

Bird and Bat Conservation Strategy

Tenaska Clear Creek Energy Center
Nodaway County, Missouri

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Sign-off Sheet

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Abbreviations

ac	acres
APLIC	Avian Power Line Interaction Committee
Audubon	National Audubon Society
BBCS	Bird and Bat Conservation Strategy
BBS	Breeding Bird Survey
BGEPA	Bald and Golden Eagle Protection Act
BMP	Best Management Practice
BiM	Birds in Missouri
BP/DN	bat pass per detector night
CBC	Christmas Bird Count
Clear Creek	Tenaska Clear Creek Wind, LLC
COA	Conservation Opportunity Areas
Cornell	Cornell Lab of Ornithology
ECP	Eagle Conservation Plan
ECPG	Eagle Conservation Plan Guidance, Module 1 – Land-based Wind Energy, Version 2
ERA	Eagle Risk Assessment
ESA	Endangered Species Act
ETP	Eagle Incidental Take Permit
FR	Federal Register
ft	feet
GIS	Geographic Information System
HFSG	High Frequency Species Group
IBA	Important Bird Area

IBAT	Indiana Bat
IDNR	Iowa Department of Natural Resources
kHz	kilohertz
LAP	Local Area Population
LFSG	Low Frequency Species Group
MBTA	Migratory Bird Treaty Act
MDC	Missouri Department of Conservation
mi^2	square mile
MW	megawatts
MET	meteorological evaluation tower
NLEB	Northern Long-Eared Bat
NLCD	National Land Cover Dataset
NWR	National Wildlife Refuge
O&M	Operations and Maintenance
Project	Tenaska Clear Creek Energy Center
SCS	Site Characterization Study
SCC	Missouri Species of Conservation Concern
Stantec	Stantec Consulting Services Inc.
SWAP	State Wildlife Action Plan
T/E	threatened or endangered
USACE	United States Army Corp of Engineers
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WOUS	Waters of the United States
WEG	USFWS Land-Based Wind Energy Guidelines

1.0 INTRODUCTION

Tenaska Clear Creek Energy Center (Project), which is owned and under development by Tenaska Clear Creek Wind, LLC (Clear Creek) is located in Nodaway County, Missouri. Pre-construction biological surveys were conducted at the Project as part of Clear Creek's environmental due diligence. These surveys were conducted as part of an effort to identify potential impacts on birds, bats, and other sensitive species and their habitats from the construction and operation of the proposed Project. Stantec Consulting Services Inc. (Stantec) has developed this Bird and Bat Conservation Strategy (BBCS) for Clear Creek by collecting and reviewing data from publicly available literature as well as conducting site-specific desktop analyses and field studies to assess potential risk to bird and bat resources from development and operation of the Project.

1.1 PURPOSE

This BBCS was prepared to address the general concern from natural resource agencies, environmental interest groups, the public, and Clear Creek about the potential risks to birds, bats, and sensitive species from the construction and operation of the Project. Stantec has prepared this BBCS to address the following objectives:

1. Compile data collected at the Project through pre-construction survey efforts and through additional literature review to identify bird, bat, and other sensitive species or their habitats known to occur or that are likely to occur in and around the Project. Of particular interest were federally- or state-listed threatened or endangered species (T/E) and Missouri Species of Conservation Concern (SCC) bird and bat species.
2. Determine whether the Project contained suitable habitat for T/E or SCC bird or bat species based on the literature review, a review of species habitat preferences and ranges, and field studies, if applicable.
3. Evaluate the potential impacts on birds, bats, and other sensitive species or their habitats from the construction and operation of the Project.
4. Avoid and minimize bird and bat fatalities and secondary effects on wildlife at the Project.
5. Comply with federal and state wildlife regulations (e.g., Migratory Bird Treaty Act [MBTA]).
6. Effectively document any bird or bat injuries or fatalities that occur as a result of Project operations to provide a basis for ongoing development of avian and bat protection measures.
7. Implement adequate training for all Project personnel and subcontractors.
8. Plan for and commit to effective and routine coordination between Clear Creek and the United States Fish and Wildlife Service (USFWS) and the Missouri Department of Conservation (MDC).

9. Demonstrate Clear Creek's commitment to implement best management practices to avoid and minimize impacts on birds, bats, other sensitive wildlife, and their habitats to the extent practicable.

The findings in this assessment are based on information obtained from publicly available data sources, Geographic Information System (GIS) desktop analyses, site-specific field surveys, and by comparing potential habitats and geography to bird and bat distributions and life-history characteristics. Stantec used this information to identify potential risk to birds and bats from wind energy development. Risk, in the context of this BBCS, is the likelihood that adverse impacts (direct or indirect) will occur to birds, bats, and other species of concern, or their habitats, as a result of the construction and operation of the Project. The degree to which those adverse impacts will be detrimental to the species or habitat is discussed in this BBCS on a species-by-species basis, and avoidance and minimization measures that have been, or will be, implemented by Clear Creek are included in Section 7.0. Because there are relatively few methods available for direct estimation of risk, a weight-of-evidence (qualitative) approach (Anderson et al. 1999) was used for this risk assessment.

This BBCS will be in effect throughout the life of the Project as a working document. The document may need to be updated in the future based on the completion of on-going studies at the time of this writing as well as results of any post-construction studies conducted at the Project, as laws (or interpretations of laws) change, as species are removed from or added to certain regulatory lists, as ongoing monitoring reveals new sensitive wildlife resources at the Project, or as research identifies additional effective methods for protecting birds, bats, and other wildlife from operations of wind turbines.

1.1.1 Applicable State and Federal Wildlife Laws and Regulations

The primary objective of this BBCS is to evaluate potential risks to federally- or state-protected bird and bat species, as well as other sensitive species and habitats in the Project area. The following laws and regulations are applicable to the Project with regards to birds, bats, sensitive species, and habitats:

- Migratory Bird Treaty Act (16 United States Code [U.S.C.] §703 et seq.) as amended
- Bald and Golden Eagle Protection Act (BGEPA; 16 U.S.C. §668-668d) as amended
- Endangered Species Act (ESA; 16 U.S.C. §1531 et seq.)
- Missouri Code of State Regulation (3 Code of State Regulation [CSR] 10-4.111)
- Section 404 of the Clean Water Act (CWA; 33 U.S.C. 1344)
- Section 401 of the Clean Water Act (CWA; 33 U.S.C. 1341)
- Missouri Noxious Weed Law (Missouri Law 263.190)

Birds, bats, sensitive species, and/or habitats affected by these regulations were assessed for this BBCS in context of the Project's construction and operation.

1.1.1.1 Migratory Bird Treaty Act

All native migratory birds and raptors are protected under the MBTA.[1] The MBTA is a joint agreement between the United States, Canada, Mexico, Japan, and Russia to ensure the protection of a shared migratory bird resource. All migratory birds and raptors in North America are protected under the MBTA (16 United States Code [U.S.C.] §703 et seq.). The MBTA prohibits the take, kill, possession, transportation, and importation of migratory birds, their eggs, parts, and nests, except when specifically authorized by the Department of the Interior (16 U.S.C. §703). The word "take" is defined by the MBTA as any act that pursues hunting, wounding, killing, or capturing migratory birds (50 Code of Federal Regulations §10.12). The MBTA excludes non-migratory upland game birds, introduced species such as House Sparrow (*Passer domesticus*), Rock Pigeon (*Columba livia*), and any recently listed unprotected species in the Federal Register.

1.1.1.2 Bald and Golden Eagle Protection Act

The Bald Eagle (*Haliaeetus leucocephalus*) and the Golden Eagle (*Aquila chrysaetos*) are protected under the BGEPA and MBTA. The BGEPA provides protection for Bald Eagles and Golden Eagles (16 U.S.C. §668a−668d) and prohibits anyone, without a permit issued by the Secretary of the Interior, from "taking" Bald or Golden Eagles, including their parts, nests, or eggs. The BGEPA provides criminal penalties for persons who "take, possess, sell, purchase, barter, offer to sell, purchase or barter, transport, export or import, at any time or any manner, any Bald or Golden eagle alive or dead, or any part, nest, or egg thereof" (16 U.S.C. §668c). The BGEPA defines "take" as any act that pursues hunting, wounding, killing, capturing, or disturbing, etc. (16 U.S.C. §668c). "Disturb" is defined as agitating or bothering an eagle that causes injury to, decreases productivity of, or causes nest abandonment.

