already committed to the conservation measures for northern long-eared bat, and USFWS stated that many of the same measures would apply to tricolored bats as well if they are listed. USFWS recommended following the guidance for northern long-eared bats and provided the web link.

On August 30, 2023, SDGFP provided an explanation for prioritizing turbine siting based on the preliminary prairie grouse leks survey results discussed during the July 25, 2023, agency meeting. SDGFP identified three turbines that they suggested removed due to proximity to large blocks of unbroken grasslands and potential for fragmentation concerns by connecting infrastructure.

On October 11, 2023, Philip Wind provided a brief review of the completed prairie grouse lek surveys from 2022 and 2023. Philip Wind reviewed the original 2022 turbine layout and provided the updated 2023 turbine layout in addition to connecting infrastructure as previously discussed with SDGFP on August 30, 2023. Philip Wind discussed the Project's siting updates based on the feedback from SDGFP. Philip Wind demonstrated adherence to minimization recommendations for associated infrastructure such as collection lines and access roads to follow existing disturbance. Philip Wind responded that they would still remove four turbines and re-site five other turbines based on proximity to sensitive resources such as an eagle nest, prairie grouse leks, and high-quality modeled grouse habitat. All agencies present agreed to the avoidance and minimization efforts by Philip Wind and stated this was a good balance between agency recommendations and energy production.

USFWS recommended that Philip Wind obtain an eagle take permit for the Project noting a bald eagle nest within the Project Area, the Project's proximity to the Missouri River, and fatalities of eagles at other wind facilities. Philip Wind acknowledged the recommendation but noted that surveys were still ongoing along with a focus on developing a BBCS, uncertainty around the Project operator (and therefore permit holder) and awaiting the proposed finalization of the expected 2024 eagle rule. Philip Wind would continue to coordinate with USFWS as the Project continued development.

On May 1, 2024, Philip Wind provided the USFWS with a NEPA update and anticipated schedule to submit the Final EA for WAPA's review in mid-June and FONSI issued early October. The Project is currently operating under the assumption that the TCB will be listed, and that the final guidance will likely be issued by USFWS before the FONSI is issued. Philip Wind reviewed previous efforts employed for NLEB avoidance and minimization measures following the CEFs in addition to an assessment of NLEB summer habitat to inform setbacks from suitable summer habitat. Philip Wind discussed previous conversations with the agencies and intended to use the same avoidance and minimization measures for NLEB and apply those to TCB for risk minimization. This would include increasing cut-in speeds to 5.0 m/s during fall (August 15 – October 15) each year in addition to one year of post-construction monitoring. USFWS suggested

Philip Wind review the new draft guidance for NLEB and TCB dated April 2024 and see if the draft guidance could be applied to the Project. Additionally, USFWS noted that post-construction acoustic monitoring could also inform curtailment options. USFWS noted that finalized guidance would be available later in 2024.

2 TIER 1 AND 2 – DESKTOP ANALYSES

Characterization of biological resource issues early in the development phase of a wind energy project helps identify, avoid, and minimize potential bird and bat impacts associated with project development. The list of Tier 1 and 2 studies in Table 2.1 are relevant to the Project Area because of their spatial overlap or similarities in habitats with the Project Area.

Table 2.1 List of Tier 1 and 2 reports relevant to the BBCS for the Philip Wind Project in Haakon County, South Dakota.

Date	Report	Citation
May 22, 2017	Critical Issues Analysis	Westwood 2017a
May 31, 2017	Site Characterization Study	Westwood 2017b
June 6, 2023	Whooping Crane Habitat Assessment	Piorkowski 2023d
June 6, 2023	Water Resources Analysis	Fields et al. 2023a
June 8, 2023	Northern Long-eared Bat Habitat Assessment	Piorkowski and Mabee 2023b
June 9, 2023	Site Characterization Study	Piorkowski et al. 2023a

2.1 Site Characterization Study

Biological resources in and near the Project Area were evaluated through desktop reviews of existing data. Available data used in this review included spatial datasets for topography, elevation, land ownership, land use/land cover, wetlands, and wildlife distributions in South Dakota as well as information from the USFWS, South Dakota Natural Heritage Program (SDNHP), USGS Breeding Bird Surveys (BBS), National Audubon Society (Audubon) Christmas Bird Count (CBC), eBird, and Bat Conservation International. In addition to the desktop analyses, a site reconnaissance was conducted on September 13, 2022 and October 13 – 14, 2022, to perform a coarse-scale ground-truth of the National Land Cover Database (NLCD) cover types, NWI potential wetland locations, National Hydrography Dataset (NHD) features, grassland condition (i.e., broken or unbroken sod), document areas where land cover types provide potential habitat for species of concern, search for suitable substrates for and map nests of eagles or other raptor species of concern, and record incidental wildlife observations.

2.1.1 Land Cover

Land cover was assessed for the Project Area and the landscape within a separate 2-mi buffer of the Project Area (i.e., Study Area). The desktop review of the NLCD (2019) for the Project Area identified herbaceous vegetation (52%) as the major land cover type within the Project Area, intermixed with patches of cultivated crops (42%). All other land cover types together accounted for approximately 6% of the Project Area. The NLCD cover types in the Study Area were also identified as predominately herbaceous vegetation (82%), but with a lower percentage of the

Study Area in cultivated crops (13%) as compared to the Project Area. All remaining cover types made up approximately 5% of the Study Area.

The site reconnaissance revealed that for areas accessible by public roads, land cover types present at the Project and Study areas were consistent with those identified during the desktop review and included dominant plant species such as: wheatgrass (*Agropyron* spp.), brome grasses (*Bromus* spp.), bluegrass (*Poa* spp.), and lucerne (alfalfa; *Medicago sativa*). Additionally, the site visit confirmed that the herbaceous land cover in the western third of the Project Area included large areas of intact grasslands and that much of the herbaceous land cover within the Study Area was contiguous unbroken grasslands.

2.1.2 Protected Areas

Protected areas within proximity to the Project Area included Bureau of Land Management (BLM) lands, Cheyenne River Reservation, South Dakota Schools and Public (SDSP) lands, and SDGFP Billsburg Game Production Area. There are no federal wilderness areas, wildlife refuges, USFWS conservation easements, designated critical habitats, or additional special status lands designated within 10-mi of the Project Area. Special status lands included lands classified by the National Audubon Society as Important Bird Areas, eBird hotspots, USDA Natural Resources Conservation Service (NRCS) conservation easements, or lands managed as mitigation parcels by a non-governmental organization because of previous development projects. Land ownership and management practices are summarized in the following sections.

2.1.2.1 Bureau of Land Management

There are approximately 1,439 ac of BLM lands within the Project Area and an additional 3,471 ac of BLM lands within a 10-mi buffer of the Project Area. No infrastructure will be constructed on BLM lands. The BLM manages their parcels for multiple uses including recreation and wildlife conservation. These are currently managed for a variety of resources including wildlife, water conservation, livestock grazing, recreation, and minerals production. Within the Project Area, the primary land use of BLM lands is for grazing purposes.

2.1.2.2 U.S. Fish and Wildlife

The Project is located entirely in the USFWS Lacreek Wetland Management District. The USFWS manages waterfowl production areas such as small wetlands and grasslands that provide migratory and breeding habitat for various bird species. The wetland management districts are composed predominantly of patches of waterfowl production areas across several counties. No waterfowl production areas are within the Project Area or within 10-mi of the Project. USFWS confirmed no wetland or grassland easements on November 17, 2022.

2.1.2.3 Native American Lands

The southern border of the Cheyenne River Reservation is located approximately eight mi north of the Project Area.

2.1.2.4 State Managed Lands

There are approximately 7.5 ac of SDSP lands bordering the outside edges of the Project Area, and there are an additional 17,274 ac of SDSP lands within a 10-mi buffer of the Project Area. State lands are typically leased for minerals and/or livestock grazing. Funds generated from leasing are used to support the state's schools, universities, and other endowed institutions. These lands are also used for public recreation, including hunting and fishing.

The Billsburg Game Production Area is located approximately five mi northeast of the Project Area. This Game Production Area is approximately 80 ac in size and is managed by SDGFP for wildlife production and public hunting.

2.1.3 Species of Concern

Species of concern in this report are defined per the WEG as any species that 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).

Table 2.2 summarizes federal- and state-protected or candidate bird and bat species and their likelihood to occur within the Project and Study areas. The likelihood of occurrence in the Project and/or Study areas was determined by considering the species' range, habitat suitability, species' mobility, population size, and records of occurrence in that area. Based on these factors, the likelihood of occurrence was defined for each species, using the following categories:

- None – outside the species' known range; no suitable habitat, restricted mobility, or small population size.
- Unlikely – outside the species' known range and suitable habitat appears absent; may have restricted mobility or population size; however, species may occur in the area during dispersal, migration, or annual movements.
- Possible – in the species' known range but contains marginal suitable habitat; or the species is highly mobile and may occur year-round.
- Likely – in the species' known range and contains suitable habitat, no records from the area.
- Occurs – records of species' occurrence in the area based on USFWS, SDGFP or other survey data.

SDGFP maintains a list of bird and bat SGCN in the state (SDGFP 2014). These SGCN species are not afforded additional protections but warrant special attention and management to keep them from becoming federally or state listed in the future. SGCN species were reviewed to determine their potential to occur in the Project and Study areas (Piorkowski et al. 2023a). There is no USFWS-designated Critical Habitat within the Project or Study areas.

Five federally protected species of birds range from occur to unlikely to occur at the Project in Haakon County, South Dakota (Table 2.2; USFWS 2022a, 2023a). One federally protected species of bat has the potential to occur in addition to one proposed endangered bat species (Table 2.2; USFWS 2022a, 2023a). Five state-listed endangered or threatened bird species were known to occur or possibly occur in Haakon County, South Dakota (USFWS 2022a, 2023a; Table 2.2). Five state-listed endangered or threatened bird species range from unlikely to possibly occur at the Project in Haakon County, South Dakota (USFWS 2022a, 2023a; Table 2.2).

Two species of prairie grouse reside within South Dakota, the sharp-tailed grouse (*Tympanuchus phasianellus*) and greater prairie-chicken (*Tympanuchus cupido*; SDGFP 2023b). Both are valued bird species because of their status as game birds, charismatic lekking behavior, and habitat use (SDGFP 2023b). According to the South Dakota Breeding Bird Atlas II (SDGFP 2023a) prairie grouse are known to occur within the Project Area.

Table 2.2. Federal and state-protected bird and bat species and their likelihood of occurrence within the Philip Wind Project Area in Haakon County, South Dakota.

Bird or Bat/ Common Name	Scientific Name	Status (Federal; State)[1]	Habitat by Season	NLCD Land Cover Types	Seasons of Potential Occurrence and Likelihood of Occurrence[2] in the Project and Study Areas				
					Location	Spring	Summer	Fall	Winter
Birds									
Bald eagle	*Haliaeetus leucocephalus*	BGEPA, BCC; SGCN	Nests in large trees during spring and summer; forages near water in steppe and shrub-steppe habitats in spring, summer, fall, and winter.	Deciduous forest, evergreen forest, mixed forest, shrub/scrub, herbaceous.	*Project/ Study Areas*	Occurs	Occurs	Likely	Occurs
Golden eagle	*Aquila chrysaetos*	BGEPA; --	Nests in trees and cliffs during spring and summer; forages in shrub-steppe habitats spring, summer, fall, and winter.	Herbaceous, shrub/scrub	*Project/ Study Areas*	Occurs	Occurs	Likely	Occurs
Interior least tern	*Sterna antillarum athalassos*	--; SE, SGCN	Interior population nests colonially on mudflats, sand spits, or gravel along rivers in summer. Migrates along major river drainages in spring and fall. Winters outside of U.S.	Barren land, open water.	*Project/ Study Areas*	Unlikely	Unlikely	Unlikely	Unlikely
Osprey	*Pandion haliaetus*	--, ST, SGCN	Migrates in the spring and fall. Breeds and forages near rivers, lakes, ponds. Nests in large open-top trees during the summer. Winters primarily outside the U.S.	Open water.	*Project/ Study Areas*	Unlikely	Unlikely	Unlikely	Unlikely
Peregrine falcon	*Falco peregrinus*	--; ST, SGCN	Migrates in the spring and fall. Nests along cliffs and rock outcroppings and forages in open grasslands. Typically, winters outside the U.S.	Herbaceous, shrub/scrub.	*Project/ Study Areas*	Possible	Unlikely	Possible	Unlikely

Table 2.2. Federal and state-protected bird and bat species and their likelihood of occurrence within the Philip Wind Project Area in Haakon County, South Dakota.

Bird or Bat/ Common Name	Scientific Name	Status (Federal; State)[1]	Habitat by Season	NLCD Land Cover Types	Seasons of Potential Occurrence and Likelihood of Occurrence[2] in the Project and Study Areas				
					Location	Spring	Summer	Fall	Winter
Piping plover	*Charadrius melodus*	FT; SE, SGCN	Migrates in spring and fall to/from wintering ground along the southern Atlantic and Gulf of Mexico coasts. Breeds along small alkaline lakes, large reservoirs, or river islands and sandbars during the summer.	Barren land, open water.	*Project/ Study Areas*	Unlikely	Unlikely	Unlikely	Unlikely
Rufa red knot	*Calidris canutus rufa*	FT; --	Migrates in spring and fall primarily to/from South America to breeding grounds in central Canadian Arctic and stopover habitat includes coastal habitats, beaches, and mudflats. Does not breed in the U.S.	Barren land, open water.	*Project/ Study Areas*	Unlikely	Unlikely	Unlikely	Unlikely
Whooping crane	*Grus americana*	FE; SE, SGCN	Migrates from wintering grounds along the Texas coast to breeding grounds in central Canada in the spring and fall with stopovers primarily occurring in wetlands through the central states of the U.S. Occupies a variety of wetland and other habitats, including coastal marshes and estuaries, inland marshes, lakes, ponds, wet meadows and rivers, agricultural fields, and wetlands during migration.	Cultivated crops, emergent herbaceous wetlands, open water.	*Project/ Study Areas*	Possible	None	Possible	None

Table 2.2. Federal and state-protected bird and bat species and their likelihood of occurrence within the Philip Wind Project Area in Haakon County, South Dakota.

Bird or Bat/ Common Name	Scientific Name	Status (Federal; State)[1]	Habitat by Season	NLCD Land Cover Types	Seasons of Potential Occurrence and Likelihood of Occurrence[2] in the Project and Study Areas				
					Location	Spring	Summer	Fall	Winter
Bats									
Northern long-eared bat	*Myotis septentrionalis*	FE; SGCN	Summer roosts underneath bark, in cavities, or crevices of live trees and snags. Migrates between summer roosts and wintering caves and mines.	Woody wetlands, evergreen forest, mixed forest, and deciduous forest.	*Project/ Study Areas*	Possible	Possible	Possible	None
Tricolored Bat	*Perimyotis subflavus*	PE; --	Primarily roosts among live and dead leaf clusters. Migrates between summer roosts and wintering caves and mines.	Forest, dense forest with underbrush.	*Project/ Study Areas*	Possible	Possible	Possible	None

[1] BGEPA = Federal Bald and Golden Eagle Protection Act of 1940, FE = Federal endangered species, FT = Federal threatened species, PE = Proposed Endangered = USFWS considering listing on the Endangered Species Act (ESA), SE = State endangered species, ST = State threatened species, SC = State candidate species; SGCN – South Dakota Game, Fish and Parks (SDGFP) Species of Greatest Conservation Need, -- = Not federal- or state-listed as endangered or threatened species.

[2] Likelihood of species to occur for breeding, nesting, spawning, migration, flowing, etc., based on the species' range, habitat suitability, species' mobility, population size, and records of occurrence in the appropriate area (Section 3.1). Seasonal likelihood of occurrence applies to the Project area, Study Area, or neither (--) as shown under "Suitable Habitat".

Sources: SDGFP South Dakota Wildlife Action Plan 2014; Tetra Tech 2018; NatureServe 2021; U.S. Fish and Wildlife Service (USFWS) Birds of Conservation Concern 2021a; USFWS Information for Planning and Consultation report (2022a, 2024a); eBird 2023; USFWS Environmental Conservation Online System 2023a

NLCD = National Land Cover Database (2019)

2.1.4 Prairie Grouse

Sharp-tailed grouse have a wide distribution from the Great Plains to Alaska and in South Dakota, they are a fairly common resident west of the Missouri River and on the Missouri and Prairie coteaus east of the Missouri River (Runia et al. 2021). In contrast, greater prairie-chicken now only occurs in isolated populations, with the largest population extending from central South Dakota south to central Kansas. In South Dakota, greater prairie-chickens occur in the northeast, but the densest and most stable populations are in the center of the state south to Nebraska (Runia et al. 2021).

Based on models presented in Runia et al. (2021), SDGFP developed Modelled Priority Habitat Areas categorized primarily in four tiers with Tier 1 as the highest quality habitat, followed by Tier 2 and Tier 3. Areas not categorized as Tier 1, 2, or 3 are considered Low-Quality habitat (Runia et al. 2021, SDGFP 2022).

The Project Area lacks large areas of Tiers 1 and 2 for both sharp-tailed grouse and greater prairie-chickens (Figures 2.1 and 2.2). Limited Tier 3 habitat exists with the Project Area, otherwise the majority of the landscape is considered low-quality habitat for both species.