1.1.1.3 Endangered Species Act

T/E species are protected under the federal ESA. The purpose of the ESA is to protect and recover imperiled species and the ecosystems upon which they depend. Under the ESA, species may be listed as either endangered or threatened. "Endangered" means a species is in danger of extinction throughout all or a significant portion of its range. "Threatened" means a species is likely to become endangered within the foreseeable future. The ESA makes it unlawful for a person to "take" a listed species without a permit. Take is defined as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in any such conduct" (16 U.S.C. §1531 et seq.). ESA listed species that have the potential to be present at the Project are included in this BBCS.

1.1.1.4 Missouri Code of State Regulation

In addition to the species listed under the ESA, there are eight state-listed endangered bird species in Missouri. The MDC identifies state endangered species as those threatened with extirpation in Missouri (3 Code of State Regulations [CSR] § 10-4.111). The Missouri Natural Heritage Program assigns Missouri SCC state ranks. These designations help prioritize species and habitats for conservation and management purposes, but do not afford species additional legal protection (MDC 2018). The rankings are: S1 – Critically Imperiled, S2 – Imperiled, S3 – Vulnerable, S4 – Apparently Secure, and S5 – Secure. The MDC currently offers no permits for take of state-listed endangered species in Missouri.

1.1.1.5 Section 401 and 404 of the Clean Water Act

Section 401 of the Clean Water Act (CWA; 33 U.S.C. 1341) states "Any applicant for a Federal license or permit to conduct any activity including, but not limited to, the construction and operation of facilities, which may result in any discharge into the navigable waters, shall provide the licensing or permitting agency a certification from the state in which the discharge originates or will originate". Section 404 of the Clean Water Act (CWA; 33 U.S.C. 1344) "regulates the discharge of dredged or fill material into the water of the United States, including wetlands". A permit is required if dredged or fill material will be discharged into any water of the United States unless the activity is exempt from Section 404 regulation.

1.1.1.6 Missouri Noxious Weed Law

The Missouri Noxious Weed Law (Missouri Law 263.190) states "it shall be the duty of every owner of lands in this state to control all noxious weeds growing thereon so often in each and every year as shall be sufficient to prevent such noxious weeds from going to seed".

1.1.2 USFWS Land-Based Wind Energy Guidelines

The USFWS developed the *USFWS Land-Based Wind Energy Guidelines* (WEG) to assist wind project developers by providing a structured process for evaluating and addressing wildlife conservation concerns for land-based wind energy development (USFWS 2012). Adherence to the WEG is voluntary and the WEG is meant to facilitate communication among wind energy developers and federal, state, and local conservation agencies. The WEG includes a five-tiered process for assessing potential adverse effects to species of concern and their habitats. The WEG pre-construction evaluation includes: Tier 1 – Preliminary Site Evaluation, Tier 2 – Site Characterization, and Tier 3 – Pre-construction Field Studies. Tiers 4 and 5 involve post-construction monitoring and evaluations (USFWS 2012). This BBCS was designed to summarize the results of Clear Creek's efforts to address the elements of Tiers 1 through 3 by describing the wildlife and habitats at the Project and predicting potential impacts to those resources and describing conservation measures that will be implemented to address impacts.

1.1.3 USFWS Eagle Conservation Plan Guidance

In April 2013, the USFWS issued the *Eagle Conservation Plan Guidance, Module 1 – Land-based Wind Energy, Version 2* (ECPG; USFWS 2013). This document was designed to guide wind energy developers in conserving Bald and Golden Eagles during the siting, construction, and operation of a wind energy facility. Adherence to the ECPG is voluntary; however, if a wind project poses high to moderate risk to eagles, developers who follow the ECPG should have the data necessary to develop a project-specific Eagle Conservation Plan, which can be used to support an application for an eagle take permit, if needed. The USFWS has yet to update the ECPG to incorporate changes from the 2016 Eagle Rule Revisions of BGEPA (81 Federal Register (FR) 91494, Dec. 16, 2016). However, the survey methods and the five-stage approach in the ECPG are still compatible with the 2016 Eagle Rule Revisions.

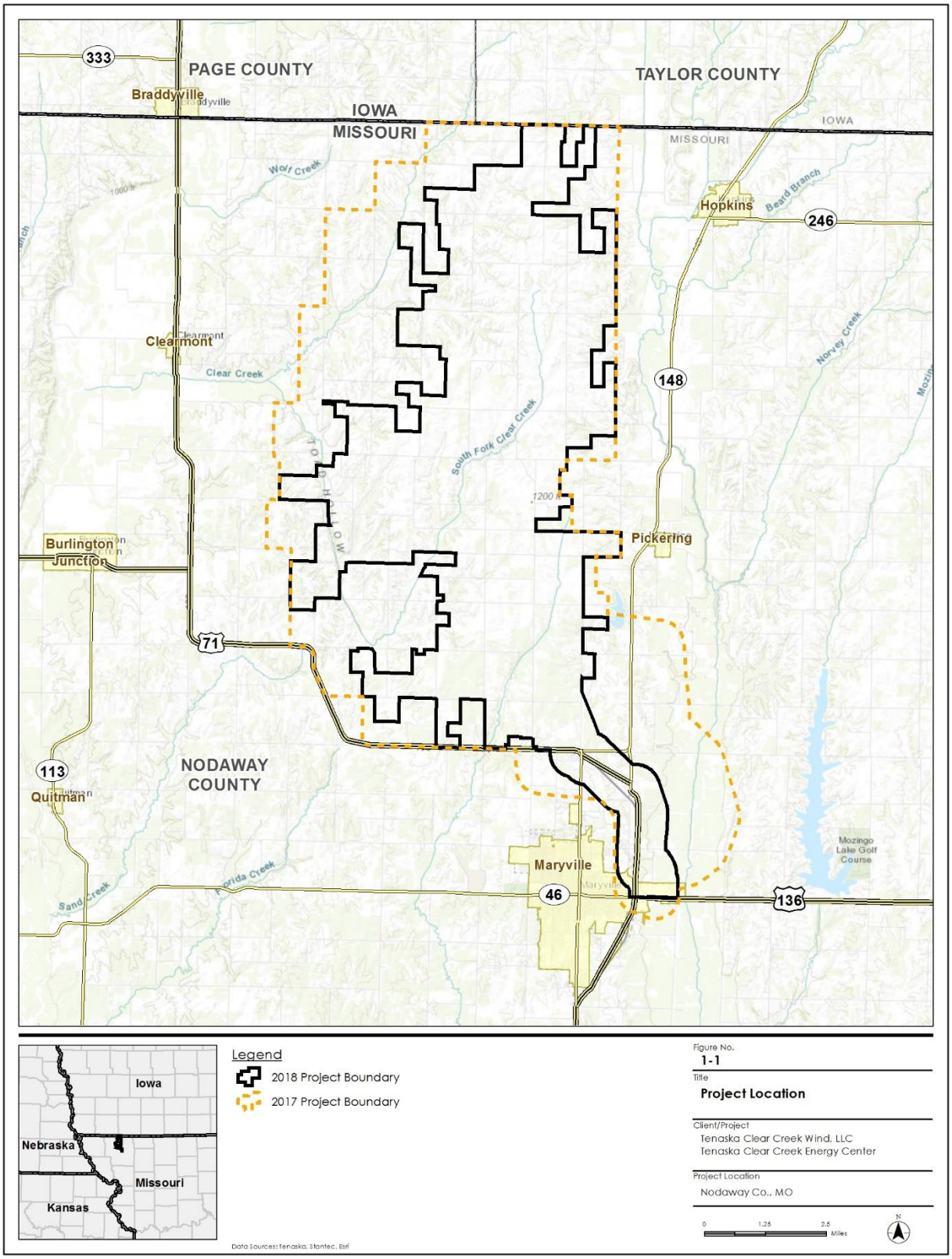
The ECPG outlines a five-stage approach to assessing the potential impacts on and risk to eagles from a wind energy facility. These stages are different from the tiers in the WEG (see Section 1.1.2), but the ECPG stages fit within the five tiers of the WEG. The ECPG also provides a means for wind developers