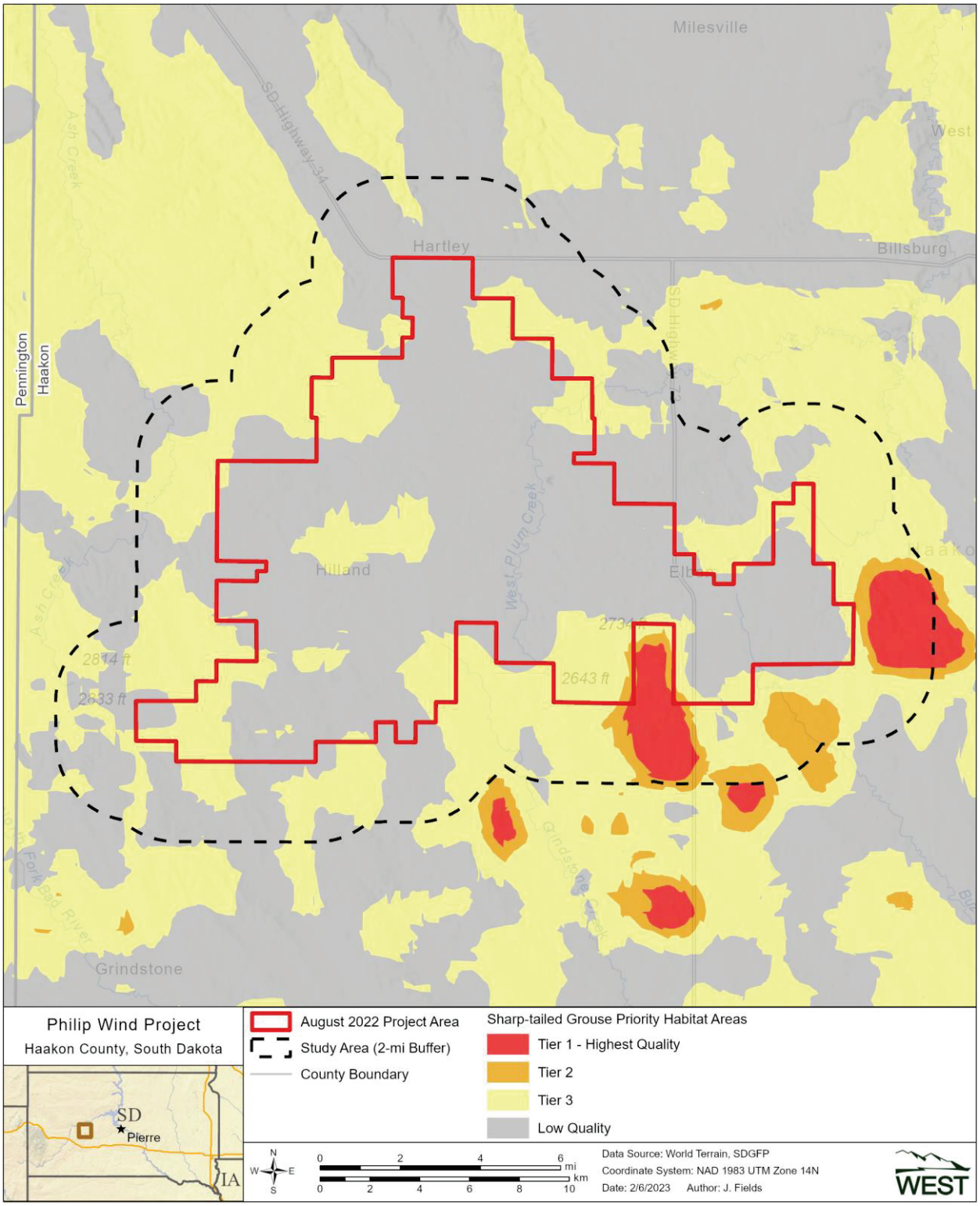

Figure 2.1. Sharp-tailed grouse modelled priority habitat areas within the Philip Wind Project, Haakon County, South Dakota.

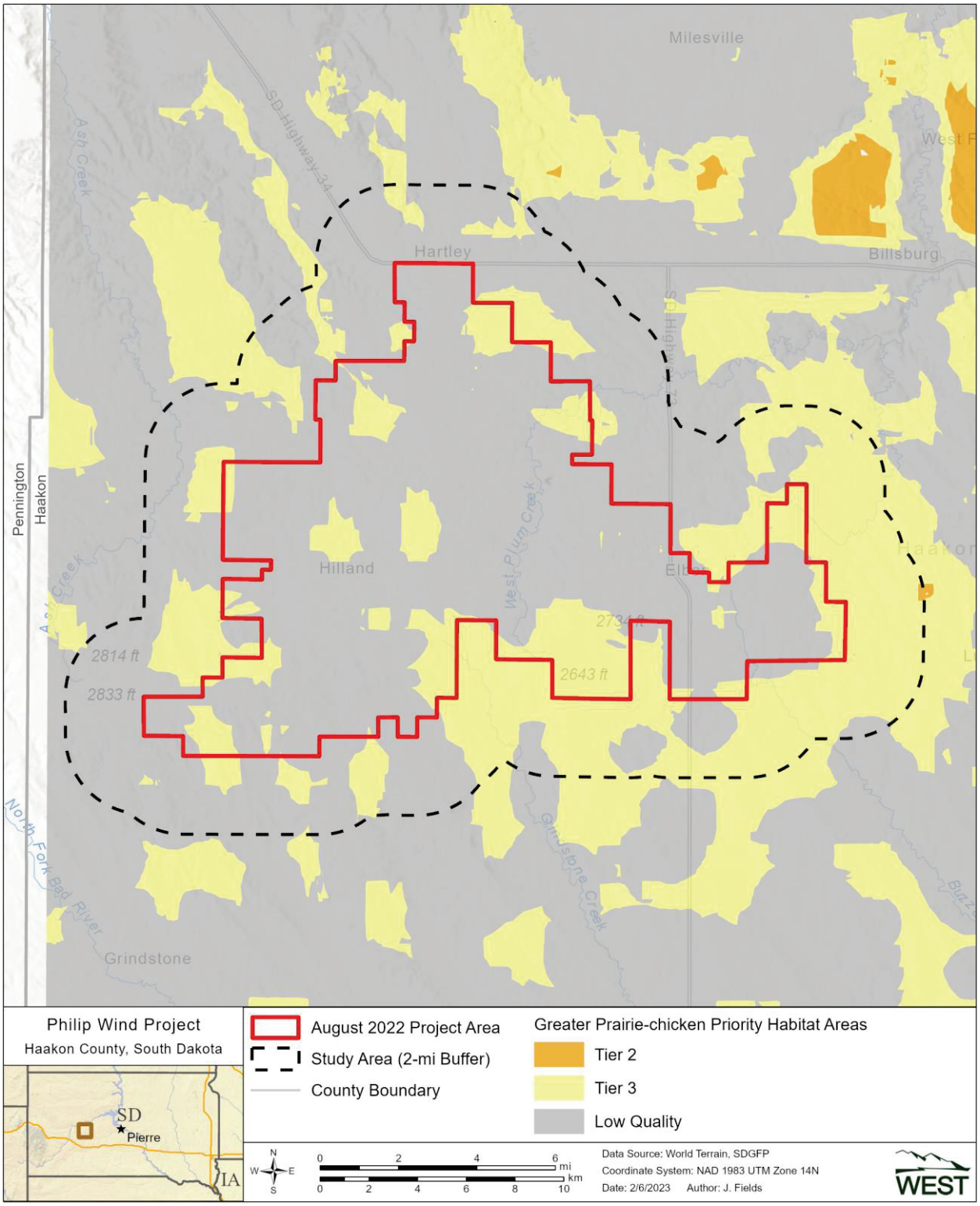

Figure 2.2. Greater prairie-chicken modelled priority habitat areas within the Philip Wind Project, Haakon County, South Dakota.

2.2 Water Resources Analysis

The objective of the desktop water resources analysis was to obtain spatial data on the location and extent of water resource features within the Project Area and the Study Area, a separate 2.0-mile buffer from the Project Area, and preliminarily characterize the types of wetlands and waterbodies. The desktop review was conducted using USGS topographic maps, soil survey information from the USDA NRCS (2019), NWI maps (USFWS NWI 2023), and National Hydrography Dataset (NHD) data (USGS 2023) for the Study Area. Desktop analysis is a detailed precursor to a more formal, complete field delineation.

Results of the desktop analysis of NWI data indicated that there are 1,799 acres of potential wetlands within the Project Area and 2,536 acres within the Study Area. Freshwater emergent wetlands were the most common NWI category identified in the Project and Study areas. Results of the desktop analysis of NHD data indicated that there are 378 mi of waterways in the Project Area and 509 mi in the Study Area. Several named drainages are present within the Project Area and Study Area, and all drainages are tributaries to the Cheyenne River and the Bad River.

2.3 Northern Long-eared Bat Habitat Assessment

The objective of the northern long-eared bat (*Myotis septentrionalis)* habitat assessment was to identify potentially suitable summer roosting and foraging habitat within the March 2022 Project Area and the Study Area, a separate 2.5-mi buffer from the Project Area. This combined Project Area and Study Area encompasses the most recent Project Area (dated August 2022).

The assessment of summer habitat for northern long-eared bat was completed in accordance with the Range-wide Indiana Bat and Northern Long-Eared Bat Survey Guidelines (Guidelines; USFWS 2022b). Northern long-eared bat roosting habitat was defined as deciduous forest, mixed forest, and woody wetlands 10 ac or larger in size with potential roost trees and any forested areas within 1,000 feet (ft) of these patches. Anthropogenic structures were not included in this assessment. Linear forest features, isolated trees, and isolated small forest stands (less than 10 ac in size) located more than 1,000 ft away from suitable forested habitat were considered unsuitable habitat for northern long-eared bat as per supporting research and USFWS guidelines (Foster and Kurta 1999, Henderson and Broders 2008, USFWS 2022b). The habitat assessment consisted of an initial desktop review, followed by a field reconnaissance visit to ground-truth the desktop results.

The Project Area contains 65 ac of potentially suitable summer habitat, and the Study Area contains 345 ac of potentially suitable summer habitat (green area; Figure 2.3; Table 2.3). The Project Area contains 1,508 ac of connected habitat (inclusive of suitable summer habitat), and the Study Area contains 8,031.8 ac of additional connected habitat (black outline; Figure 2.3; Table 2.3; area calculations may differ slightly due to rounding), which includes a 1,000 ft connected habitat buffer. During the site visit, it was confirmed that the desktop evaluation of potentially suitable summer habitat was accurate and that the tree composition within the forest patches were of at least three inches diameter at breast height interspersed with snags.

Table 2.3. Potentially suitable northern long-eared bat summer habitat at the Philip Wind Project, Haakon County, South Dakota, October 2022.

	Potentially Suitable Summer Habitat (acres)		Connected Habitat Buffer (acres)[1]	
Site	**Study Area**	**Project Area**	**Study Area**	**Project Area**
Site 1	104	–	2,906	–
Site 2	44	–	583	–
Site 3	95	–	1,946	–
Site 4	66	25	1,421	552
Site 5	6	40	269	947
Site 6	30	–	905	8
Total	**345**	**65**	**8,031**	**1,508**

[1] Connected Habitat Buffer includes Potential Suitable Summer Habitat.

Sums may not equal total values shown due to rounding.

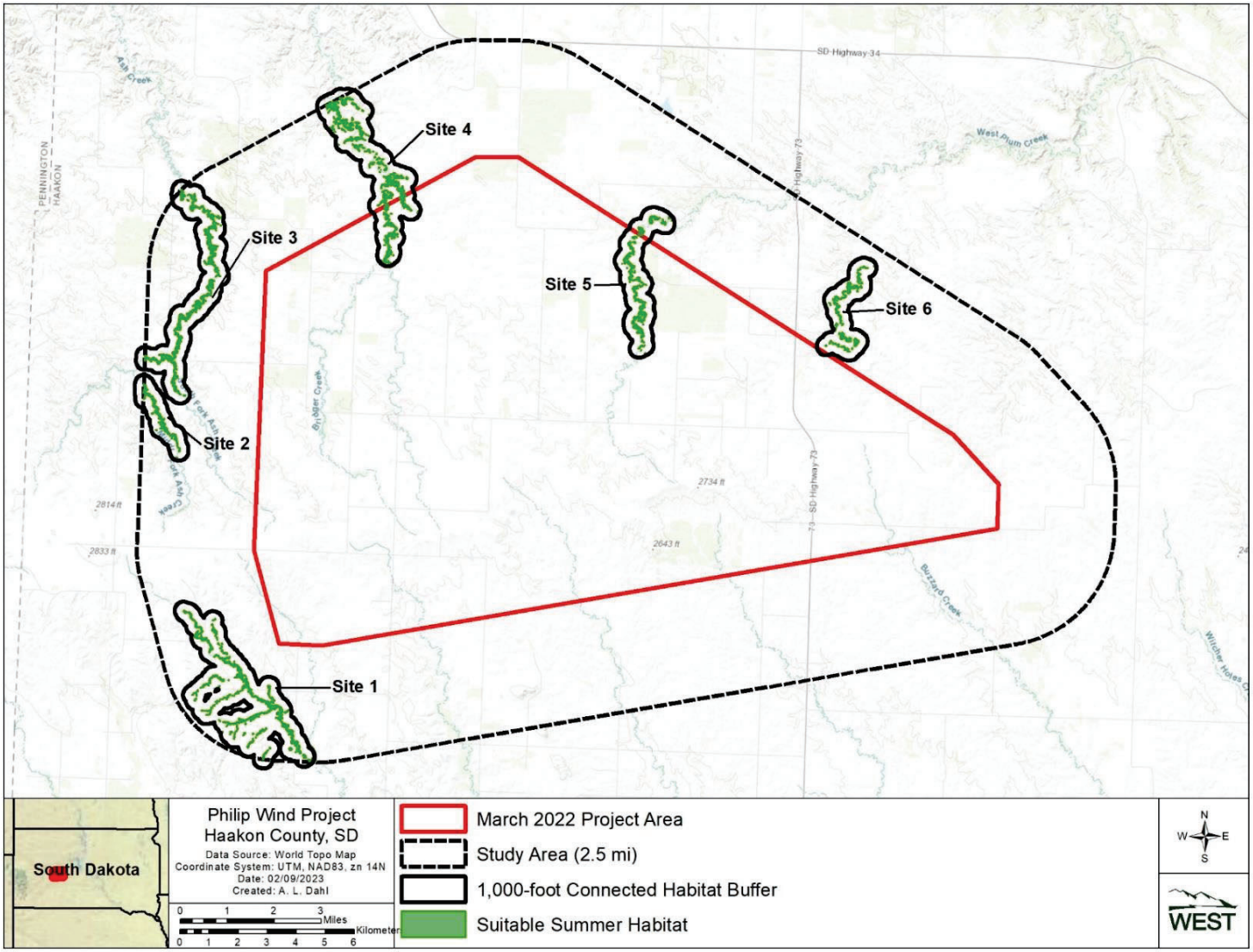

Figure 2.3. Potentially suitable summer habitat for the northern long-eared bat at the Philip Wind Project in Haakon County, South Dakota, 2022.

2.4 Whooping Crane Habitat Assessment

The objective of the whooping crane habitat assessment was to evaluate potentially suitable whooping crane stopover habitat within the Project Area. Three methods for assessing potentially suitable whooping crane stopover habitat within the Project Area have been recommended by federal agencies including Western Area Power Administration (WAPA; B. Pauly, pers comm. January 13, 2023) and USFWS (N. Gates, pers comm. January 13, 2023) as consistent with the Upper Great Plains Programmatic Environmental Impact Statement (WAPA and USFWS 2015). These three models were used independently to analyze wetland habitat suitability:

1. The Watershed Institute (TWI) Wetland Suitability Model (TWI 2012),
2. Predicted Habitat Use Model (Niemuth et al. 2018), and
3. Decile Model (Niemuth et al. 2018).

The most recently available data (Pearse et al. 2020, USFWS 2023b), indicate no observations or telemetry locations of whooping cranes have been documented within the Project Area. Two observations of whooping cranes have been observed 5.5 mi west and 8.8 mi east of the Project Area (USFWS 2023b) along with two individuals less than 0.5 mi south and 5.5 mi southeast of the Project Area confirmed by telemetry locations (Pearse et al. 2020). Results for each of three habitat suitability models assessed for the Project Area are presented below.

The Watershed Institute Wetland Suitability Model (TWI Model; TWI 2012) – TWI published a standardized approach to formalize and identify potentially suitable habitat for migrating whooping cranes. The TWI Model is feature-specific, and potentially suitable habitat was compared to habitat at Quivira National Wildlife Refuge in Kansas, which is designated Critical Habitat for the species (USFWS 1978). Based on a desktop analysis, the Project Area contains 1,799 ac of NWI wetlands. Based on the definition wetland inclusion (TWI 2012), 872 ac of NWI wetlands were evaluated using this model to assess whooping crane habitat within the Project Area. The wetland scores range from 3–18 with 18 as the highest quality of wetland stopover habitat. Of the scored acres of wetlands within the Project Area, 415 ac of NWI wetlands were considered potentially suitable habitat (scores of 12 or more; TWI 2012) for whooping cranes.

Predicted Habitat Use Model (Niemuth Model; Niemuth et al. 2018) – The Niemuth Model was developed explicitly for North and South Dakota and provides a numerically continuous (0.0–1.0) prediction of the relative probability of habitat use by whooping cranes. The model considered 12 predictor variables that were analyzed and validated using GPS location data from whooping cranes equipped with radio-telemetry transmitters (Niemuth et al. 2018). Predicted whooping crane habitat use within the Project Area ranged from less than 0.0001 to 0.0038 on a scale of 0 to 1.0. Therefore, it is expected that habitat within the Project Area would have a maximum of a 0.38% chance of use by whooping cranes during migration.

Decile Model (Niemuth et al. 2018) – To aid in conservation planning, the Decile Model approach divides the Niemuth Model into 10 equal areas which are referred to as deciles with the first decile (Decile 1) as the highest likelihood of use decile and the 10th decile (Decile 10) as the lowest likelihood of use. Like the Niemuth Model, the Decile Model was developed specifically for North and South Dakota. For this habitat assessment, suitable wetland stopover habitat for whooping crane was defined as any NWI wetland within the five highest use deciles (deciles 1–5) within the Project Area. Results of this modelling indicated that there were five deciles (5–9) represented within the Project Area. Of which, only one (Decile 5), representing 348 ac, was considered a whooping crane high use decile. Five acres of NWI wetlands occurred within Decile 5 (Figure 2.4).