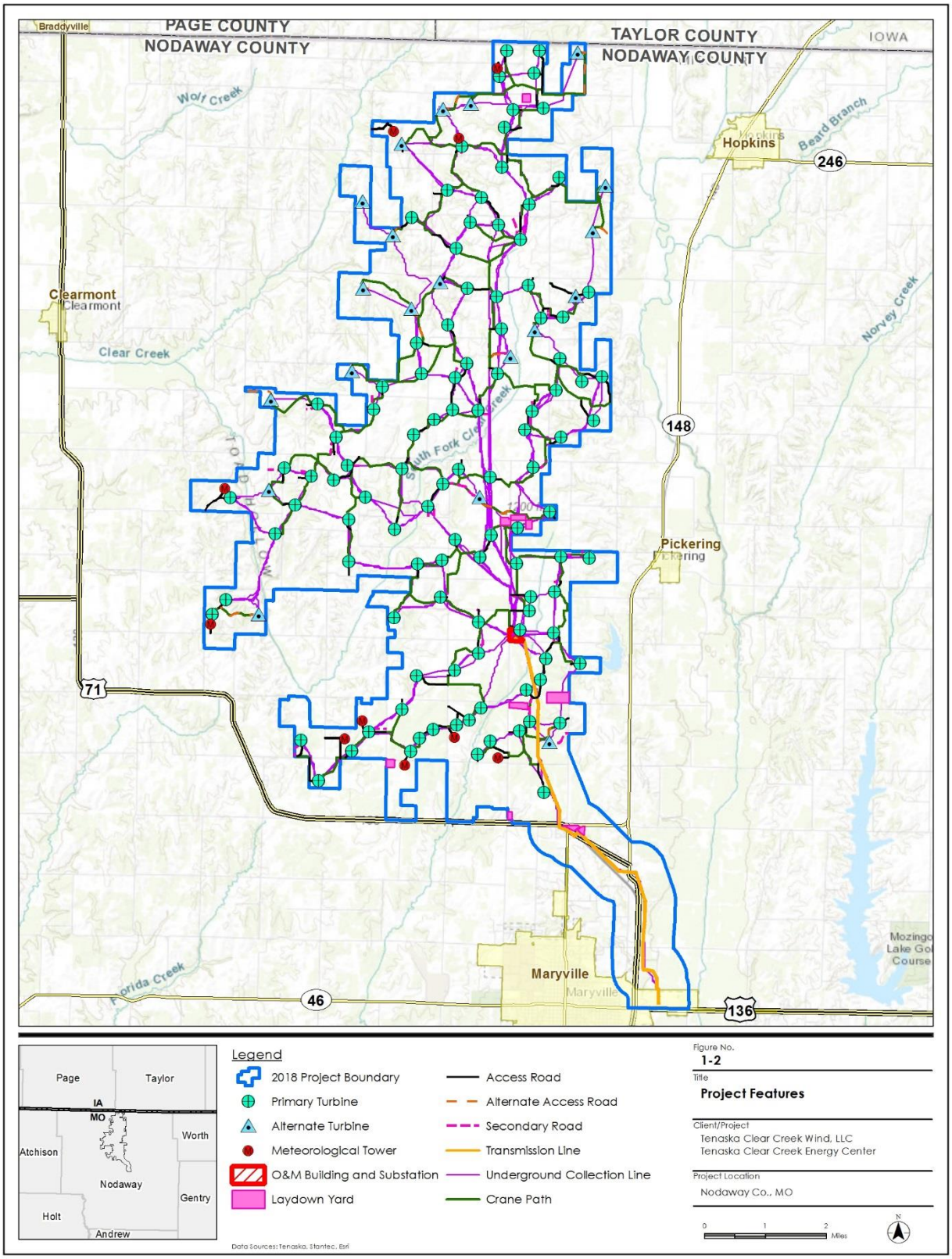
to assess the level of risk to eagles at specific projects based on three risk categories: Category 1 – High risk to eagles where the potential to avoid or mitigate impacts is low; Category 2 – High or moderate risk to eagles with the opportunity to mitigate impacts; and Category 3 – Minimal risk to eagles. Which category a project falls into is based on: (1) its proximity to important eagle use areas[2] or migration concentration sites, and (2) the species-specific uncertainty-adjusted annual fatality estimate (USFWS 2013). The risk category for a given project may change during the siting and development process as new information about eagles at the project site is gathered. In the 2016 Eagle Rule Revisions, the USFWS reconsidered their definition of "low-risk" and found that the annual fatality estimate necessary to fall within Category 3 was counter-productive; however, the USFWS was unable to develop an alternate definition to a "low-risk" wind project (81 Federal Register 91506, Dec. 16, 2016). Therefore, the Project's potential risk to eagles was assessed by the same methods used for the other species evaluated in this BBCS (see Section 1.1 and 5.3.1); additionally, Clear Creek will voluntarily develop an Eagle Conservation Plan (ECP; see Section 8.3).

1.2 PROJECT DESCRIPTION

The Project is located in Nodaway County, Missouri, and is approximately 33,600 acres (ac; 53 square miles [mi^2]) including a proposed transmission line extending from the southeast corner of the Project towards Maryville, Missouri. The Project is north of Maryville, between U.S. Highway 71 to the west, State Highway 148 to the east, and the Missouri-Iowa state border along the northern boundary. The Project boundary used for the initial pre-construction environmental survey work was established in 2017, then was reduced in size in 2018. The boundary shift allowed the Project to avoid impacts to woodlands. The Project's 2017 and 2018 boundaries are shown in Figure 1-1. Many of the assessments and surveys detailed in this BBCS were designed using the Project's 2017 boundary. The Project will include 111 turbines, all located within Nodaway County, that will generate a nameplate capacity of approximately 242 megawatts (MW) of electricity[3]. The locations of Project infrastructure are shown in Figure 1-2. Project infrastructure will consist of the following based on the design as of October 5, 2018:

- 100 Vestas V12 (2.2 MW) wind turbine generators and 11 Vestas V110 (2.0 MW) Wind turbine generators.[3]
- One Operations and Maintenance (O&M) Building located on approximately 13 ac of land.[3]
- 3 permanent meteorological towers.[3]
- Approximately 30 miles of private access roads, approximately 16 feet (ft) in width, will be constructed to connect the wind turbines to public roads. Access roads will allow equipment and vehicle access for construction and subsequent maintenance of the facilities.[3]
- One new electrical Project substation with a footprint of about 3 ac[3].
- An approximately 7.3-mile[3], overhead, 161-kilovolt transmission line that will connect the Project substation to a point of interconnection located near Maryville.
- Approximately 87 miles[3] of underground electrical collection lines, which will deliver the electricity generated by the turbines to the Project substation.


PAGE COUNTY
TAYLOR COUNTY
IOWA
MISSOURI
Braddyville
Hopkins
Clearmont
Pickering
Burlington Junction
Quitman
NODAWAY COUNTY
Maryville
Mozingo Lake Golf Course
333
246
148
71
113
46
136
Wolf Creek
Beard Branch
Clear Creek
South Fork Clear Creek
Norvey Creek
Florida Creek
Sand Creek
Iowa
Nebraska
Missouri
Kansas
Legend
2018 Project Boundary
2017 Project Boundary
Figure No.
1-1
Title
Project Location
Client/Project
Tenaska Clear Creek Wind, LLC
Tenaska Clear Creek Energy Center
Project Location
Nodaway Co., MO
0
1.25
2.5
Miles
N
Data Sources: Tenaska, Stantec, Esri


PAGE COUNTY
NODAWAY COUNTY
TAYLOR COUNTY
NODAWAY COUNTY
IOWA
Braddyville
Wolf Creek
Hopkins
Beard Branch
246
Clearmont
Clear Creek
Norvey Creek
148
Pickering
71
Maryville
46
136
Florida Creek
Mozingo Lake Golf Course
Page
Taylor
IA
MO
Worth
Atchison
Nodaway
Gentry
Holt
Andrew
Legend
2018 Project Boundary
Primary Turbine
Alternate Turbine
Meteorological Tower
O&M Building and Substation
Laydown Yard
Access Road
Alternate Access Road
Secondary Road
Transmission Line
Underground Collection Line
Crane Path
Figure No.
1-2
Title
Project Features
Client/Project
Tenaska Clear Creek Wind, LLC
Tenaska Clear Creek Energy Center
Project Location
Nodaway Co., MO
0
1
2
Miles
N
Data Sources: Tenaska, Stantec, Esri

- Two temporary laydown yards are anticipated – one for the Project and another for the transmission line where equipment and supplies will be stored and where construction activities will be coordinated from. The temporary laydown yard will be approximately 15 and 10 ac[3].

- Temporary crane paths to allow the construction cranes, which assemble the wind turbines, to move between turbine pads.

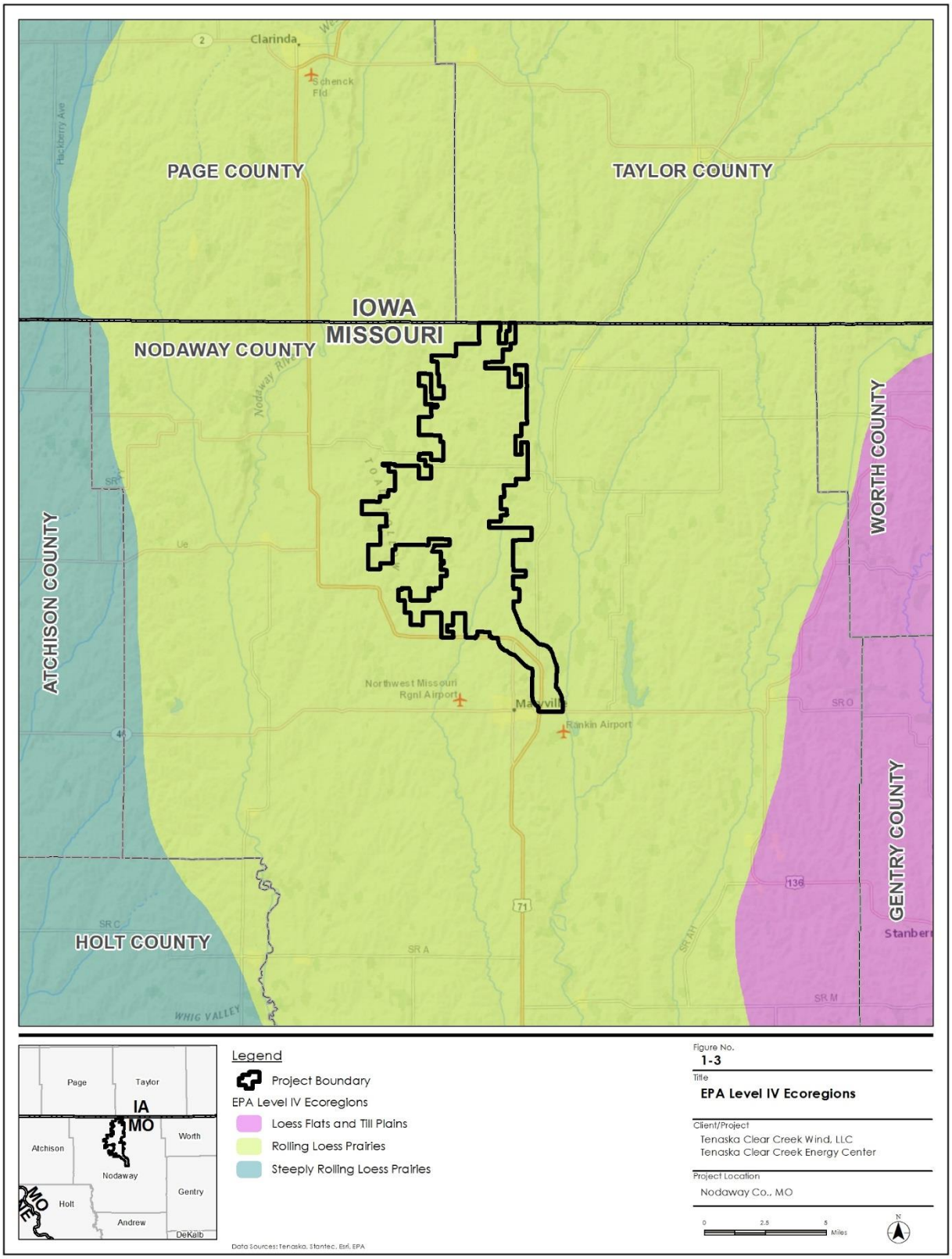
1.2.1 Project Landscape

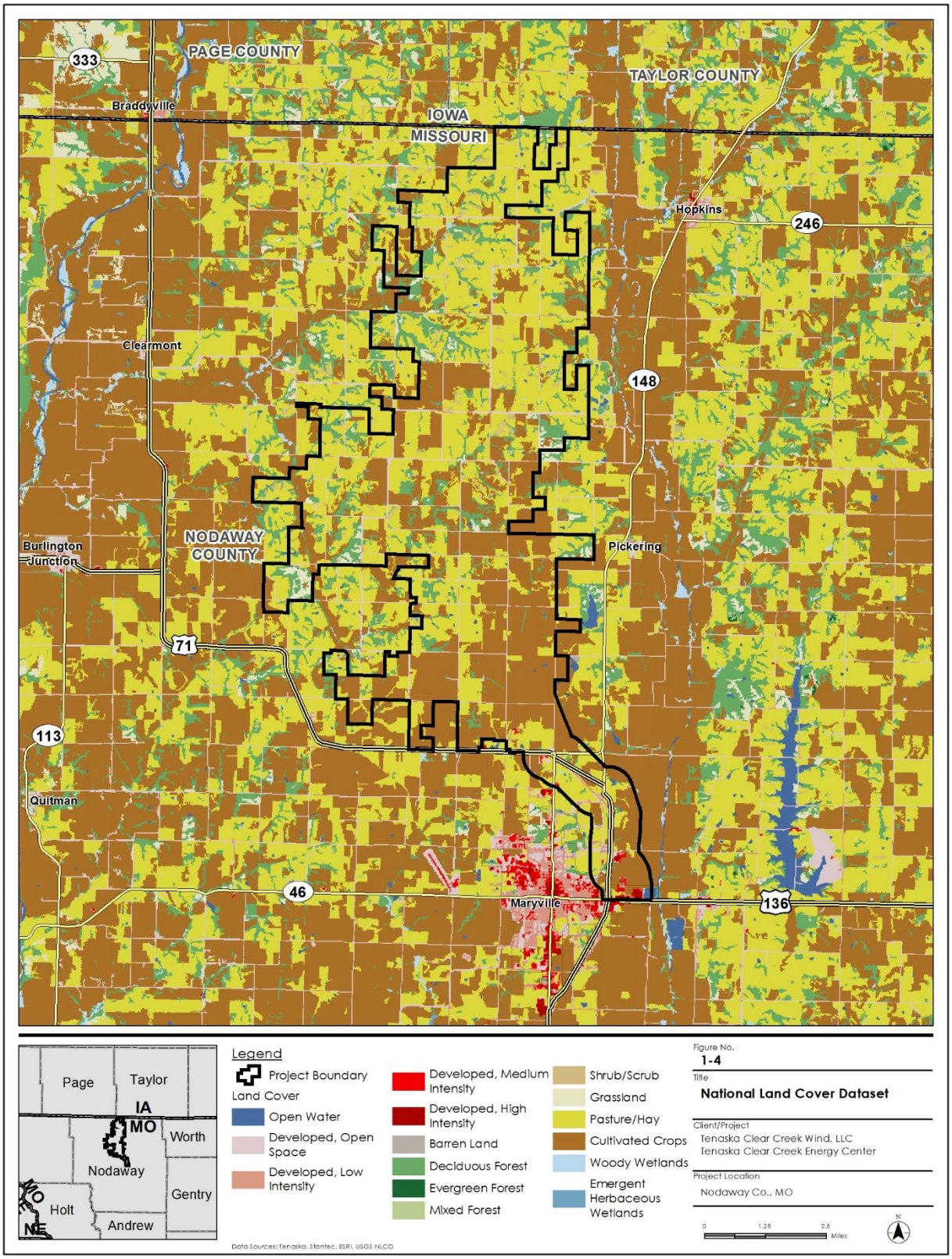
As shown in Figure 1-3, the Project is located within northwest Missouri within the Rolling Loess Prairies U.S. Environmental Protection Agency (Level IV) ecoregion. Native vegetation in the Rolling Loess Prairies ecoregion consists of tallgrass prairie with areas of oak-hickory forest. Despite widespread cropland throughout the region, this region has more woodland and pasture than much of the surrounding areas (Chapman et al. 2002).