3 TIER 3 – FIELD STUDIES

Numerous Tier 3 studies were conducted to evaluate and characterize wildlife resources within or near the Project Area to assess potential impacts from development of the Project between 2017 and 2024 (Table 3.1). For the purposes of this BBCS, a summary of the methods and results from both unique survey efforts and repeated studies completed within the past five years are provided for the most updated information for the Project.

Table 3.1. List of Tier 3 pre-construction surveys relevant to the BBCS at or near the Philip Wind Project Area in Haakon County, South Dakota.

Survey Dates	Survey Report	Citation
August 27 to November 8, 2017	Fall Avian Use Study (2017)	Tetra Tech 2017
August 27, 2017 to July 26, 2018	Eagle Use Study (2017-2018)	Tetra Tech 2018a
March 25 to August 7, 2018	Spring/Summer Avian Use Study (2018)	Tetra Tech 2018b
April 11 to November 7, 2018	Bat Acoustic Study (2018)	Tetra Tech 2019a
April 20 to April 24, 2018	Eagle Nest Aerial Survey (2018)	Tetra Tech 2018c
April 22 to May 9, 2018	Prairie Grouse Lek Surveys (2018)	Tetra Tech 2018d
June 19 to June 28, 2018	Eagle Nest Ground Surveys (2018)	Tetra Tech 2018e
July 11 to July 22, 2018	Grassland Assessment (2018)	Chodachek and Moratz 2018
August 2018	Whooping Crane Habitat Assessment (2018)	Chodachek 2018
August 27, 2018 to July 11, 2019	Eagle Use Study (2018-2019)	Tetra Tech 2019b
January 13 to June 15, 2022	Raptor Nest Survey (2022)	Piorkowski and Arellano 2023
February 24 to October 13, 2022	Prairie Dog Colony Mapping (2022)	Piorkowski 2023b
April 4 to May 11, 2022	Prairie Grouse Lek Survey (2022)	Piorkowski 2023c
May 14 to June 22, 2022	Bald Eagle Utilization Distribution Monitoring (2022)	Piorkowski and Mabee 2023a
July 2018 to September 14, 2022	Grassland Assessment (2022)	Piorkowski 2023a
January 25, 2022 to March 30, 2023	Avian Use Study (2022-2023)	Fields et al. 2023b
February 2 to June 1, 2023	Raptor Nest Survey (2023)	Piorkowski and Wilson 2023
March 29 to May 5, 2023	Prairie Grouse Lek Survey (2023)	Piorkowski et al. 2023b
April 3, 2023 to August 30,2024	Avian Use Study (2023-2024)	TBD

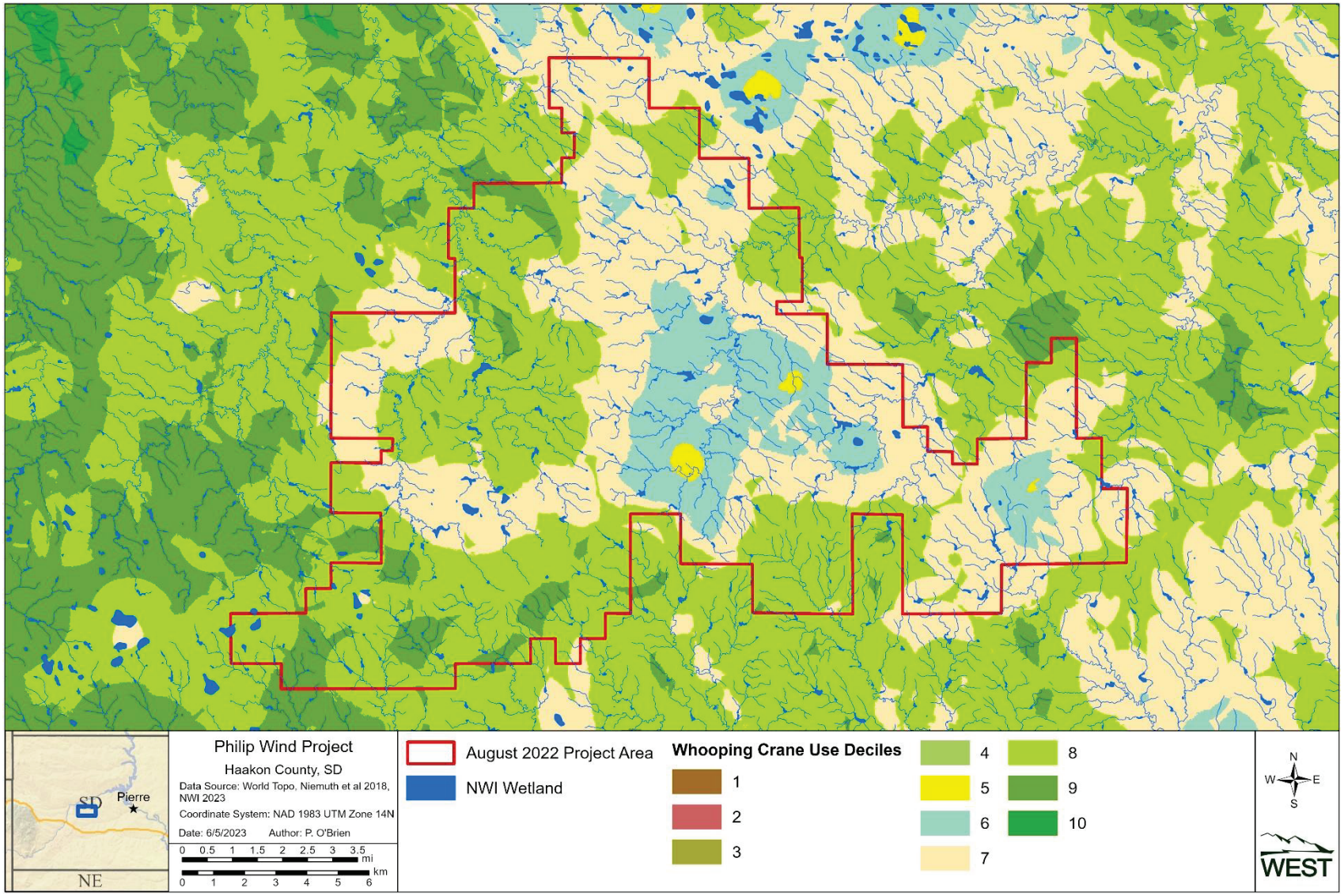

Figure 2.4. National Wetlands Inventory (NWI) wetlands and Neimuth Model whooping crane use deciles at the Philip Wind Project Area in Haakon County, South Dakota.

3.1 Birds

3.1.1 Avian Use Studies

Tetra Tech Inc. (Tetra Tech) conducted avian use studies at the Project in 2017-2018 (Tetra Tech 2017, 2018b; Table 3.1). The combined objective of these surveys were to estimate bird use for the fall migration period and the combined spring and summer seasons within the Project Area.

WEST conducted fixed-point bird use surveys in 2022-2023 within the Project (Fields et al. 2023b; Table 3.1). The second year of data collection began in April 2023 and is ongoing within the Project Area and this section will be following the completion of survey efforts in August 2024. Survey objectives were to 1) assess spatial and temporal use of the Project Area by large birds, including eagles and species of concern (USFWS 2012).

3.1.1.1 Methods (2017–2018)

Tetra Tech conducted 20-minute (min) surveys for all diurnal birds within 800-m survey plots at each of 13 survey locations. Survey points were selected to obtain representative coverage of habitat types present within the proposed turbine locations (Tetra tech 2017, 2018b). In 2017, surveys were conducted bi-weekly between August 27 to November 8, 2017. In 2018, surveys were conducted between March 25-June 28, 2018, and July 23-August 7, 2018. Surveys were conducted by continuously scanning the 800-m survey buffer and recording any visual or auditory observations. Data collection included bird species (or lowest taxonomic level), number of individuals, behavior, distance form observer, flight height, flight direction, and weather (temperature, wind speed, wind direction, precipitation visibility, and cloud cover).

3.1.1.2 Methods (2022–2023)

Avian use studies primarily followed guidance in the WEG, ECPG, and the 2016 *Revisions to Regulations for Eagle Incidental Take and Take of Eagle Nests* (Revisions; USFWS 2016), and the South Dakota Game Fish and Parks (SDGFP) *Siting Guidelines for Wind Power Projects in South Dakota* (SDGFP 2012). Methods described below were used for both survey years and were common for all birds (i.e., large birds, eagles, and other species of concern) except as noted.

Large birds were defined as waterbirds, waterfowl, shorebirds, diurnal raptors (i.e., kites, accipiters, buteos, eagles, falcons, northern harrier [*Circus hudsonius*], and osprey [*Pandion haliaetus*]), owls, vultures, upland game birds, doves and pigeons, nightjar, and large corvids (e.g., magpies, crow, and ravens).

If an eagle was observed biologists recorded behavior (i.e., flight height, distance from observer, activity) at the top of each minute an eagle was in view. Biologists also recorded an eagle minute, defined as an eagle flying below 220 m above ground level and within the 800-m survey plot at any time during the minute. Total bald and golden eagle minutes were the sum of eagle minutes defined above, separated by species. Flight paths and perch locations of eagles were also recorded.

Fifty survey points were selected randomly in the Project Area, providing 33% coverage of the Project Area; exceeding the ECPG recommendation (USFWS 2013; Figure 3.1). Each survey plot was an 800-meter (m) radius circle centered on the survey point (Reynolds et al. 1980, USFWS 2013, 2016).

Surveys at each point were conducted for a period of 60 min. Surveys were conducted once per month during all seasons from January 25, 2022 – March 30, 2023. Seasons were defined as spring (March 1 – May 30), summer (May 31 – August 31), fall (September 1 – November 30), and winter (December 1 – February 28). Surveys were conducted during daylight hours and survey times at survey points were randomized to cover all daylight hours during a season. Flight paths and perch locations of eagles were mapped during large bird use surveys to qualitatively look for potential areas of concentration and consistent flight patterns within the Project Area.

3.1.1.3 Avian Use Study (2023–2024)

The completion of a second full year of avian use surveys at the Project are ongoing. WEST is conducting an avian use study at the Project from April 3, 2023, to August 2024 to collect two complete years of data at all survey points. Field surveys are expected to be completed in August 2024 with a complete analysis available in late 2024.

3.1.1.4 Results

3.1.1.4.1 Avian Use Studies (2017–2018)

During fall surveys (Tetra Tech 2017), each survey point was surveyed six times each resulting in the documentation of 761 birds representing 27 species. Overall avian mean use was 9.76 bird/20 minutes. Passerines composed the majority of use (63.5%) with raptors composing 4.9% of use. No federal or state protected threatened or endangered species were recorded during surveys. One bald eagle and one golden eagle were recorded during the fall surveys.

During spring and summer surveys (Tetra Tech 2018b), each survey point was surveyed 10 times resulting in the documentation of 2,645 birds representing 59 species. Overall avian mean use was 20.35 birds/20 minutes. Passerines composed the majority of use (75.6%) with raptors composing 1.3% of use. No federal or state protected threatened or endangered species were recorded during surveys. One bald eagle and two golden eagles were recorded during the spring and summer surveys.

3.1.1.4.2 Avian Use Study (2022–2023)

WEST conducted an avian use study at the Project for 15 months from January 25, 2022 – March 30, 2023. Six hundred thirty-four avian use surveys were conducted at 50 survey points over 15 visits within the Project Area. Fifty-two large bird species were observed during the study. Large bird species richness was highest during spring (40 species) and summer (39 species), followed by fall (25 species) and winter (16 species).

Large Birds (Non-eagle)

Large bird mean use (observations/60-min survey/800-m radius survey plot) ranged from 2.29 to 18.20 among seasons and was highest during spring (18.20) followed by fall (8.11), summer (6.68), and winter (2.29). Overall large bird mean use was 8.59 observations/60-min survey/800-m radius survey plot for the 15-month study. The species group with the highest mean use was waterfowl (3.69) followed by doves/pigeons (1.46), upland game birds (1.20), waterbirds (0.99), and diurnal raptors (0.45). Waterfowl use was largely influenced by migrating Canada geese.

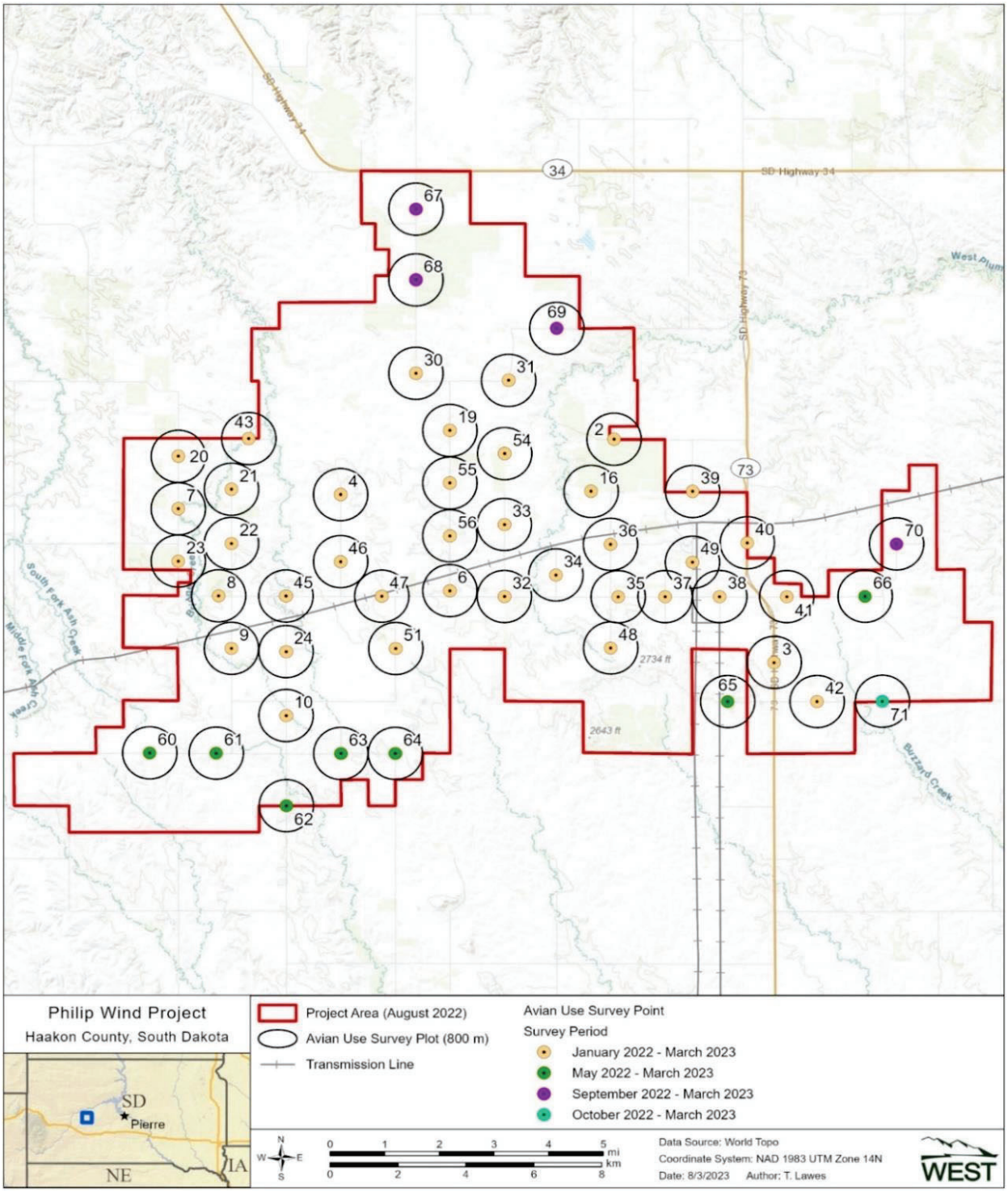

Figure 3.1. Avian use survey points and plots at the Philip Wind Project, Haakon County, South Dakota, from January 25, 2022 – March 30, 2023.

Mean large bird flight heights ranged from approximately 4 to 299 m across all large bird types. Large birds were mainly observed below the rotor swept area (RSA; 58%), although there was variation by bird type. Owls, upland game birds, and nightjars (all 100%), along with large corvids (93%), shorebirds (86%), doves/pigeons (78%), diurnal raptors (66%), and waterbirds (60%) were mainly observed below the RSA. Gulls/terns (67%) were most frequently recorded within the RSA and vultures (60%) were most frequently recorded above the RSA.

Large bird use ranged from 1.33 observations/60-min survey/800-m radius survey plot to 64.92 across points. The highest use values were from waterfowl at Point 31 (58.69) followed by waterbirds at Point 32 (20.00), and upland game birds at Point 71 (13.67; Figure 3.1).

Eagles

Twenty-three bald eagles and 46 golden eagles were recorded during 634 survey hours. Bald eagle mean use ranged from 0.01 observations/60-min survey/800-m radius survey plot to 0.08 among seasons and was highest during winter (0.08) followed by spring (0.04), summer (0.01), and fall (0.01). Overall bald eagle mean use was 0.10 observations/60-min survey/800-m radius survey plot. Bald eagle flight heights were recorded most frequently (60.0%) within the RSH (30–195 m) with fewer flights below (35.0%) and above (5.0%) the RSH. Golden eagle mean use ranged from 0.03 observations/60-min survey/800-m radius survey plot to 0.11 among seasons and was highest during winter (0.11) followed by spring (0.10), fall (0.07), and summer (0.03). Overall golden eagle mean use was 0.27 observations/60-min survey/800-m radius survey plot. Golden eagle flight heights were recorded more frequently (43.6%) within the RSH (30–195 m) with fewer flights below (38.5%) and above (17.9%).

Species of Concern

No federal- or state-protected threatened or endangered species were recorded within the Project Area. Species of concern observed during the study included five species designated as BCC (USFWS 2021), three species designated as SGCN (SDGFP 2014), one species designated as both BCC and SGCN, and two species protected under the BGEPA (1940; Table 3.2).