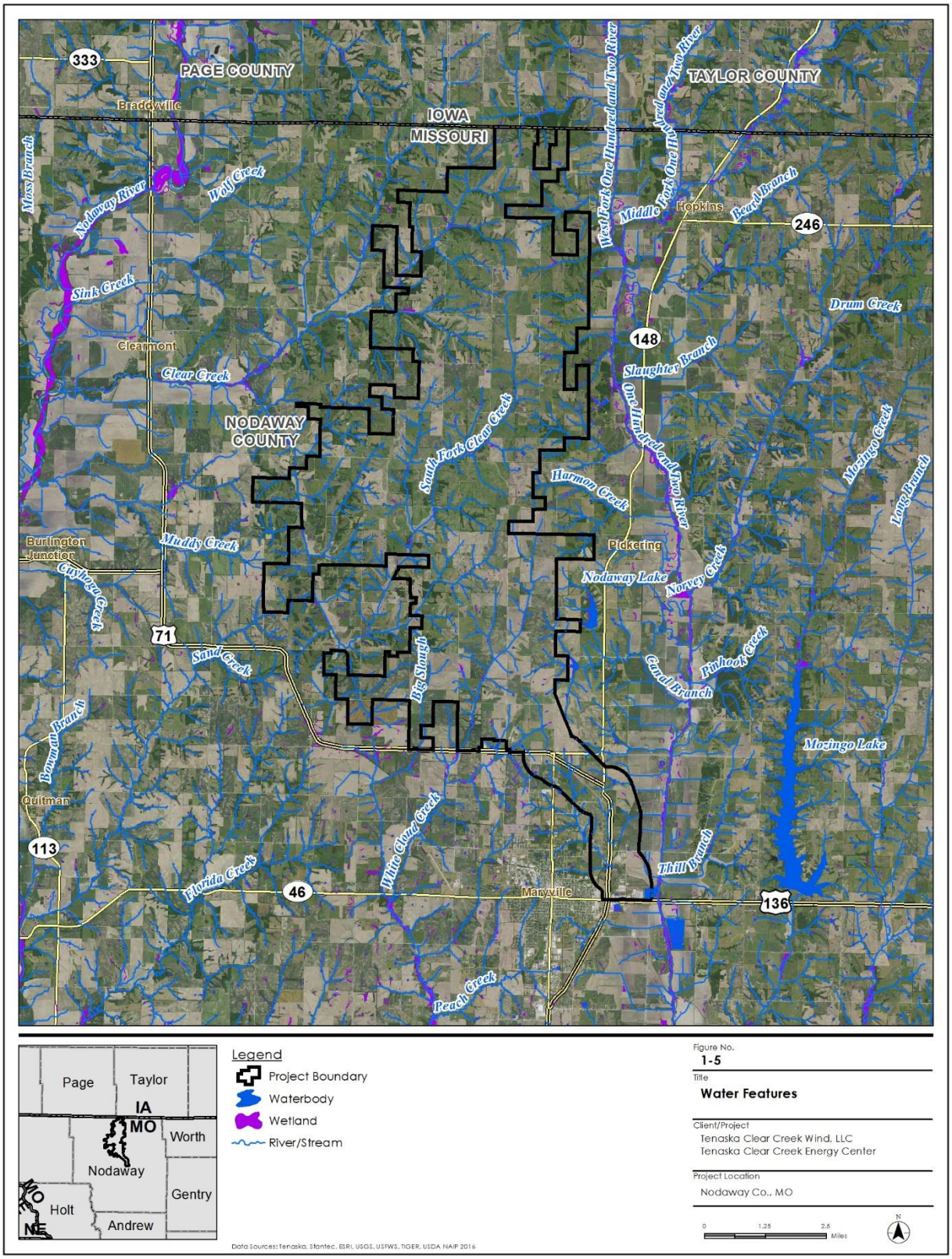
According to the U.S. Geological Survey's (USGS) National Land Cover Dataset (NLCD), the habitat within the Project is primarily pasture/hay (44% of the total land use within the Project boundary) and cultivated cropland (36%). The remaining habitat within the Project is deciduous forest (11%); developed land (6%); scrub/shrub (1%); grassland/herbaceous (1%); and less than 1% each of open water, wetlands, and barren land (Homer et al. 2015). Land use and land cover within the Project boundary are shown in Figure 1-4. Photographs of representative habitat within the Project boundary are provided in Appendix A.

There are approximately 197 linear miles of streams within the boundary. Streams within the Project are tributaries of two rivers, the Nodaway River and One Hundred and Two River. Project water features are shown in Figure 1-4. The Nodaway River is approximately 4 miles from the Project's western boundary at its closest point and flows north to south. One Hundred and Two River is adjacent to the Project's eastern boundary and passes through the south-eastern corner of the Project. Both rivers are generally sandy bottom rivers with wooded or open shorelines in flat, farmed floodplains. Clear Creek is a tributary of the Nodaway River and flows north to south through the Project.

There are no large lakes within the Project apart from Nodaway Lake (Figure 1-5), a 72-acre reservoir located on the Project's east-central boundary. The largest waterbody near the Project is Mozingo Lake, a 998-acre reservoir located approximately 3 miles southeast of the Project. Waterbodies within the Project range between 0.1 and 71.6 ac (USGS 2017). Nodaway County Lake is a public fishing, hunting, and wildlife viewing area (MDC 2007). There are 1,136 National Wetlands Inventory wetlands within the Project boundary, ranging in size from 0.0 ac to 8.3 ac and totaling 960 ac within the boundary (USFWS 1985).


Clarinda
Schenck Fld
PAGE COUNTY
TAYLOR COUNTY
IOWA
MISSOURI
NODAWAY COUNTY
ATCHISON COUNTY
WORTH COUNTY
GENTRY COUNTY
HOLT COUNTY
Northwest Missouri Rgnl Airport
Rankin Airport
WHIG VALLEY
Page
Taylor
IA
MO
Atchison
Worth
Nodaway
Gentry
Holt
Andrew
DeKalb
Legend
Project Boundary
EPA Level IV Ecoregions
Loess Flats and Till Plains
Rolling Loess Prairies
Steeply Rolling Loess Prairies
Data Sources: Tenaska, Stantec, Esri, EPA
Figure No.
1-3
Title
EPA Level IV Ecoregions
Client/Project
Tenaska Clear Creek Wind, LLC
Tenaska Clear Creek Energy Center
Project Location
Nodaway Co., MO
0
2.5
5
Miles
N


PAGE COUNTY
TAYLOR COUNTY
NODAWAY COUNTY
IOWA
MISSOURI
Braddyville
Hopkins
Clearmont
Burlington Junction
Pickering
Quitman
Maryville
333
246
148
71
113
46
136
Page
Taylor
IA
MO
Worth
Nodaway
Gentry
Holt
Andrew
KS
NE
Legend
Project Boundary
Land Cover
Open Water
Developed, Open Space
Developed, Low Intensity
Developed, Medium Intensity
Developed, High Intensity
Barren Land
Deciduous Forest
Evergreen Forest
Mixed Forest
Shrub/Scrub
Grassland
Pasture/Hay
Cultivated Crops
Woody Wetlands
Emergent Herbaceous Wetlands
Data Sources: Tenaska, Stantec, ESRI, USGS NLCD
Figure No.
1-4
Title
National Land Cover Dataset
Client/Project
Tenaska Clear Creek Wind, LLC
Tenaska Clear Creek Energy Center
Project Location
Nodaway Co., MO
0
1.25
2.5
Miles
N