Table 3.2. Groups and observations of large bird species of concern observed during surveys in the Philip Wind Project, Haakon County, South Dakota, from January 25, 2022 – March 30, 2023.

Species	Scientific Name	Status[1]	Surveys	
			# grps	# obs
bald eagle	*Haliaeetus leucocephalus*	BGEPA	24	24
black-billed magpie	*Pica hudsonia*	SGCN	4	8
Clark's grebe	*Aechmophorus clarkii*	SGCN	1	1
ferruginous hawk	*Buteo regalis*	BCC	10	10
golden eagle	*Aquila chrysaetos*	BGEPA	50	50
lesser yellowlegs	*Tringa flavipes*	BCC	1	1
marbled godwit	*Limosa fedoa*	BCC	7	10
merlin	*Falco columbarius*	SGCN	9	9
northern harrier	*Circus hudsonius*	BCC	10	10

Table 3.2. Groups and observations of large bird species of concern observed during surveys in the Philip Wind Project, Haakon County, South Dakota, from January 25, 2022 – March 30, 2023.

Species	Scientific Name	Status[1]	Surveys	
			# grps	# obs
prairie falcon	*Falco mexicanus*	BCC	3	3
short-eared owl	*Asio flammeus*	BCC; SGCN	1	1
Total	**11 species**		**120**	**127**

[1] SGCN = South Dakota Species of Greatest Conservation Need; BCC = USFWS Birds of Conservation Concern (Bird Conservation Region 17); BGEPA = Bald and Golden Eagle Protection Act.

grps = groups; obs = observations

3.1.2 Raptor Nest Surveys

WEST conducted aerial raptor nest surveys during 2022 (Piorkowski and Arellano 2023) and 2023 (Piorkowski and Wilson 2023). The objective of the raptor nest surveys was to identify and record the location and status of all raptor nests within the Project and Study Areas. Surveys were conducted throughout the March 2022 Project Area and the Study Area, a separate 2.0-mi buffer from the Project Area (Figure 3.2). The methods described below were used for both survey years and results for eagles are presented separately from other raptors.

3.1.2.1 Methods

3.1.2.1.1 Aerial Surveys (All Raptors)

Raptor nest surveys were conducted in accordance with guidance provided in the WEG, the ECPG the Revisions, the USFWS *Updated Eagle Nest Survey Protocol* (USFWS 2020) and the USFWS *Region 6 Recommended Protocol for Conducting Pre-construction Eagle Nest Surveys at Wind Energy Projects* (Protocol; USFWS 2021b).

Two experienced WEST biologists conducted the first round of a double observer (i.e., a primary and a secondary observer) aerial raptor nest survey from a Robinson R-44 Raven II helicopter with bubble windows that provided good visibility (Pagel et al. 2010, USFWS 2013). The survey was conducted early in the season prior to deciduous tree leaf-out to ensure easier detection of nests and before fledging of nestlings. One experienced WEST biologist conducted a second aerial survey to confirm nest status and to check each nest observed during the first round.

In general, the helicopter was flown at approximately 150–200 ft above ground level at an air speed of approximately 60–70 mi per hour surveying all potential habitat by flying meandering transects spaced approximately 0.5 mi apart. (Pagel et al. 2010, USFWS 2013). To determine the status of a nest, the biologist evaluated behavior of adults on or near the nest, and the presence of eggs, young, whitewash, or fresh building materials. Species, nest type, nest status, nest condition, and nest substrate were recorded at each nest location to the extent possible.

3.1.2.1.2 Ground-based Surveys (Eagles)

Ground-based surveys to check the status of known eagle nest locations for occupancy or productivity at any new eagle nest location observed during the aerial surveys were conducted

by an experienced biologist. The biologist focused on locating giant and large stick nest structures in suitable nesting habitats within the Project and Study areas by driving along all public roads allowing for a thorough visual inspection of the habitat and providing views of trees from several different angles. The ground survey was conducted during the hours after sunrise and before sunset. To determine the status of a nest, the biologist used the same criteria as that of aerial surveys with the exception that inactive nest (consistent with an eagle nest) was monitored for four hours per survey or until occupancy was confirmed.

3.1.2.2 Results

3.1.2.2.1 2022 (Eagles)

Aerial nest surveys were conducted on February 24 and March 19, 2022, and April 19, 2022, while ground-based surveys were completed on January 13, 2022, April 8, 2022, and June 15, 2022 (Piorkowski and Arellano 2023). One bald eagle nest (BAEA-1) and one golden eagle nest (GOEA-1) were documented during the surveys at the Project; both nests were classified as occupied active in 2022 (Figure 3.2). The golden eagle nest, however, was initially found active and occupied by a ferruginous hawk during the first aerial survey but was later observed to be occupied inactive by a golden eagle during the subsequent ground-based and aerial surveys.

3.1.2.2.2 2022 (Non-eagle Raptors)

Aerial nest surveys were conducted on February 24 and March 19, 2022, and April 19, 2022 (Piorkowski and Arellano 2023). Six non-eagle raptor nests were documented within the Project and Study areas (Figure 3.3). All three active red-tailed hawk (*B. jamaicensis*) nests were within the Study Area, whereas all three inactive unidentified raptor nests were within the Project Area. Two active great blue heron (*Ardea herodias*) rookeries were documented within the Study Area (Figure 3.2).

3.1.2.2.3 2023 (Eagles)

Aerial nest surveys were conducted on March 1, and May 3, 2023, while ground-based surveys were completed on February 2, 2023, and June 1, 2023 (Piorkowski and Wilson 2023). Surveys found two bald eagle nests and one golden eagle nest in the Project Area (Figure 3.2). Of these, one of the bald eagle nests (BAEA-1) and the golden eagle nest (GOEA-1) were previously documented in 2022 (Piorkowski and Arellano 2023). In 2023, nest BAEA-1 was first determined to be occupied inactive by a bald eagle, then was found occupied active later in the season with a great horned owl (*Bubo virginianus*). Similarly, nest GOEA-1 was first determined to be occupied inactive by a golden eagle, then occupied inactive later in the season by a red-tailed hawk during the 2023 surveys. The second bald eagle nest identified during surveys in 2023 (BAEA-2) was approximately 816 ft east of the other bald eagle nest; this nest had not been observed during previous surveys (i.e., Tetra Tech 2018 or Piorkowski and Arellano 2023) and was determined to be occupied inactive in 2023.

3.1.2.2.4 2023 (Non-eagle Raptors)

Aerial nest surveys were conducted on March 1, and May 3, 2023 (Piorkowski and Wilson 2023). Twelve non-eagle raptor nests were documented within the Project and Study Areas (Figure 3.2). Two active great horned owl nests and two active red-tailed hawk nests were within the Study Area. Two active great horned owl nests, three active red-tailed hawk nests, and three inactive unidentified raptor nests were within the Project Area. The western great blue heron rookery only was documented as active in 2023. The eastern rookery did not appear active in 2023.

3.1.3 Prairie Grouse Lek Surveys

In 2022 (Piorkowski 2023c) and 2023 (Piorkowski et al. 2023b), WEST conducted lek surveys for prairie grouse (sharp-tailed grouse [*Tympanuchus phasianellus*] and greater prairie-chicken [*T. cupido*]) at the Project Area and a separate 2-mi buffer around the Project Area (i.e., Study Area; Figure 3.3). Surveys were conducted following guidance from the SDGFP *Prairie Grouse Management Plan for South Dakota 2017-2021* (SDGFP 2017) in 2022 and *Management of prairie grouse in South Dakota* (SDGFP 2022) with approved modifications from SDGFP agency discussion in March 2023.

The objective of the survey was to locate prairie grouse leks within the Project and Study areas and, to the extent possible, record the species and number of birds observed at a lek. Methods and results of these surveys are presented below.

3.1.3.1 Methods

3.1.3.1.1 Aerial Surveys

To search for prairie grouse leks within the Project Area and Study Area in 2022 and 2023, two experienced WEST biologists and a pilot flew aerial transects spaced 400 m apart, at approximately 50–100 m above ground level using a fixed-wing aircraft (Cessna 172). In both years, aerial surveys were conducted between late March and early May, the typical lekking timeframe for prairie grouse (SDGFP 2022). The flight route was developed using transects oriented in a north-south direction to increase visibility due to sun positions in the early morning hours. Transects were spaced throughout the Project and Survey areas to provide complete visual coverage of these areas. Survey flights occurred during calm weather (wind speeds less than 20 mi per hour) with no or very light rain and were conducted approximately 30 min before sunrise until two hours after sunrise.

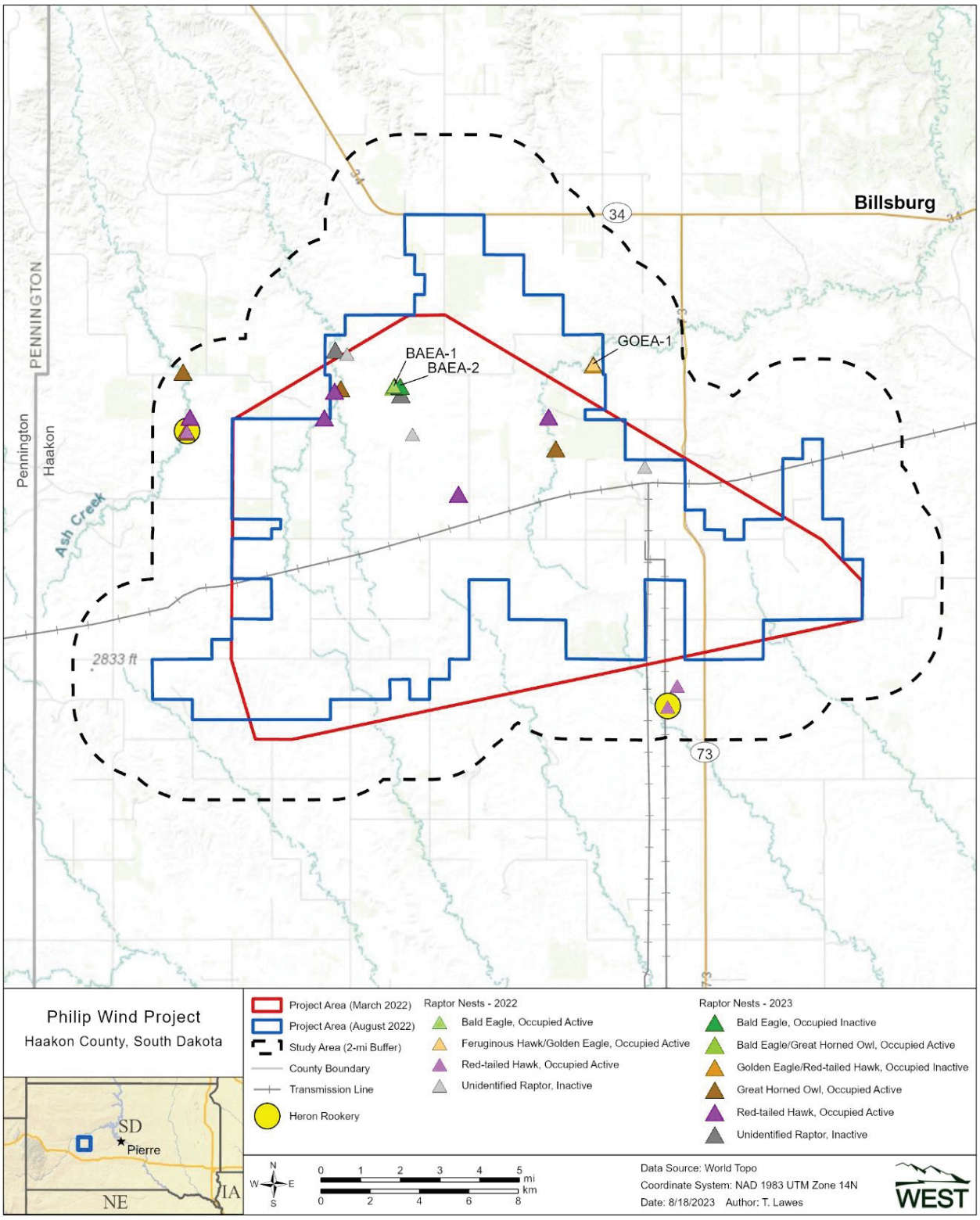

Figure 3.2. Location of raptor nests within the Project and Study areas at the Philip Wind Project Area, Haakon County, South Dakota, 2022-2023.

WEST conducted three aerial surveys in 2022 and one aerial survey in 2023. In 2022, the aerial survey covered the entire Project and Study areas but focused on locations that could not be covered during the ground surveys.

3.1.3.1.2 Ground Surveys

In 2023, WEST conducted three surveys for prairie grouse and their leks at locations that were spaced approximately 0.5 mi apart along publicly accessible roads using ground-based surveys. Ground and aerial surveys overlapped temporally in 2023, but not spatially. At each location, WEST biologists visually scanned and listened for prairie grouse for up to 5 min. Three ground surveys were conducted during the season. If an active lek was detected, a count was conducted to quantify the number of grouse, their sex, and species if possible.

3.1.3.2 Results

3.1.3.2.1 2022 Prairie Grouse Lek Surveys

Three aerial surveys were conducted between April 4 and May 11, 2022, at the Project and Study areas. Survey 1 was conducted from April 4 – 19. Survey 2 was conducted from April 20 – 28, and Survey 3 was conducted from April 29 – May 11, 2022. Twenty-seven active lek locations were documented within the August 2022 Project and Study areas in 2022 (Table 3.3, Figure 3.3). Twenty of these lek locations were new and five were historical locations (Tetra Tech 2018d). Lek attendance ranged from 4-40 individuals for sharp-tailed grouse.

Table 3.3. Number of active prairie grouse leks in the August 2022 Project and Study areas, in relation to proposed turbine locations for the Philip Wind Project, Haakon County, South Dakota. Based on surveys from April 4 – May 11, 2022.

Lek Location	Sharp-tailed Grouse	Greater Prairie-chicken	Total
Project Area	8	0	8
Study Area (only)	17	0	17
Sub-total	**25**	**0**	**25**

3.1.3.2.2 2023 Prairie Grouse Lek Surveys

One aerial and three ground surveys were conducted between March 29 and May 5, 2023. Throughout the Project and Study areas, 274 points were surveyed during three survey efforts from the ground and one complete survey was conducted from the air. Ground surveys occurred between March 29 – April 13, April 15 – April 26, and April 17 – May 5; the one aerial survey occurred between April 10 – May 2.

During the surveys, 69 active prairie grouse leks were located in the Project and Study areas (Table 3.4, Figure 3.3). Leks appeared to be generally located in the western and eastern areas of the Project and Study areas, with fewer leks in the central area (Figure 3.3). Greater prairie-chicken lek attendance ranged from 2–20 birds and sharp-tailed grouse lek attendance ranged from 3–30 birds.

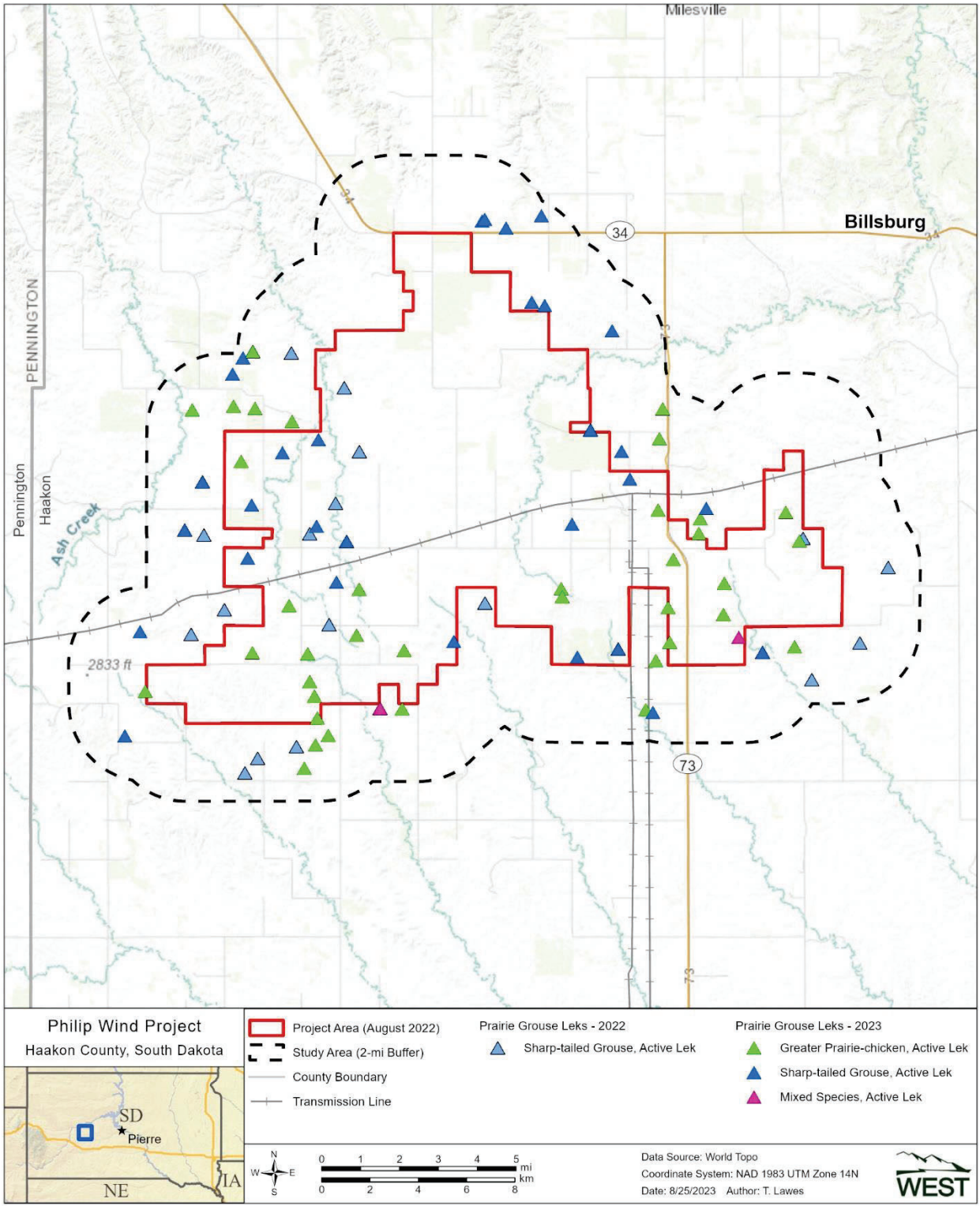

Figure 3.3. Location of active prairie grouse leks within the August 2022 Project and Study areas at the Philip Wind Project in Haakon County, South Dakota, from April 4 – May 11, 2022, and March 29 – May 05, 2023.