PAGE COUNTY
TAYLOR COUNTY
IOWA
MISSOURI
NODAWAY COUNTY
Bradyville
Clearmont
Hopkins
Pickering
Burlington Junction
Quitman
Maryville
Mozingo Lake
Nodaway Lake
333
246
148
71
113
46
136
Moss Branch
Nodaway River
Wolf Creek
Sink Creek
Clear Creek
West Fork One Hundred and Two River
Middle Fork One Hundred and Two River
One Hundred and Two River
Bear Branch
Drum Creek
Slaughter Branch
South Fork Clear Creek
Harmon Creek
Muddy Creek
Crawford Creek
Sand Creek
Big Slough
Bowman Branch
Florida Creek
White Cloud Creek
Peach Creek
Norvey Creek
Pinhook Creek
Canal Branch
Thill Branch
Mozingo Creek
Long Branch
Page
Taylor
IA
MO
Worth
Nodaway
Gentry
Holt
Andrew
KS
NE
Legend
Project Boundary
Waterbody
Wetland
River/Stream
Figure No.
1-5
Title
Water Features
Client/Project
Tenaska Clear Creek Wind, LLC
Tenaska Clear Creek Energy Center
Project Location
Nodaway Co., MO
0
1.25
2.5
Miles
N
Data Sources: Tenaska, Stantec, ESRI, USGS, USFWS, TIGER, USDA NAIP 2016

1.2.2 Agency Coordination

Clear Creek initiated coordination with the USFWS, MDC, and Iowa Department of Natural Resources (IDNR) in 2017. A timeline of agency coordination is shown in Table 1-1. Initiation of contact and agency coordination documentation can be found in Appendix E. Clear Creek requested via letter that the USFWS, MDC, and IDNR provide information about species and habitats of concern that could occur within or adjacent to the Project. In their letter response dated May 12, 2017, MDC identified the Indiana Bat (IBAT; *Myotis sodalis*) and Northern Long-eared Bat (NLEB; *Myotis septentrionalis*) as federally-listed endangered and threatened species, respectively, that have the potential to occur in Nodaway County, Missouri. A meeting took place on March 1, 2017 at the USFWS office in Columbia, Missouri. USFWS and MDC biologists were present during the meeting.

MDC and USFWS expressed concerns regarding Bald Eagles in the area with an emphasis on Nodaway County Lake and Mozingo Lake; however, the presence of nests at those sites was unknown by the agencies at the time of the meeting. Stantec conducted aerial eagle and raptor nest surveys during March 2017. During that survey no eagle nests were located within the Project boundary or in the area of Nodaway County Lake or near Mozingo Lake. The nearest nest to the Project was approximately 4.5 miles west of the boundary along the Nodaway River (Stantec 2017a). MDC and USFWS expressed concerns regarding bat species within the Project and recommended further pre-construction surveys and consideration of multiple best management practices to reduce risk to bats. MDC additionally expressed concern over Missouri SCC including Franklin's Ground Squirrel (*Poliocitellus franklinii*), Least Weasel (*Mustela nivalis*), and American Badger (*Taxadea taxus*), and the state-listed endangered Greater Prairie-Chicken (*Tympanuchus cupido*). USFWS stated that any ESA species impacted by Project construction and/or operation should be addressed. Specifically, Bald Eagles and T/E bat species (i.e., IBAT, NLEB) should be considered.

During an in-person meeting on March 1, 2017 MDC stated that Golden Eagle occurrences in northwestern Missouri are rare and therefore risk to this species from Project construction and operation is low. MDC recommended voluntary set back of 1 to 5 miles of Project infrastructure near Nodaway County Lake and Mozingo Lake to decrease the risk to eagles and other wildlife using those resources and because management could impact or be impacted by proposed construction.

An MDC Natural Heritage Review Report dated May 12, 2017 was compiled and sent to Stantec. In the report, MDC identified 2 federally listed T/E species and 13 Missouri SCC and Communities of Conservation Concern. Accompanying each species was a record of the species' status, habitat preferences, and known occurrences within 10 miles of the proposed Project, detailed to township/range/section (see Appendix B).

On July 20, 2017 IDNR issued a response letter to Clear Creek with information regarding state and federal-listed T/E species rare natural communities, sensitive habitat, and state lands and water in the proposed Project area. The letter did not mention any species of concern, but did note two protected natural resource areas, Ross Park Wildlife Area, and Siam Tract. IDNR recommended a voluntary minimum 1-mile buffer from these areas. IDNR also recommended adequate pre-construction monitoring and two years of post-construction surveys (see Appendix B).

Table 1-1 Agency Coordination Timeline

Type of Consultation	Date	Parties Involved	Notes
Clear Creek Letter to USFWS	2/3/2017	Clear Creek Stantec USFWS – Columbia field office	Request for information on sensitive species and habitats potentially occurring in the Project area.
Clear Creek Letter to MDC	2/3/2017	Clear Creek Stantec MDC	Request for information on sensitive species and habitats potentially occurring in the Project area.
In-person Meeting	3/1/2017	Clear Creek Stantec USFWS – Columbia field office MDC	Project area and information were presented. MDC identified species of concern for the Project including Greater Prairie-Chicken. USFWS identified IBAT and NLEB as potentially occurring in the Project.
MDC Letter to Clear Creek	5/12/2017	Clear Creek Stantec MDC	MDC responded to request for information and sent a natural heritage review for the Project. Identified IBAT and NLEB as federally-listed species that could occur in the Project and mentioned 13 Missouri Species and Communities of Conservation Concern.
Clear Creek Letter to IDNR	6/12/2017	Clear Creek Stantec IDNR	Request for information on sensitive species and habitats potentially occurring in the Project area.
IDNR letter to Clear Creek	7/20/2017	Clear Creek Stantec IDNR	IDNR responded to a request for information. IDNR identified no site-specific records of rare species or significant natural communities within the Project. Two protected natural resource areas near Clear Creek were listed, Ross Park Wildlife Area, and Siam Tract. IDNR requested a minimum of one-mile avoidance buffer from these areas and preconstruction and post construction bird and bat surveys.
In-person Meeting	10/13/2017	Clear Creek Stantec USFWS – Columbia field office MDC	Project description overview and discussion with USFWS and MDC. Methods, results, and timelines of field surveys were presented. USFWS recommended bat presence/absence surveys be conducted June and July. The USFWS recommended coordination for minimization and mitigation strategies for bat species. Avenues for achieving coverage for an Incidental Take Permit (ITP), development of an ECP, and permitting timelines were discussed. Bald Eagle take avoidance and minimization practices were presented.
Conference Call	10/27/2017	Clear Creek Stantec USFWS	Summary of the October 13, 2017 meeting and PowerPoint presentation.
In-person Meeting	3/2/2018	Clear Creek Stantec	USFWS and MDC requested updated GIS shapefiles of the Project boundary. USFWS committed to providing NLEB occurrences within and near the Project boundary. USFWS described the 4(d) rule for NLEB, as well as potential status changes for Tri-colored Bat.