Table 3.4. Number of active prairie grouse leks in Project and Study Areas, in relation to proposed turbine locations for the Philip Wind Project, Haakon County, South Dakota. Based on surveys from March 29 – May 05, 2023.

Lek Location	Sharp-tailed Grouse	Greater Prairie-chicken	Both Species	Total
Project Area	12	19	1	32
Study Area (only)	18	18	1	37
Sub-total	**30**	**37**	**2**	**69**

3.2 Bald Eagle Utilization Distribution Monitoring

In 2022, WEST conducted bald eagle Utilization Distribution (UD) surveys at the Project (Piorkowski and Mabee 2023a; Table 3.1). The objective of bald eagle UD surveys was to gain information on how bald eagles use the area around the active nest spatially by mapping flight paths to and from the nest. Eagle nest flight path mapping was carried out in accordance with the WEG and ECPG, and in compliance with the Revisions

3.2.1 Methods

Bald eagle UD surveys were conducted at nest BAEA-1, the one known occupied active bald eagle nest (i.e., nest had eggs, nestlings, and/or an adult in incubating/brooding position at the time of the survey; Piorkowski and Arellano 2023; Figure 3.2) within the Project Area during the 2022 breeding season. Surveys were conducted from observation points that maximized the observers' ability to note activity at the nest and surrounding landscape. Survey points were generally located within 1,200 m of the nests. The nest was observed during weekly, 4-hour observation periods beginning in the second week of May 2022 and continuing until the nest was confirmed to have either succeeded (at least one young fledged [able to fly] or reached an age of 67 days within the nest; Steenhof and Newton 2007, USFWS 2013) or failed (no documented use by adults for at least two consecutive surveys). Survey timing alternated between early morning and late afternoon.

3.2.2 Results

The bald eagle nest was surveyed between May 14 and June 22, 2022. One bald eagle observation was recorded over 28 hours (seven, 4-hour surveys) of nest monitoring. The observation on June 8, 2022, was of an adult soaring and approaching from the north then circling towards the nest tree. The eagle did not perch on the nest. The eagle was recorded in the air for two minutes before landing in the nest tree where it remained perched until the conclusion of the survey (121 minutes). The eagle's flight height ranged from 800 m to 25 m prior to perching on the tree above the nest (nest height approximately 20 m off the ground). No spatial or temporal patterns could be made with a single observation. Nest failure was confirmed on June 22, 2022, because no eagle observations were made during two consecutive surveys (June 15, 2022, and June 22, 2022).

3.3 Bats

In 2018, Tetra Tech conducted acoustic monitoring surveys for the Project (Tetra Tech 2019a; Table 3.1). Twelve bat species are known to occur in South Dakota (Tetra Tech 2019a; Table 3.5) with the recent addition of tricolored bat (*Perimyotis subflavus*; USFWS 2023c). Of these 13 species, available information about species-specific suitable habitat, known distribution ranges, and documented occurrences indicated that eight species, big brown bat (*Eptesicus fuscus*), little brown bat (*Myotis lucifugus*), fringed bat (*Myotis thysanodes*), long-legged bat *(Macrophyllum macrophyllum*), western small-footed bat (*Myotis ciliolabrum*), eastern red bat (*Lasiurus borealis*), hoary bat (*Lasiurus cinereus*), and silver-haired bat (*Lasionycteris noctivagans*) are expected to have a moderate potential to occur within the vicinity of the Project Area (Tetra Tech 2019a). The remaining five species, western long-eared bat (*Myotis evotis*), Townsend's big-eared bat (*Corynorhinus townsendii*), evening bat (*Nycticeius humeralis*), northern long-eared bat, and tricolored bat are expected to have a low potential of occurrence (Tetra Tech 2019a, USFWS 2023c). The objective of the acoustic monitoring was to assess the use of the Project Area by resident and migratory bat species, as recommended in the WEG.

3.3.1 Methods

Tetra Tech designed the acoustic monitoring surveys for the Project using standardized passive acoustic survey protocols to evaluate bat species' risk from wind projects, and in accordance with the recommendations outlined within the WEG. Tetra Tech conducted acoustic bat monitoring in the Project Area from April 11 through November 7, 2018, using four bat detectors: three were ground-based with a single microphone, and one detector was outfitted with a high and a low microphone mounted on a meteorological tower). Tetra Tech used Wildlife Acoustics Song Meter SM3BAT Monitoring Systems (acoustic detector) to record bat activity in full spectrum format for the duration of the acoustic monitoring survey at all four survey locations. For a map of the Project Area at the time of the acoustic bat study and the location of the acoustic detectors see Tetra Tech (2019).

3.3.2 Results

During the 2018 surveys, 892 detector-nights (cumulative number of nights surveyed by all microphones) were sampled over the course of 211 calendar nights. A total of 14,262 bat passes were recorded and identified to the species level or frequency group, resulting in an overall activity rate of 16.0 bat passes/detector-night. Mean activity rates across all detectors ranged from 0.6 bat passes/detector-night to 54.4 bat passes/detector-night.

Bat passes identified at the species level included seven species and three groups (Table 3.5). The recorded bat species, ordered by frequency of detection included: big brown bats (32% of total passes recorded), hoary bats (18%), little brown bats (17%), silver-haired bats (12%), western small-footed bats (12%), eastern red bats (4%), long-legged bats (4%), and unidentified high frequency bats, unidentified low frequency bats, and unidentified myotis species (accounting for less than one percent each, respectively).

Table 3.5. Bat species with potential to be present at the Philip Wind Project, Haakon County, South Dakota (adapted from Tetra Tech 2019a).

Common Name	Species Name	Migratory Status[1,2]	Habitat Associations	Status[3,4]
big brown bat[5]	*Eptesicus fuscus*	Non-migratory	Most abundant in deciduous forests, although found in most habitats including agricultural croplands.	-
eastern red bat[5]	*Lasiurus borealis*	Long-distance migrant	Found in hardwood deciduous forests. Generally found in close association with riparian areas. Roosts in foliage of trees.	SGCN
evening bat	*Nycticeius humeralis*	Long-distance migrant	Associated with forested areas along waterways. Hollow trees are utilized for nursing sites and day roosts.	-
fringed myotis	*Myotis thysanodes*	Regional migrant	Found in a wide variety of habitats including roosts in trees, snags, buildings, cave, rocks, cliffs, and bridges.	SGCN
hoary bat[5]	*Lasiurus cinereus*	Long-distance migrant	Found in forested upland habitats, including junipers. Roosts in tree foliage.	SGCN
little brown bat[5]	*Myotis lucifugus*	Regional migrant	Found in a wide variety of forested habitats.	SGCN
long-eared myotis	*Myotis evotis*	Regional migrant	Typically found in coniferous forests but can occur in shrub-steppe regions. Forages mainly in forests or adjacent to creeks.	-
long-legged myotis[5]	*Myotis volans*	Regional migrant	Typically found in coniferous forests but can occur in desert and riparian habitats.	-
northern long-eared bat	*Myotis septentrionalis*	Regional migrant	Forages along forested hillsides and ridges. Roosts in cavities, caves and mines, underneath bark, or in crevices of trees and snags; rarely roosting in barns. Hibernate in caves and mines.	E
silver-haired bat[5]	*Lasionycteris noctivagans*	Long-distance migrant	Found in northern temperate conifer and mixed conifer-hardwood forest. Generally found in association with riparian areas.	SGCN
Townsend's big-eared bat	*Corynorhinus townsendii*	Regional migrant	Found in natural caves, mines, and buildings in the summer. Hibernates October to April in caves and mines.	SGCN
tricolored bat[6]	*Perimyotis subflavus*	Regional migrant	Found in forested habitats primarily within deciduous hardwoods. Hibernates in caves, abandoned mines, and occasionally road-associated culverts.	PE
western small-footed myotis	*Myotis ciliolabrum*	Regional migrant	Found in dry climates, particularly near cliffs and rock outcroppings. Forages near cliff faces and hibernates in caves and mines.	-

[1] Western Bat Working Group (2019)

[2] Bat Conservation International (2018)

[3] E = Endangered (USFWS 2024a); PE = Proposed Endangered (USFWS 2024a)

[4] Listed as a Species of Greatest Conservation Concern (SDGFP 2023a)

[5] Documented during acoustic surveys (Tetra Tech 2019a)

[6] Proposed Endangered (USFWS 2024a)

Acoustic detectors recorded bat activity for nearly the entire survey period, with the highest activity rates detected during early June and early August. Migratory tree bats accounted for over 34% of all bat activity and demonstrated spikes of activity in early June and early August. Myotis species and big brown bats (33% and 32%, respectively) accounted for the remaining activity and demonstrated consistent activity throughout the survey period with the highest levels in mid-summer.

3.4 Prairie Dog Colony Status and Mapping

Prairie dog colonies can be a source of prey for raptors. In 2022, WEST identified and mapped prairie dog colonies through a desktop review and field surveys (Piorkowski 2023b; Table 3.1). The objective was to identify and determine colony status (active versus inactive) and map active prairie dog colonies in the March 2022 Project Area (Project Area) and the Study Area, a separate 2.0-mi buffer from the Project Area (Figure 3.4). In addition, prairie dog colonies were scanned visually for burrowing owls and swift foxes (*Vulpes velox)*.

3.4.1 Methods

Prairie dog colonies were identified and mapped through a desktop review and field surveys. The desktop review consisted of a data request to identify historical colonies and a review of aerial imagery to identify potential colonies. Historical prairie dog colonies were identified and located within the Project and Study areas using data discussed during an agency meeting including Western Area Power Administration, USFWS, and SDFGP on August 14, 2018. Additionally, WEST conducted a desktop review of aerial imagery using the National Agricultural Imagery Program (NAIP; USDA NRCS 2022) to identify potential prairie dog colonies within both the Project and Study areas. Field surveys were conducted to determine the status of identified colonies and to map active colonies. Prairie dog colony locations were collected in conjunction with prairie grouse lek (transect surveys spaced every 400 m; April 4-19, 20-27, 2022; Piorkowski 2023c) and raptor nest surveys (combination of aerial surveys and ground verification surveys; February 24, March 19, and April 19, 2022; Piorkowski and Arellano 2023). Observations of swift fox and burrowing owls (*Athene cunicularia*) recorded incidentally, if observed during the mapping efforts within or immediately adjacent to any colony.

3.4.2 Results

Twelve locations were surveyed for the presence of prairie dog colonies (Figure 3.4), which included six historical locations identified from data discussed from the South Dakota Natural Heritage Database and six new locations identified from the NAIP aerial imagery review. Three active prairie dog colonies were located in the Project Area (Figure 3.4). The absent and inactive colony locations all experience regular agricultural practices.

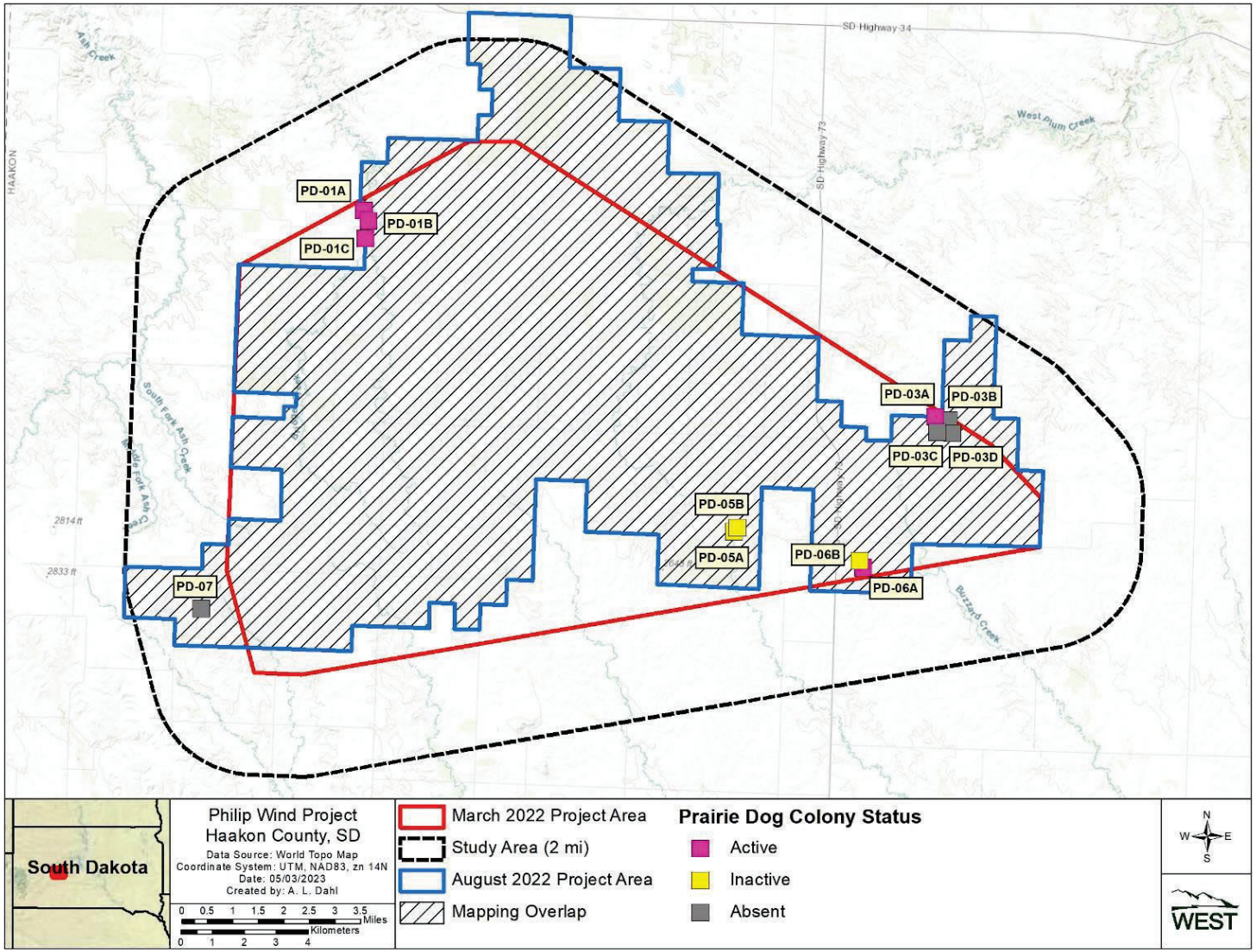

Figure 3.4. Status and location of prairie dog colonies at the Philip Wind Project in Haakon County, South Dakota, 2022.

3.5 Grassland Assessment

Grasslands, including native prairie, are important habitats for grassland birds which have shown declines in avian populations (Rosenberg et al. 2019). The objective of the grassland assessment was to identify grassland parcels and categorize the sod type of each parcel as either unbroken or broken sod within the Project Area. Bauman et al. (2018) defined undisturbed land as soil that has not been mechanically manipulated or has not experienced "iron in the ground" practices and the authors refer to undisturbed grasslands as native prairie. Bauman (2021) later described undisturbed grasslands as 'unbroken' grasslands. The grassland habitat assessment was conducted using a two-stage process: a desktop analysis followed by field surveys in areas not surveyed in 2018 (Chodachek and Moratz 2018). This report presents the combined results of the 2018 and current assessment.

The desktop analysis included a review of digital data within the Project Area to map and categorize potential grasslands by sod type (broken or unbroken grasslands; Bauman 2021). Based on the desktop analysis of NLCD (2019), USDA National Agricultural Statistics Service (2021) and the South Dakota native habitat digital layer "Quantifying Undisturbed (Native) Lands in Western South Dakota (2020)" and field verification, the Project Area is composed of approximately 27,678 ac (40.5% of the Project Area) of grassland. Of this area, approximately 12,192 ac (17.9% of the Project) was categorized as having broken sod and 14,915 ac (21.9% of the Project) as having unbroken sod (Figure 3.5). Field verification surveys were not completed at 0.8% of the grasslands due to lack of access.