Type of Consultation	Date	Parties Involved	Notes
		USFWS – Columbia field office MDC	USFWS recommended winter tree removal as an avoidance measure. Survey strategies to determine presence of IBAT and NLEB including acoustic data, mist-netting surveys, tracking efforts, and net site determination were identified. USFWS recommended that an Habitat Conservation Plan (HCP) be developed, and Clear Creek apply for an ITP. A low-effect HCP option for IBAT and NLEB was mentioned.
Letter to USACE	4/3/2018	Clear Creek Stantec USACE	Letter request for a pre-application meeting with USACE to discuss field activities and preparation of documents necessary for compliance with the Clean Water Act Sections 404 and 401.
In-person Meeting	4/10/2018	Clear Creek Stantec USFWS–Moline, IL Field Office MDC	Meeting regarding intent to develop and ECP and pursue an eagle incidental take permit (ETP). Field survey methods and to-date data were presented. Impacts of the Project boundary evolution were discussed. Timeline for an ITP was presented. Mitigation options for Bald Eagles and Golden Eagles and including Golden Eagles in the ITP was discussed.
In-person Meeting	4/24/2018	Clear Creek Stantec USACE – Kansas City District Office	Clear Creek and Stantec provided an overview on Project specifics and desired COD by the end of 2019. Anticipated fieldwork for wetlands was described. USACE indicated likely areas of impact included jurisdictional waters. Permitting avenues for temporary work that impacted jurisdictional waters was discussed, including acquiring Nationwide Permits (NWP's), HCPs, Section 10 and Section 7 consultations, 401/404 permits, and/or mitigation was discussed. USFWS approved the T/E bat presence absence plan.
In-person Meeting	8/16/2018	Clear Creek Stantec USFWS – Columbia field office USACE MDC	Acoustic data collection efforts were discussed in relation to Project construction scheduling. Results of mist netting data were presented, and netting effort was determined to be adequate for both IBAT and NLEB. NLEB hearings to determine status was discussed. Clear Creek planned to continue developing an HCP and requested a technical assistance letter (TAL). USFWS inquired about voluntarily lowering cut-in speeds and monitoring the levels of take in order to better inform an HCP.
Nationwide Permit Application	10/1/2018	Clear Creek Stantec Consulting Ltd. USACE	The nationwide permit application for impacts to waters of the United States under Section 404 of the Clear Water Act, submitted.
USFWS Letter to Clear Creek	11/7/2018	Clear Creek USFWS – Columbia field office	The USFWS provided Clear Creek with a TAL to cover incidental take of T/E species during construction and operation of the Project until an HCP with associated ITP is approved and issued.

Key:
COD = Commercial Operation Date
ETP = Eagle Incidental Take Permit
HCP = Habitat Conservation Plan
IDNR = Iowa Department of Natural Resources
ITP = Incidental Take Permit
MDC = Missouri Department of Conservation
NLEB = Northern Long-eared Bat
NWP = Nationwide Permit
USACE = United States Army Corps of Engineers
USFWS = United States Fish and Wildlife Service
TAL = Technical Assistance Letter

A meeting took place on October 13, 2017 with USFWS and MDC and discussed methods, results, and timelines of field surveys. In addition, developments of an ECP and bat presence/absence survey timing were discussed. On October 27, 2017 a follow-up conference call was made to summarize the meeting. USFWS biologists were present on the conference call.

On March 2, 2018 a meeting took place with USFWS and MDC to discuss the updated Project boundary and survey strategies to determine presence/absence of T/E bat species in the Project, including NLEB and IBAT. USFWS agreed to provide Clear Creek with NLEB occurrences within and near the Project and discussed the potential status-change for Tri-colored Bat (species petitioned for ESA listing). USFWS made recommendations for mist-net surveys be conducted in tracts of contiguous forest. Survey strategies to determine presence of IBAT and NLEB including acoustic bat surveys, mist netting surveys, tracking efforts were discussed. USFWS recommended winter tree (November 1 – March 31) removal as an avoidance measure and suggested that if Clear Creek develops an HCP, that they apply for an ITP.

On April 3, 2018 Clear Creek requested a pre-application meeting with the USACE via letter to discuss field activities and documents necessary to obtain compliance with Clean Water Act sections 404 and 401. On April 24, 2018 a meeting was held between Clear Creek, Stantec, and USACE to determine avenues of obtaining permits for impact to jurisdictional waters in compliance with CWA Sections 404 and 401. The wetland delineation report and application was submitted to the USACE by Stantec on behalf of Clear Creek on October 1, 2018.

On April 10, 2018 a meeting was held to discuss strategies for development of an Eagle Conservation Plan and application for an eagle incidental take permit (ETP). USFWS and MDC were present at the meeting. Recommendations for reducing surveys to reflect the current Project boundary were presented. A schedule to complete the ECP was presented and avenues of obtaining a Permit were discussed. USFWS mentioned that obtaining an ETP for Bald Eagles only might not be an option, and coverage of Golden Eagles in the ECP was discussed and mitigation strategies were debated.

On August 16, 2018 a meeting was held with the USFWS, MDC, and USACE. Steps for moving forward with the HCP were presented. A technical assistance letter (TAL) was requested by Clear Creek from USFWS to provide Clear Creek with a bridge to an ITP if the Section 10 consultation was not complete prior to operations. The Bat Survey Report was submitted for the Project to demonstrate presence/presumed absence of NLEB and IBATs within the Project. USFWS acknowledged the survey effort for both species was adequate and they approved of the results. USFWS inquired about voluntarily raising cut-in speeds and monitoring levels of take to inform the HCP. The agency also reiterated that winter tree removal is preferred to reduce impacts on all tree-roosting bats.

On November 7, 2018 Clear Creek received a TAL from the USFWS that documents compliance with the Endangered Species Act (Appendix B). The TAL states that take for IBAT is not likely at the Project since it is located on the western edge of the IBAT range. However, NLEB were documented in the Project and as a result the Project qualifies for the 4(d) exemptions, provided there is no tree clearing outside the pup season. Clear Creek has also committed to:

- developing the BBCS,

- limit tree clearing to November 1 2018 – March 31 2019,
- developing the HCP,
- operate turbines at avoidance cut in speeds should the 4(d) rule be vacated,
- contact the USFWS if an endangered species other than NLEB is documented.

2.0 BBCS LITERATURE REVIEW

Stantec reviewed publicly available sources of information to determine the likelihood of occurrence, relative abundance, and/or seasonal timing of bird and bat species and other environmental resources of concern in the Project's vicinity. Environmental resources of concern were evaluated using the Missouri State Wildlife Action Plan (SWAP; MDC 2015) and the Missouri Natural Heritage Program (NHP) Review (NHP 2017a). The sources Stantec reviewed for bird-related information include:

- USGS Breeding Bird Survey (BBS)
- *Birds in Missouri* (BiM; Jacobs 2003)
- National Audubon Society's (Audubon's) Christmas Bird Count (CBC)
- Audubon's and the Cornell Lab of Ornithology's (Cornell's) eBird program
- Audubon's Important Bird Area (IBA) program
- Bird studies from other regional wind projects relevant to the Project

Stantec reviewed the following sources for bat-related information:

- Bats of Missouri (Boyles et al. 2009)
- The Wild Mammals of Missouri (Schwartz and Schwartz 2016)
- Bats of the United Stated and Canada (Harvey et al. 2011)
- Impacts of Wind Energy Development on Bats: Implications for Conservation (Arnett and Baerwald 2013)
- Phase 1 Bat Risk Assessment: Mount Wachusett Community College Wind Energy Project (Reynolds and Veilleux 2008)
- Causes of Bat Fatalities at Wind Turbines: Hypotheses and Predictions (Cryan and Barclay 2009)
- Mating Behavior as a Possible Cause of Bat Fatalities at Wind Turbines (Cryan 2008)
- Patterns of Bat Fatalities at Wind Energy Facilities in North America (Arnett et al. 2008)
- Impacts of Wind Energy Development on Bats: A Global Perspective (Arnett et al. 2016)
- Fatalities at Wind Turbines May Threaten Population Viability of a Migratory Bat (Frick et al. 2017)

- Wind Turbine Interactions with Wildlife and Their Habitats: A Summary of Research Results and Primary Questions (AWWI 2017a)