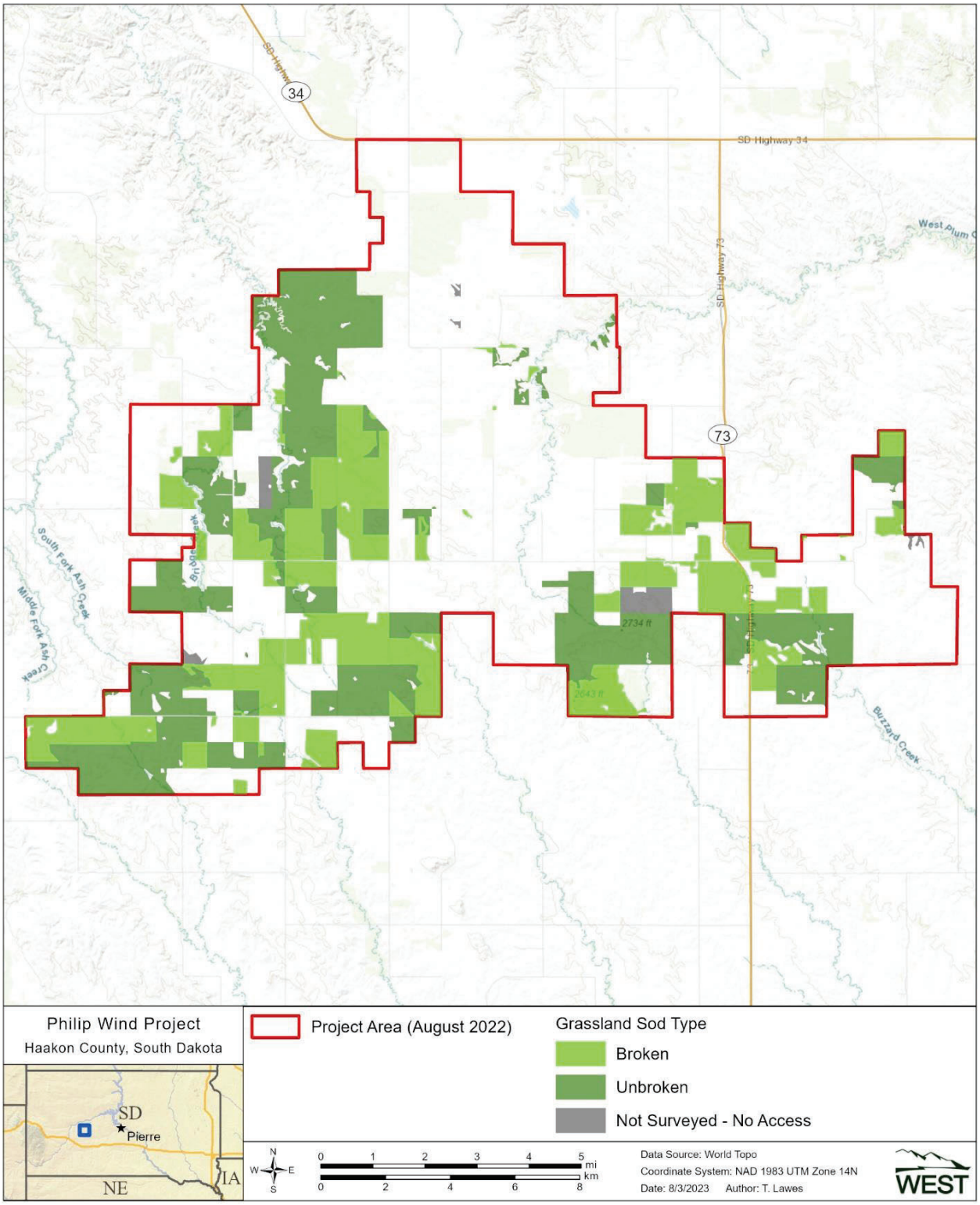

Figure 3.5. Grassland sod types for grassland parcels assessed during field surveys completed in 2018 and 2022 at the Philip Wind Project in Haakon County, South Dakota.

3.6 Wetlands

Impacts to wetlands can cause both direct and indirect impacts to waterfowl (Loesch et al. 2013) Wetland delineations were conducted for the Project between June 13 to 16, 2023, and June 19 to 22, 2023. Field wetland delineations focused on a survey corridor, rather than the Project Area. The survey corridor does not encompass the whole of the Project Area, but it is based on the Project design and associated buffers. The Survey Corridor encompassed approximately 2,068 acres.

4 POTENTIAL IMPACTS TO BIRDS AND BATS

Impacts to birds and bats from construction and operation of a wind energy facility (WEF) can be *direct* or *indirect*. *Direct* impacts result from interactions with facility infrastructure during operations, such as collisions with turbines or buildings or interactions with power lines. *Indirect* impacts can occur during construction, operation, and decommissioning of a facility and can be difficult to predict, especially at locations where they have not been studied. Displacement is the main potential indirect impact from wind energy development on birds and bats; barrier effects are another potential indirect impact. Habitat loss, fragmentation, or alteration are all examples of potential direct or indirect impacts from wind energy development that could occur during construction and/or operations.

This section focuses on impacts that are possible to occur at the Project, particularly collisions with turbines, avian power line interactions, and displacement, which were determined from results of Tier 1 (preliminary site evaluation), 2 (site characterization), and 3 (field studies) studies (USFWS 2012), and WEST's experience with WEF in the Project's region and the U.S. These impacts will be described for all birds, diurnal raptors, and bats along with avian and bat species of concern observed at the Project. These potential impacts may be reduced through avoidance and minimization measures (Section 5).

4.1 Methods

Assessment of potential impacts to avian and bat species at the Project was informed by Tier 1–3 studies conducted for the Project along with the most up-to-date publicly available information on impacts to wildlife from wind energy. Tier 1–3 studies provided information on 1) the likelihood of species of concern occurring at the Project, 2) actual occurrence of species of concern observed across all studies relevant to the Project, and 3) spatial and temporal patterns of species occurrences at the Project. Project-specific information was contextualized by including publicly available information at multiple spatial scales on 1) avian and bat fatality estimates due to turbine collisions, 2) species composition of turbine-related fatalities of avian and bat species of concern, and 3) temporal patterns of avian and bat fatalities. In addition, factors influencing potential avian power line interactions and potential indirect impacts for birds and bats were discussed in the context of the Project.

Analysis of direct impacts to birds and bats resulting from collision with wind turbines for this BBCS relies on WEST's Renew database that contains results of post-construction fatality

monitoring studies for birds and bats from across the U.S. Fatality estimates for birds (all birds, diurnal raptors) and bats were summarized at multiple spatial scales (e.g., state, bird conservation region [BCR], USFWS region, EPA ecoregions, and U.S.) to provide a landscape-scale context. For this Project, landscape scales corresponded to South Dakota, Badlands and Prairies BCR (BCR 17), USFWS Mountain-Prairie region (Region 6 – North and South Dakota, Nebraska, Kansas, Montana, Wyoming, Colorado, Utah), EPA Level I ecoregion (9, Great Plains), and the lower 48 states of the U.S. (Figure 4.1). Fatality studies were screened to provide "comparable" information across WEFs by including annual fatality estimates that 1) were calculated from turbines greater than 0.5 MW; 2) were calculated from the Huso, Shoenfeld, or GenEst estimators; 3) covered adequate sampling time for taxa of interest when most fatalities have been observed (i.e., two seasons for bats, three seasons for birds); and 4) were averaged for each WEF when multiple fatality studies were conducted at a facility.

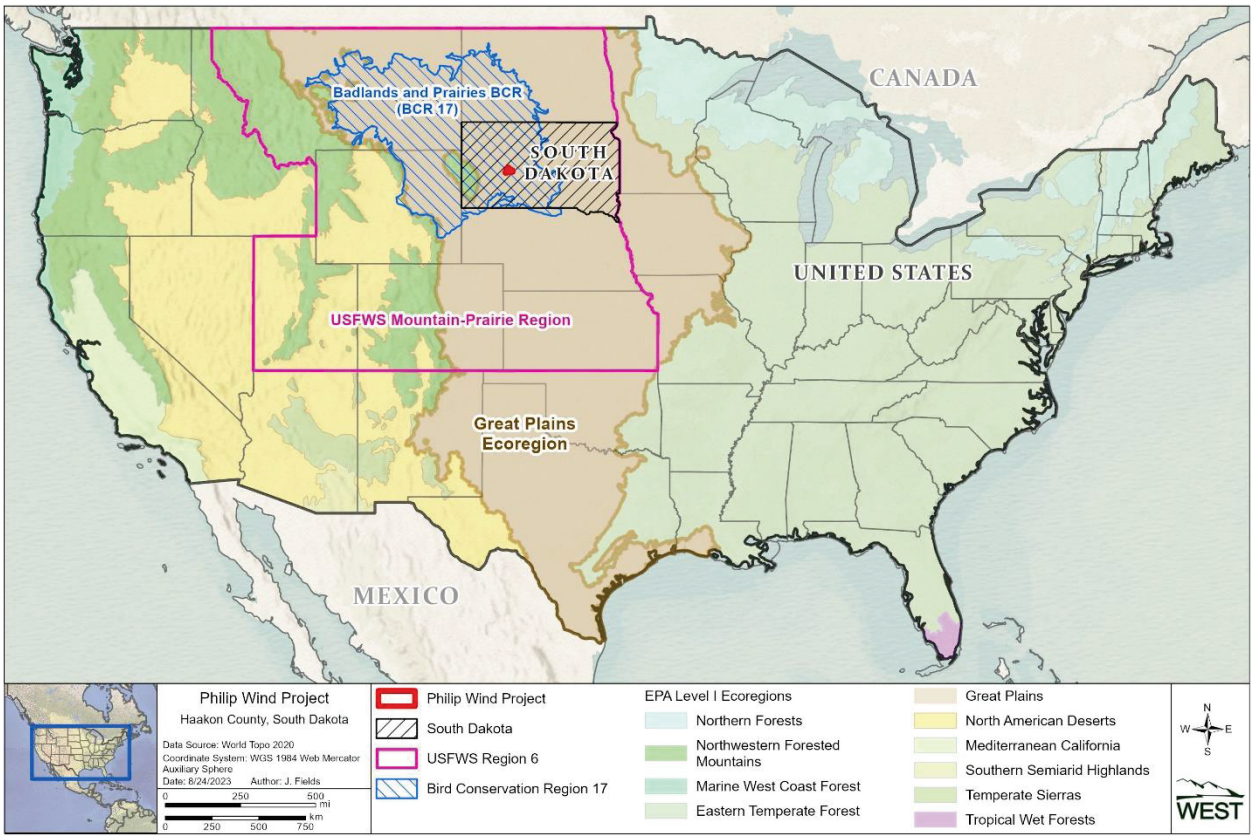

Figure 4.1. Spatial scales (Bird Conservation Region 17, U.S. Fish and Wildlife Service Mountain-Prairie Region, Environmental Protection Agency Level I Ecoregion [Great Plains]) examined for avian and bat impacts relative to the Philip Wind Project in Haakon County, South Dakota.

4.2 Birds

Impacts to birds include both direct (collisions) and indirect (avoidance or displacement). Direct impacts to birds from land based WEFs have been documented in the U.S. since the late 1980s (Orloff and Flannery 1992) and 363 species of birds have been recorded as fatalities at WEFs in

the U.S. (WEST 2023). Given continued concern over bird species' vulnerability to collision fatalities at WEFs (Thaxter et al. 2017, AWWI 2019), understanding the magnitude of these impacts at multiple spatial scales is critical for management of species of concern. Indirect impacts have been measured in terms of avoidance or displacement of different bird species and bird groups (Leddy et al. 1999, Loesch et al. 2013, Shaffer and Buhl 2016, Pearse et al. 2021).

4.2.1 Fatality Estimates

4.2.1.1 All Birds

WEST compiled data from 617 studies across 372 WEF in the U.S. that have reported 363 species of birds as fatalities (WEST 2023). Across all spatial scales examined in this report, fatality estimates ranged from zero to 8.45 fatalities/MW/year; median and mean estimates ranged from 1.04 to 2.96 (median) to 1.04 to 3.19 (mean) across all spatial scales (Table 4.1). Fatality estimates from scales with low sample sizes should be interpreted with caution.

Table 4.1. Summary of fatality estimates for all birds from multiple spatial scales in the U.S.[1]

Spatial Scale	Fatality estimates (birds/megawatt/year)				Facilities[2]	Studies[3]
	Min	Max	Median	Mean		
South Dakota	1.69	1.69	1.69	1.69	1	3
Badlands and Prairies BCR	0.59	1.49	1.04	1.04	2	4
USFWS Mountain-Prairie Region	0.56	5.95	1.49	2.32	9	15
Great Plains	0.08	8.44	2.96	3.19	37	48
U.S.	0	8.45	2.63	2.87	83	125

1. Data on fatality rates from the Renew database (Western EcoSystems Technology, Inc. 2023).
2. Facilities are individual wind projects.
3. Multiple studies may occur at a given facility in different years.

BCR = Bird Conservation Region; USFWS = U.S. Fish and Wildlife Service.

4.2.1.2 Diurnal Raptors

WEST reviewed fatality estimates for raptors at multiple spatial scales, similar to all birds (above). Overall fatality estimates ranged from zero to 0.77 fatalities/MW/year; median and mean estimates ranged from 0.04 to 0.11 (median) to 0.08 to 0.11 (mean) across all spatial scales (Table 4.2). Fatality estimates from scales with low sample sizes should be interpreted with caution.

Table 4.2. Summary of fatality estimates for diurnal raptors from multiple spatial scales in the U.S.[1]

Spatial Scale	Fatality estimates (birds/megawatt/year)				Facilities[2]	Studies[3]
	Min	Max	Median	Mean		
South Dakota	0.10	0.10	0.10	0.10	1	2
Badlands and Prairies BCR	0.04	0.18	0.11	0.11	2	3
USFWS Mountain-Prairie Region	0.04	0.18	0.09	0.10	4	6
Great Plains	0	0.40	0.04	0.08	26	30
U.S.	0	0.77	0.07	0.10	58	76

1. Data on fatality rates from the Renew database (Western EcoSystems Technology, Inc. 2023).
2. Facilities are individual wind projects.
3. Multiple studies may occur at a given facility in different years.

BCR = Bird Conservation Region; USFWS = U.S. Fish and Wildlife Service.

4.2.2 Species Composition

4.2.2.1 All Birds

One hundred forty of the approximately 450 avian species from the USFWS Mountain-prairie region were recorded as fatalities with the top five species including horned lark, (*Eremophila alpestris*) ring-necked pheasant (*Phasianus colchicus*), mallard (*Anas platyrhynchos*), mourning dove (*Zenaida macroura*), and western meadowlark (*Sturnella neglecta*; WEST 2023).

4.2.2.2 Diurnal Raptors

The top five raptor species found as fatalities in the USFWS Mountain-prairie region were golden eagle, red-tailed hawk, American kestrel (*Falco sparverius*), Swainson's hawk (*B. swainsoni*), and ferruginous hawk (WEST 2023). Two of these species (golden eagle, ferruginous hawk) are species of concern that have been observed at the Project (see 4.2.1.2.4).

4.2.2.3 Temporal Patterns of Fatalities

Temporal patterns at multiple spatial scales show peak bird fatalities during spring and/or fall migration seasons, particularly for passerines (Figure 4.2) and are particularly evident at spatial scales with larger sample sizes (i.e., Great Plains, U.S.). Fatality patterns from scales with low sample sizes should be interpreted with caution.

4.2.2.4 Species of Concern

Nineteen avian species of concern were recorded during studies conducted for the Project and of these, seventeen species were recorded as fatalities at WEFs at one of the spatial scales of interest in the U.S. (Table 4.3). Two species of concern (marbled godwit [*Limosa fedoa*], Sprague's pipit [*Anthus spragueii*]) were not recorded as fatalities in the U.S. (Table 4.3). Two raptor species of concern (golden eagle, ferruginous hawk) observed at the Project are in the top five species of raptor fatalities in the USFWS Mountain-Prairie region (WEST 2023). Both species of prairie grouse have been documented at facilities within South Dakota (Table 4.3).

Note the raw fatality counts shown in Table 4.3 do not account for differences in detectability (e.g., large birds are more easily detected than small birds) nor differences in study design (e.g., many post-construction fatality monitoring studies are designed to find eagles). The information in Table 4.3, therefore, should be interpreted with caution. The intent of this table is to determine if species of concern have been recorded as fatalities at multiple spatial scales and to provide a basis for predicting if they may also be expected as fatalities at a project.

Table 4.3. Avian species of concern observed at the Philip Wind Project in Haakon County, South Dakota, and total number of fatalities recorded at multiple spatial scales in the U.S.[1]

Species	Scientific name	Bird Type	South Dakota	BCR 17	USFWS Mt-Prairie Region	Great Plains	US
American white pelican	*Pelecanus erythrorhynchos*	waterbird	0	0	0	33	41

Table 4.3. Avian species of concern observed at the Philip Wind Project in Haakon County, South Dakota, and total number of fatalities recorded at multiple spatial scales in the U.S.[1]

Species	Scientific name	Bird Type	South Dakota	BCR 17	USFWS Mt-Prairie Region	Great Plains	US
bald eagle	*Haliaeetus leucocephalus*	raptor	0	1	12	9	58
black-billed magpie	*Pica hudsonia*	passerine	0	0	0	0	9
bobolink	*Dolichonyx oryzivorus*	passerine	0	0	0	3	21
chestnut-collared longspur	*Calcarius ornatus*	passerine	0	4	7	3	7
Clark's grebe	*Aechmophorus clarkii*	waterbird	0	0	0	0	2
ferruginous hawk	*Buteo regalis*	raptor	0	4	7	15	38
golden eagle	*Aquila chrysaetos*	raptor	0	22	50	22	157
grasshopper sparrow	*Ammodramus savannarum*	passerine	3	1	9	27	32
greater prairie-chicken	*Tympanuchus cupido*	upland game bird	1	1	3	3	3
lark bunting	*Calamospiza melanocorys*	passerine	0	4	5	5	6
lesser yellowlegs	*Tringa flavipes*	shorebird	0	0	0	0	1
marbled godwit	*Limosa fedoa*	shorebird	0	0	0	0	0
merlin	*Falco columbarius*	raptor	0	1	3	3	9
northern harrier	*Circus hudsonius*	raptor	0	3	3	5	28
prairie falcon	*Falco mexicanus*	raptor	0	3	4	2	14
sharp-tailed grouse	*Tympanuchus phasianellus*	upland game bird	3	7	10	11	12
short-eared owl	*Asio flammeus*	raptor	0	6	7	14	32
Sprague's pipit	*Anthus spragueii*	passerine	0	0	0	0	0

[1.] Data represent unadjusted fatality counts and inform the potential species composition of fatalities that may occur at the Project. Data from the Renew database (Western EcoSystems Technology, Inc. 2023).

BCR = Bird Conservation Region; USFWS = U.S. Fish and Wildlife Service.

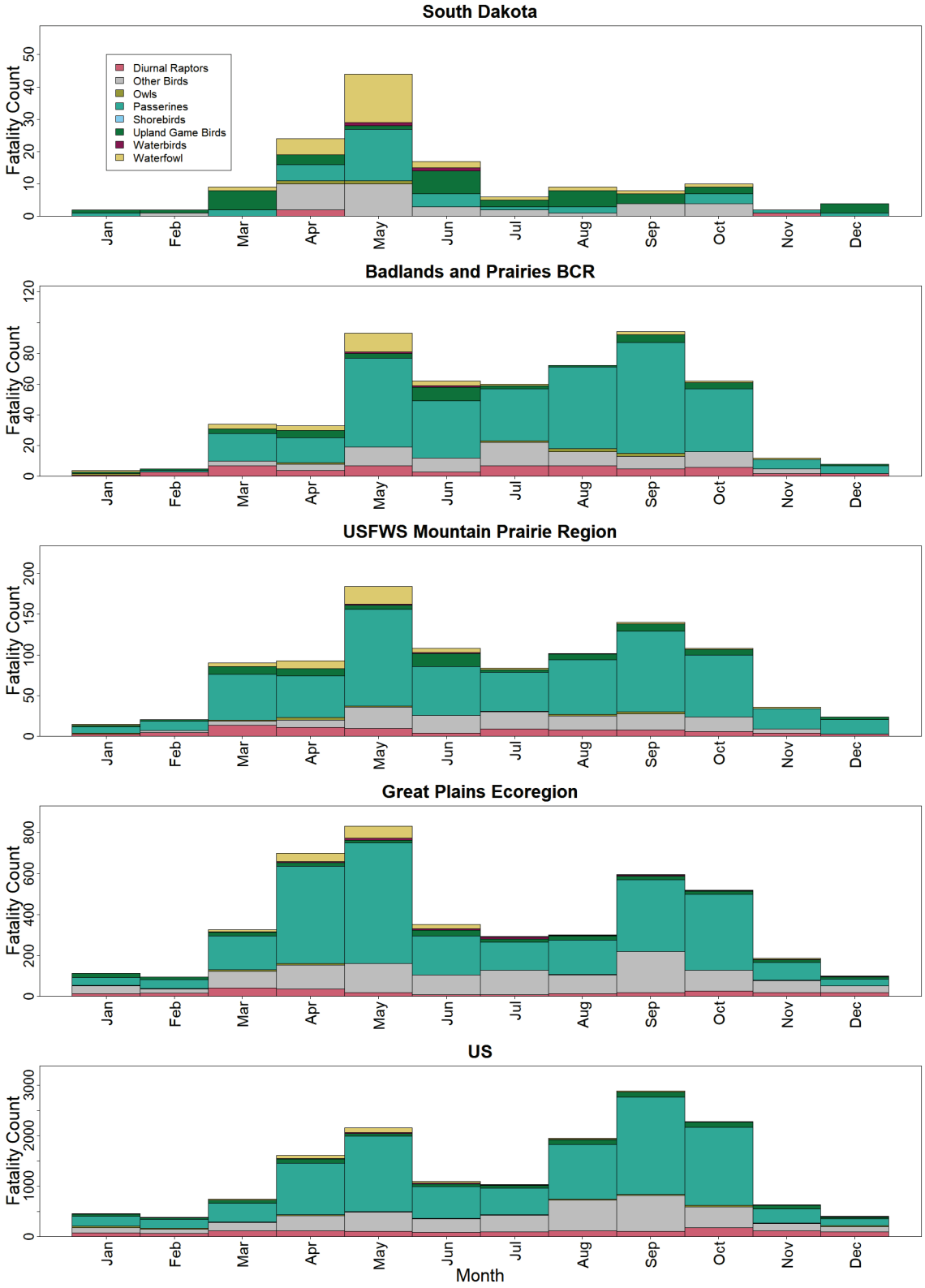

Figure 4.2. Fatalities of bird species types at multiple spatial scales in the U.S. (Western EcoSystems Technology, Inc. 2023).

4.2.3 Direct Impacts: Avian Power Line Interactions

Potential impacts to birds from power line operation include electrocution and collision risks, which depend on line location, voltage, and configurations relative to area habitats and bird presence/use. For the Project, the 34.5 kilovolt (kV) collector lines from the wind turbines to the Project's substation will be buried. Additionally, up to 7.0 mi of transmission line will be designed and constructed for the Project. These above ground lines will meet all Avian Power Line Interaction Committee (APLIC) suggested practices (APLIC 2006 and 2012, respectively).

4.2.4 Indirect Impacts

Construction of the Project will result in habitat impacts that could lead to avoidance or displacement of local avian species. Displacement effects, defined as "the displacement of birds from areas within and surrounding wind farms due to visual intrusion and disturbance that can amount effectively to habitat loss," are a primary indirect impact at WEFs (Drewitt and Langston 2006). Displacement may occur during both construction and operation of a wind project and may be caused by the presence of turbines and/or ongoing site activities such as vehicle and personnel movements or site maintenance.

The scale and degree of displacement effects varies according to site and species-specific factors. The scale of disturbance caused by WEFs varies greatly and is likely to depend on multiple factors including seasonal and daily patterns of use by birds, location to important habitats, availability of alternative habitats, and turbine and wind project specifications (Drewitt and Langston 2006, Lange et al. 2018). Similarly, the degree of behavioral responses will vary among species and individuals and may depend on factors such as life cycle stage (e.g., wintering, molting, breeding), flock size, and degree of habituation. Research indicated that indirect impacts of wind turbines on grassland nesting birds from displacement vary across years, species, sites, and distance from turbines (Erickson et al. 2004, Young et al. 2006, Shaffer and Johnson 2009, Hale et al. 2014, Johnson 2016, Shaffer and Buhl 2016).

AWWI (2017) concluded that indirect impacts on birds from operating wind turbines due to displacement result in some species showing consistent decreases in abundance while other species show no effect. Other bird groups have also indicated potential displacement from habitat in proximity to wind turbines such as waterfowl (Loesch et al. 2013) and synthesized in Marques et al. (2021).

Studies in the Great Plains on the effects of wind energy development on grassland breeding birds found immediate displacement effects (first year) for three species, attraction for two species, and no effect on four species (Shaffer and Buhl 2016). Over time, however, delayed effects (2 to 5 years post-construction) were observed for seven species that showed some displacement up to 300 meters from wind turbines, whereas no effects were observed for two species (killdeer, vesper sparrow; Shaffer and Buhl 2016). Of the seven grassland-breeding birds showing displacement in the Shaffer and Buhl (2016) study, bobolink, chestnut collared longspur, clay-colored sparrow, grasshopper sparrow, upland sandpiper, and western meadowlark were detected at the Project, whereas savannah sparrow was not detected at the Project.

Impacts to grassland breeding birds at the Project have been minimized through Project siting, including the avoidance of unbroken grasslands for turbine placement and reduced fragmentation through the use of existing right of ways for access roads and collection lines, to the extent practicable. Using data from two years of lek survey data, turbines have been sited to avoid known lek locations to the extent practicable. Additional measures have been implemented to avoid turbine placement within Tiers 1 and 2 of SDGFP Modelled Priority Habitat Areas for both sharp-tailed grouse and greater prairie-chicken per SDGFP prairie grouse recommendations (SDGFP 2022).

4.2.5 Summary

Multi-scale summaries of bird fatality information from South Dakota, Badlands and Prairies BCR, USFWS Mountain–Prairie region, Great Plains, and the U.S. provide insight into the number, species composition, and timing of fatalities that could be expected at the Project. Attempts were made to standardize comparisons in this report (see Section 4.1) but many factors including study design, study implementation, data analysis, and availability of public information all influence the quality of these summaries. Information from Tier 1–3 studies conducted at the Project also provide information on factors that may influence the likelihood of avian fatalities at the Project including species composition and spatial and temporal movement patterns (Watson et al. 2018, AWWI 2019), which can be applied to project planning to minimize fatalities.

Taking into account information from Tier 1–3 studies and publicly available information on bird fatalities at WEFs, the range of bird fatality estimates observed in the USFWS Mountain–Prairie region and Great Plains may be expected to encompass the impacts anticipated at the Project. Similarly, the species composition observed in the USFWS Mountain–Prairie region may resemble that anticipated at the Project, including 12 avian species of concern known as fatalities from the Mountain-Prairie region. Lastly, the timing of fatalities for birds in the USFWS Mountain–Prairie region may be expected to encompass the timing of fatalities at the Project. Indirect impacts may influence avian species at varying degrees based on the synthesis of previous research (Marques et al. 2021), although grassland breeding birds such as bobolink, chestnut collared longspur, clay-colored sparrow, grasshopper sparrow, upland sandpiper, and western meadowlark may show displacement to turbines based on research in the Great Plains (Schaffer and Buhl 2016). In all these predictions, however, there is some uncertainty because of the limited number of studies and facilities with publicly available data in South Dakota.

Impacts to birds at the Project have been minimized through Project siting, including the avoidance of unbroken grasslands for turbine placement and minimization of grassland fragmentation by use of existing right of ways for access roads and collection lines. Additional measures have been implemented to avoid known leks to the extent practicable and to avoid high quality habitat for prairie grouse species. Philip Wind is committed to avoiding and/or minimizing impacts to birds through Project design, construction, and operation by implementing Conservation Measures found in Section 5.

4.3 Bats

Impacts to bats from the construction and operation of the Project could include both direct and indirect impacts. Potential direct impacts to bats (i.e., all bats, bat species of concern) are described below.

4.3.1 Direct Impacts

4.3.1.1 Fatality Estimates

Twenty-eight species of bats were recorded as fatalities at WEFs in the U.S. (WEST 2023). Across all spatial scales examined in this report, fatality estimates for all bats ranged from zero to 40.20 fatalities/MW/year, while median and mean estimates ranged from 0.94 to 8.73 (median) to 0.94 to 9.83 (mean) across all spatial scales (Table 4.4). Fatality estimates from scales with low sample sizes should be interpreted with caution.

Table 4.4. Summary of fatality estimates for all bats from multiple spatial scales in the U.S.[1]

Spatial Scale	Fatality estimates (bats/megawatt/year)				Facilities[2]	Studies[3]
	Min	Max	Median	Mean		
South Dakota	0.93	0.94	0.94	0.94	2	5
USFWS Mountain-Prairie Region	0.42	12.72	1.53	2.91	12	19
Great Plains	0.11	36.42	8.73	9.83	56	70
U.S.	0	40.20	3.66	7.18	132	196

1. Data on fatality rates from the Renew database (Western EcoSystems Technology, Inc. 2023).
2. Facilities are individual wind projects.
3. Multiple studies may occur at a given facility in different years.

USFWS = U.S. Fish and Wildlife Service.

4.3.1.2 Species Composition

Eight of 26 species of bats in the USFWS Mountain–Prairie Region have been recorded as fatalities at WEFs with the top five species including hoary bat (54%), silver-haired bat (17%), eastern red bat (14%), Mexican free-tailed bat (*Tadarida brasiliensis*; 7%), and little brown bat (3%; WEST 2023). Four species of concern are known to occur at the Project including: eastern red bat, hoary bat, little brown bat, and silver-haired bat (Table 4.5).

4.3.1.3 Temporal Patterns of Fatalities

Temporal patterns at multiple spatial scales show peak bat fatalities for migratory tree bats (i.e., hoary bat, silver-haired bat, eastern red bat) and all bats during late summer and fall migration seasons (Figure 4.3). This pattern is consistent with other studies that found the majority of bat fatalities occur during the fall migration season (July through October) and most fatalities occur on nights with relatively low wind speeds (e.g., less than 6.0 m per second; Arnett et al. 2008, 2013; Arnett and Baerwald 2013; WEST 2023).

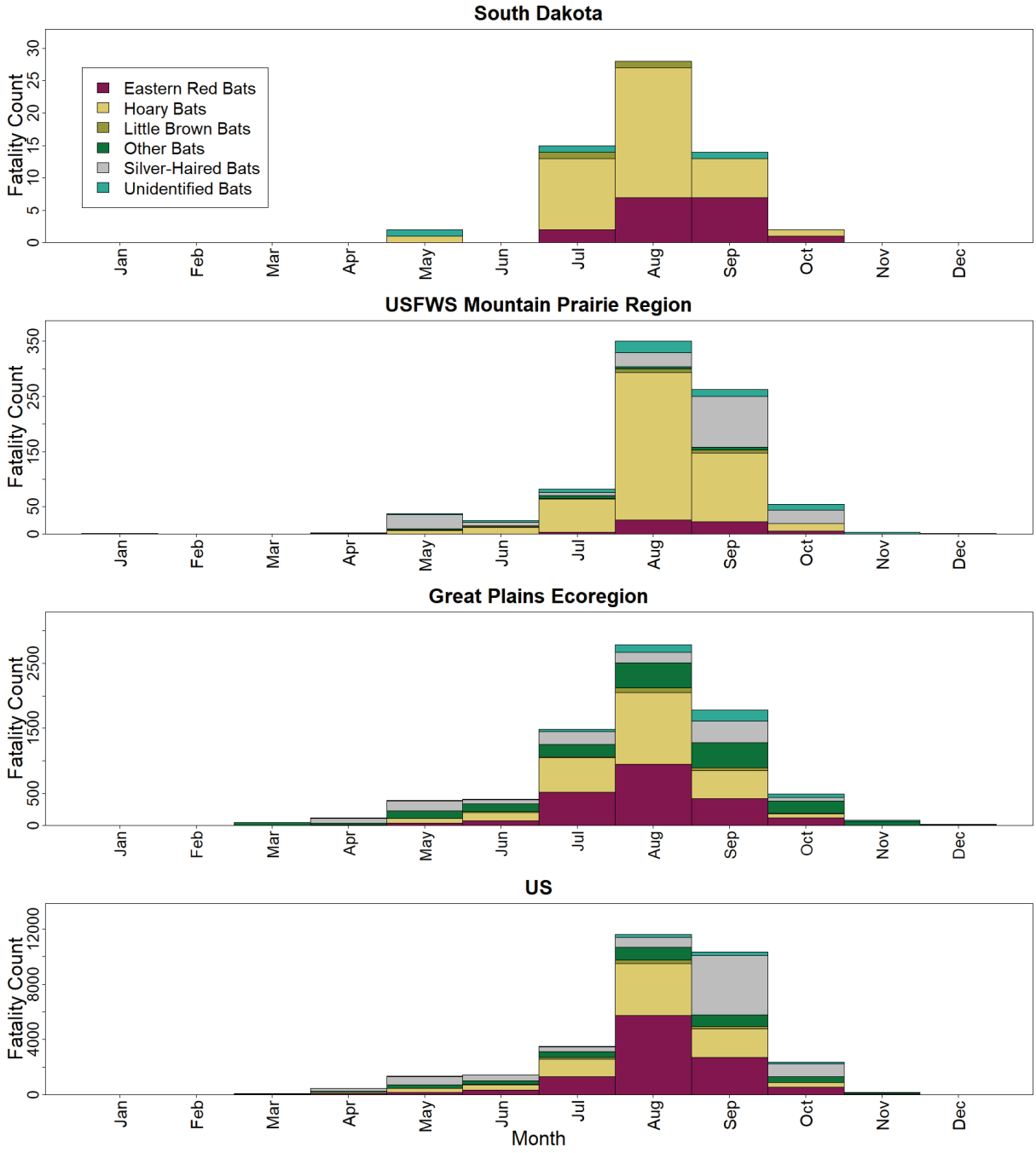

Figure 4.3. Bat fatality counts from multiple spatial scales in the U.S.

4.3.1.4 Species of Concern

Eight bat species of concern have the potential to occur at the Project and six of these species were recorded as fatalities at WEFs at one of the spatial scales of interest in the U.S. (Table 4.5). Four bat species of concern are known to occur at the Project and were recorded as fatalities at WEFs at one of the spatial scales of interest in the U.S. (Table 4.5).

Table 4.5. Bat species of concern that occur or potentially occur at the Philip Wind Project in Haakon County, South Dakota, and total number of fatalities recorded at multiple spatial scales in the U.S.

Species	Scientific name	South Dakota	USFWS Mt-Prairie Region	Great Plains	US
eastern red bat[1]	*Lasiurus borealis*	20	167	2,561	14,906
fringe-tailed myotis	*Myotis thysanodes pahasapensis*	0	0	0	0
hoary bat[1]	*Lasiurus cinereus*	43	616	2,773	11,560
little brown myotis[1]	*Myotis lucifugus*	4	33	292	1,238
northern long-eared bat	*Myotis septentrionalis*	0	0	2	36
silver-haired bat[1]	*Lasionycteris noctivagans*	0	201	1,185	9,613
tricolored bat	*Perimyotis subflavus*	0	3	53	752
Townsend's big-eared bat	*Corynorhinus townsendii*	0	0	0	0

[1] Bat species detected at the Philip Wind Project (Tetra Tech 2019a).

4.3.2 Indirect Impacts

Understanding how wind energy development could affect bats through indirect effects such as disturbance or displacement is limited by the lack of knowledge on this topic (Kunz et al. 2007; AWWI 2018). Based on a northern long-eared bat habitat assessment, there was limited northern long-eared bat roosting habitat within the Project Area. These identified areas were avoided by at least 0.5 mi from turbines, minimizing potential impacts. Additionally, minimal tree clearing is expected; however, any tree clearing conducted would occur outside of the bat active season (April 15 – October 31) as described in Section 5 thus minimizing disturbance to all tree roosting bat species. It is not anticipated that operation of the Project would permanently displace bats based on pre- and post-construction studies of bat activity conducted at WEFs that show increased activity following construction (Solick et al. 2020). Furthermore, some studies documented increased activity following construction due to attraction to turbines (Cryan et al. 2014, Richardson et al. 2021).

4.3.3 Summary

Summaries of bat fatalities that occurred in South Dakota, the USFWS Mountain-Prairie region, Great Plains, and the U.S. provide insight into the number, species composition, and timing of fatalities that may be expected at the Project. Information from Tier 1–3 studies also provide information on factors that may influence the likelihood of fatalities at the Project.

Acoustic monitoring studies were conducted in 2018 at the Project from April 11 through November 7 and identified seven bat species in the vicinity of the Project, four of which are species of concern including, eastern red bat, hoary bat, little brown bat, and silver-haired bat. Hoary bat was the most frequently recorded species of concern. No federally protected bats species were identified. SDGFP does not have any state-protected bat species (SDGFP 2024). Bat activity was lowest during spring and highest in summer and fall. Although acoustic monitoring provides valuable information on the species composition and timing of activity, it does not provide the ability to predict the level of bat fatalities at WEFs (Hein et al. 2013, Solick et al. 2020).

Taking into account information from Tier 1–3 studies and publicly available information on bat fatalities at WEFs, the range of bat fatality estimates observed in the USFWS Mountain–Prairie

region and Great Plains ecoregion may be expected to encompass the impacts anticipated at the Project. Similarly, the species composition observed in the USFWS Mountain–Prairie region may resemble that anticipated at the Project and hoary bat, silver-haired bat, and eastern red bat are expected to comprise the majority of fatalities. Lastly, the timing of fatalities for migratory tree bats in the USFWS Mountain–Prairie region may be expected to encompass the timing of fatalities at the Project. In all these predictions, however, there is some uncertainty because of the limited number of studies and facilities with publicly available data in South Dakota.

Impacts to bats at the Project have been minimized through Project design, construction and operations. Project design has included avoidance of NLEB summer habitat by 0.5 mi exceeding current USFWS draft guidance (USFWS 2024c) and no known hibernacula within the Project. Project construction included no tree removal within NLEB summer habitat and minimal tree removal outside of NLEB summer habitat, and Project operations includes various curtailment strategies throughout the bat active season (April 15 to October 31). These conservation measures benefit all bat species with a focus on tree roosting bats.

5 AVOIDANCE AND MINIMIZATION MEASURES

Information gathered during Tier 1, 2, and 3 studies will be used during the Project design and turbine and infrastructure siting process to reduce potential impacts to birds and bats and their habitats. As part of the NEPA process and Section 7 Consultation with USFWS for approval of the WAPA interconnection, the Project will implement the applicable best management practices (BMPs) and mitigation measures specified in the Upper Great Plains (UGP) Programmatic Environmental Impact Statement (PEIS) developed jointly by WAPA and USFWS (WAPA and USFWS 2015). This PEIS included species-specific avoidance and minimization measures provided in CEF that were completed by Philip Wind. Philip Wind is committed to avoiding and/or minimizing impacts to birds and bats through Project design, construction, and operation by implementing the following Conservation Measures.

5.1 Conservation Measures Implemented During Site Selection and Project Design

Philip Wind will make efforts during initial site selection and during Project design to locate and select wind turbines, met towers, and other infrastructure such that bird and bat collisions are minimized. Project design and siting measures to avoid or minimize risk to avian and bat species will include the following:

- To the extent commercially reasonable, maximize power generation per turbine to reduce the number of turbines needed to achieve maximum energy production.
- Locate transmission lines in areas where Philip Wind has site control and to the extent possible in areas where previous disturbance has occurred, thereby minimizing impacts to trees and associated birds and bats.

- Where applicable, the Project's aboveground power lines shall be designed and constructed to minimize avian electrocution and collision risks, referencing guidelines outlined in the APLIC *Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006* and *Reducing Avian Collisions with Power Lines: The State of the Art in 2012*.
- To the extent commercially reasonable, use un-guyed met towers for permanent monitoring. Schedule the installation of met towers and other characterization activities (i.e., field surveys and to avoid disruption of bird and bat reproductive activities or other important behaviors (e.g., do not install towers during periods of prairie-grouse nesting).
- Use the existing road network where feasible and reasonable to reduce the need for new road construction.
- Avoid siting project components in wetlands and waterbodies.
- Avoid siting turbines within 1,000 ft of wetlands with TWI score of 4-11 and within 0.5 mile of wetlands scores with a TWI score of 12-14.
- Minimize disturbance to broken grasslands.
- Avoid siting turbines on native (unbroken) sod grasslands.
- Avoid all SDGFP modelled Tier 1 and Tier 2 sharp-tailed grouse and greater prairie-chicken habitat for siting turbines.
- Avoid siting turbines on unbroken grasslands within one mile of known active sharp-tailed grouse and greater prairie-chicken leks.
- Avoid siting turbines within 0.5 mile of NLEB summer roosting and foraging habitats.
- Avoid siting turbines within 500 m of known active prairie dog colonies.
- Site turbines and other above-ground wind facility infrastructure away from prairie grouse leks to the extent feasible.
- Avoid siting turbine within two miles of currently known bald eagle nests.
- Follow USFWS Region 6 raptor nest (non-eagle) setback buffers from pre-construction data as follows: 800 m for red-tailed hawk and 400 m for great horned owl.
- Turn off unnecessary lighting at night to limit the attraction of migratory birds. Follow lighting guidelines, where applicable, from the WEG. This includes using lights with timed shutoff, downward-directed lighting to minimize horizontal or skyward illumination, and avoidance of steady-burning, high-intensity lights. Extinguish all internal turbine nacelle and tower lighting when unoccupied.
- Light the wind turbines and met towers in accordance with the Federal Aviation Administration requirements.
- Prepare a BBCS in accordance with the WEG that will be implemented to minimize impacts to avian and bat species during construction and operation of the Project.

5.2 Conservation Measures to be Implemented during Construction

Construction of the Project is expected to begin in 2025. The following Conservation Measures will be implemented to avoid or minimize risk to avian and bat species during construction:

- Minimize tree clearing as much as feasible to minimize potential impacts to bat roosting habitat. The Project has been sited to avoid tree clearing to the extent feasible and reasonable.
- Clear trees outside of the bat active season from November 1 – April 14 (USFWS 2024c)
- Establish wind turbine buffer zones around occupied raptor nests and occupied bat roosts.
- Conduct construction monitoring and contingencies during whooping crane migration seasons and stop construction activities within 2 mi of observed whooping cranes until the crane leaves following the whooping crane monitoring and contingency plan.
- Construction activities within 0.5-mile of known active leks in unbroken grasslands during displaying and nesting season (March 15 – May 15) will be avoided from 3 hours after sunrise to 1 hour before sunset.
- Install avian flight diverters on any new or upgraded overhead collector, distribution, and transmission lines within 1-mi (1.6-km) of suitable stopover habitat to minimize potential collision impacts to whooping cranes and other avian species. Devices will be installed on the overhead top statis wire (as appropriate) to increase wire visibility (APLIC 2012).
- To the extent feasible, the area required for Project construction and operation will be minimized. Philip Wind will restore all areas of temporary disturbance to their previous condition, including the use of applicable seed mixes.
- Following Project construction, roads not needed for site operations will be restored to preexisting conditions.
- Limit vehicle speeds to 25 mi per hour (mph) to avoid wildlife collisions and construction vehicles will be restricted to pre-designated access routes.
- Cover all trash in containers, and work sites will be cleared regularly of any garbage and debris related to food.
- Pets shall not be allowed in the Project Area near Project facilities.

5.3 Conservation Measures to be Implemented during Operations

- Vehicle speeds will be limited to 25 mph to avoid wildlife collisions.
- Fire hazards from vehicles and human activities will be reduced (e.g., use of spark arrestors on power equipment, avoiding driving vehicles off roads, allowing smoking in designated areas only).
- Pest and weed control measures will be implemented as specified by county, state, and federal requirements.
- Turbines will be feathered below the manufacturer's cut-in speed during the bat active season (April 14-October 31) when temperatures are >40 °F.
- Curtailment of turbines from 30 minutes before sunset to 30 minutes after sunrise from August 16-October 31 will increase to 5.0 m/s.

- A mitigation offset for potentially impacted whooping crane stopover habitat (5 ac) will be implemented by a third party in accordance with direction from the WAPA and USFWS prior to an interconnect.
- Conduct operational monitoring during whooping crane migration seasons following Project's monitoring and contingency plan; operations staff will be trained to identify whooping cranes, and if any are noted in the Project Area, turbines will be shut down within 2 mi of the crane until it leaves.
- All of Philip Wind's employees and contractors working on site will receive worker awareness training for identifying and responding to encounters with sensitive biological resources, including avian and bat species. The training will:
    - Be conducted by Philip Wind or their designee.
    - Instruct employees, contractors, and site visitors to avoid harassment and disturbance of birds and bats, especially during reproductive (e.g., courtship and nesting) seasons.
    - Provide information to contractors and employees on the Project detailing information on potential state and federal special-status animal and plant species that might be discovered on the Project site.
    - Include an overview of the distribution, general behavior, and ecology of golden and bald eagles. Employees will be informed that they are not authorized to approach, handle, or otherwise move any eagles that might be encountered during construction or operation, whether alive, injured, or deceased. Operations personnel will be instructed to report any finding of an injured or deceased eagle to the Philip Wind environmental lead within 24 hours of observation, which will then be reported within two business days to USFWS.

6 TIER 4 – POST-CONSTRUCTION AVIAN AND BAT MONITORING

6.1 Monitoring Goals

The goals of post-construction monitoring are to estimate bird and bat fatality rates for the Project, evaluate the circumstances under which fatalities occur, and provide a survey protocol for detecting large-bird (i.e., large raptor, vulture, eagle) carcasses that may occur over the life of the Project. Post-construction monitoring results could also provide the triggers for adaptive management, described in Section 7. In accordance with the WEG and the EA (SWCA 2023), the Project will analyze bird and bat carcass monitoring data to accomplish the following:

- Estimate bird and bat fatality rates for the Project
- Estimate fatality rates for species of concern
- Evaluate bird and bat carcasses within the Project in relation to site characteristics
- Compare estimated fatality rates at the Project to fatality rates at existing Projects in similar landscapes with similar species composition and use

- Determine the composition of carcasses in relation to migrating and resident birds and bats at the site
- The Project would conduct one year of post-construction monitoring following the first year of commercial operation and would subsequently conduct post-construction monitoring during the bat active season every seven years.
- The Project would report any found NLEB carcass within 24 hours of discovery and would submit annual reports by January 31st following finalized NLEB wind avoidance guidance (USFWS 2024c)
- Assess whether carcass data suggests the need for measures to reduce impacts

Details of the proposed post-construction monitoring will be developed and the BBCS will be updated prior to operations at the Project.

6.2 Incidental Monitoring

An incidental reporting process will be developed for operations personnel to ensure they can document bird or bat carcasses during routine maintenance work and at other times they are within the Project. Philip Wind will provide operations personnel with training describing the incidental reporting process and reporting resources.

6.3 Permits and Bird and Bat Handling Procedures

6.3.1 Permits

Philip Wind may elect to obtain federal and state collection permits. In general, carcasses will be left in place and not handled. If a permit is obtained, carcasses will be handled in accordance with the permit.

6.3.2 Bird and Bat Handling Procedures

All bird and bat carcasses found will be left in place (i.e., not handled), documented, and buried in place, or handled in accordance with federal and state permits, if applicable. If a carcass of a federal- or state-listed species or eagle is found, Philip Wind or their designee will cover the carcass with a container or other appropriate method and contact the Philip Wind environmental lead within 24 hours of observation, which will then be reported within two business days to appropriate authorities. If an injured bird or bat is found, Philip Wind may contact a wildlife rehabilitator, if appropriate.

7 ADAPTIVE MANAGEMENT

In 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 goals of the adaptive management approach are to enable the incorporation of results from the post-construction fatality monitoring, operations and management incidental reporting, industry

research, and new regulatory developments into the Project's bird and bat avoidance and minimization strategy. If the avoidance and minimization measures are not producing the desired results, adjustments will be made, as necessary, to reduce impacts to birds and bats. Philip Wind will report and coordinate with the USFWS and SDGFP as necessary and appropriate to address any unanticipated issues. If appropriate, Philip Wind will conduct additional specific, targeted monitoring to determine if adaptive management measures are necessary and/or effective.

Project siting, influenced by adaptively responding to pre-construction survey results and following bird and bat agency guidance and recommendations to the extent feasible, has attempted to avoid or minimize impacts to birds and bats within the surveyed Project Area (Sections 2.0 and 3.0). Based on these avoidance and minimization measures (Section 5.) and conditions described in the draft EA (SWCA 2023), no significant adverse impacts are anticipated at this time from the Project and avian and bat fatalities are expected to fall within the range of other similar projects in similar regions (Section 4.0). However, situations for considering an adaptive management response may include fatality of an eagle or a species listed as state or federally endangered/threatened. In this situation, an assessment of why this occurred will be conducted to aid in developing an appropriate response.

7.1 Adaptive Management Goals

The goals of the adaptive management plan are to enable the incorporation of results from the post-construction monitoring, O&M incidental reporting, industry research, and new regulatory developments into the Project's bird and bat avoidance and minimization strategy. Certain trigger events and potential subsequent changes to the avoidance and minimization strategy have been defined as a part of the adaptive management plan to guide the adaptive management process. If the avoidance and minimization measures are not producing the desired results, adjustments will be made, as necessary, to reduce impacts to birds and bats.

7.2 Adaptive Management Triggers and Response

Adaptive management measures for the Project will be triggered by the following events, which are further defined below:

- Mass casualty event (ten or more carcasses documented at a single turbine in a five-day period)
- Discovery of the carcass of a federally listed species or eagle
- Discovery of a new and/or active eagle nest

Philip Wind understands that unanticipated events beyond these adaptive management triggers may arise, and Philip Wind will report and coordinate with the USFWS and SDGFP as necessary and appropriate to address any unanticipated issues. If appropriate, Philip Wind will conduct additional specific, targeted monitoring to determine if adaptive management measures are necessary and/or effective.

7.2.1 Mass Casualty Event

If a mass casualty event is documented, Philip Wind will meet and confer with the USFWS and SDGFP as appropriate. If a particular cause can be identified, Philip Wind will develop specific mitigation measures in coordination with appropriate agencies to address the occurrence. Examples of potential adaptive management responses may include:

- Remove/modify the source of bird attraction
- Implement turbine operational protocols designed to reduce bat carcasses and target the particular issue identified during monitoring
- Implement technological solutions if new techniques or technology become available that are cost-effective and feasible to implement

7.2.2 Discovery of a Federally or State Listed Species' Carcass or Eagle Carcass

If a federally or state-listed species' carcass or eagle carcass is found at the Project, Philip Wind will take the following actions:

- Identify and secure the carcass at the place of its discovery in the field until USFWS or SDGFP can be reached and provide further instruction for carcass storage or pickup
- Notify the USFWS or SDGFP within two business days of the discovery and positive species identification confirmation of any federally or state listed species, respectively
- Notify the SDGFP in accordance with any state collection permits obtained
- Work with the USFWS to evaluate available data related to the carcass discovery and, as appropriate, identify and implement avoidance or minimization measures to avoid the risk of future fatalities; such measures may include adjusting the operational protocol at specific turbines during specific weather conditions or seasonal periods, followed by carcass monitoring to assess whether the avoidance or minimization measures are effective
- Assess the need to obtain take authorization under the ESA or BGEPA considering the new information

7.2.3 Discovery of a New and/or Active Eagle Nest

Philip Wind will notify the USFWS if a new and/or active bald eagle nest is identified within 800 m (2,625ft) of an operating turbine. If appropriate, Philip Wind may elect to monitor eagle activity in and around the eagle nest. Additionally, after the nesting season, Philip Wind will consider seeking a permit to remove the eagle nest in coordination with the USFWS and SDGFP.

8 KEY RESOURCES

Resource	Phone Number
U.S. Fish and Wildlife Service, Region 6 Migratory Bird Office, Denver, Colorado	303-236-8171
U.S. Fish and Wildlife Service, Ecological Services	605-224-8693
South Dakota Game, Fish, and Parks Pierre, South Dakota	605-223-7660
Operations and Maintenance Philip Wind Partners, LLC	TBD

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16 United States Code (USC) §§ 703-712. 1918. Title 16 - Conservation; Chapter 7- Protection of Migratory Game and Insectivorous Birds; Subchapter II - Migratory Bird Treaty; Sections (§§) 703-712. 16 USC 703-712. [July 3, 1918, Chapter (Ch.) 128, §2, 40 Statute (Stat.). 755; June 20, 1936, Ch. 634, §3, 49 Stat. 1556; Public Law (PL) 93-300, §1, June 1, 1974, 88 Stat. 190; PL 101-233, §15, December 13, 1989, 103 Stat. 1977; PL 108-447, Division E, Title I, §143(b), December 8, 2004, 118 Stat. 3071.]. Available online: https://www.gpo.gov/fdsys/pkg/USCODE-2010-title16/pdf/USCODE-2010-title16-chap7-subchapII.pdf

16 United States Code (USC) § 1531. 1973. Title 16 - Conservation; Chapter 35 - Endangered Species; Section (§) 1531 - Congressional Findings and Declaration of Purposes and Policy. 16 USC 1531. December 28, 1973. [Public Law (PL) 93-205, Section (§) 2, December 28, 1973, 87 Statute [Stat.] 884; PL 96-159, § 1, December 28, 1979, 93 Stat. 1225; PL 97-304, § 9(a), October 13, 1982, 96 Stat. 1426; PL 100-478, Title I, § 1013(a), October 7, 1988, 102 Stat. 2315.]. Available online: https://www.gpo.gov/fdsys/pkg/USCODE-2011-title16/pdf/USCODE-2011-title16-chap35-sec1531.pdf

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50 Code of Federal Regulations (CFR) § 10.12. 1973. Title 50 - Wildlife and Fisheries; Chapter I -United States Fish and Wildlife Service, Department of the Interior; Subchapter B Taking, Possession, Transportation, Sale, Purchase, Barter, Exportation, and Importation of Wildlife and Plants; Part 10 - General Provisions; Subpart B - Definitions; Section (§) 10.12. Definitions. 50 CFR 10.12. [38 Federal Register (FR) 22015, August 15, 1973, as amended at 42 FR 32377, June 24, 1977; 42 FR 59358, November 16, 1977; 45 FR 56673, August 25, 1980; 50 FR 52889, December 26, 1985; 72 FR 48445, August 23, 2007.].

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