- Publications of the USFWS and MDC

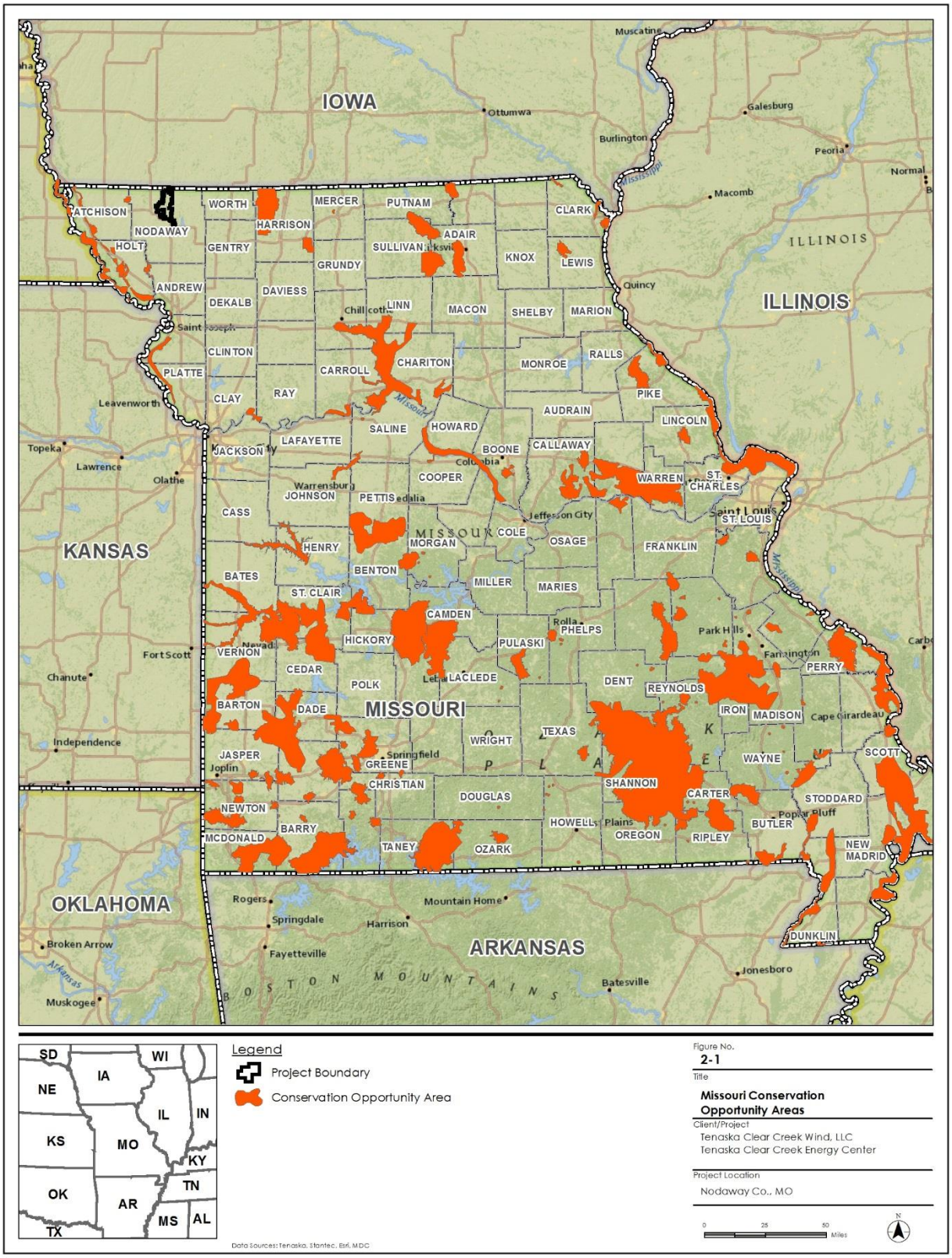
The following literature review includes an overview of Missouri natural resources, a review of relevant regional datasets, bird and bat datasets, and a brief review of the natural history characteristics of the special status bird and bat species (i.e., T/E species or SCC) that have the potential to occur in the Project region. The results of this literature review, along with the results of the pre-construction site-specific field surveys, may identify potential risks and impacts on birds and bats resulting from the construction and operation of the Project.

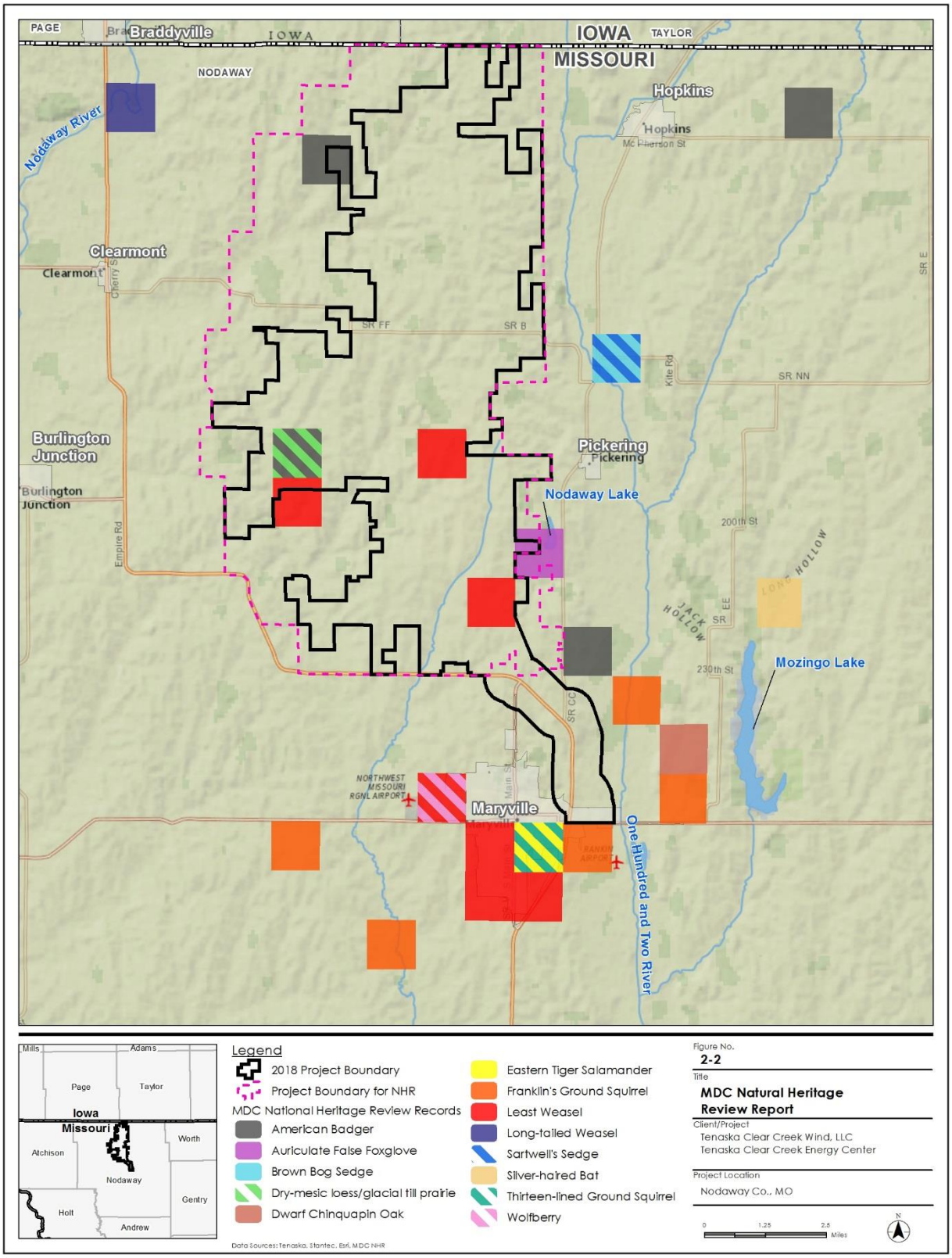
2.1 MISSOURI NATURAL RESOURCES REVIEW

Stantec evaluated environmental resources in the Project area by using publicly available state-level datasets and models including the SWAP and the NHP Review. These tools were used as a general guideline to identify species or habitats of concern; however, it should be noted that the tools are not a component of regulatory guidance or restrictive building requirements.

The SWAP was developed by the MDC to guide the agency in planning conservation measures and to assess the health of Missouri's plants and animals and identify actions necessary for the long-term conservation of these resources and the essential habitat systems that sustain them (MDC 2015). The implementation of the SWAP allows the MDC to remain eligible for federal funding to promote conservation of fish and wildlife that are not otherwise hunted or fished. The SWAP identified Conservation Opportunity Areas (COAs) that represent the greatest opportunities for sustainable conservation of Missouri's habitat systems and the species they support (MDC 2015). As Figure 2-1 shows, no COAs are within Project boundary.

The Missouri Natural Heritage Review (MNHR) provides a detailed, state-specific map that identifies important or high value areas throughout Missouri that support a diversity of wildlife (MNHR 2017). The MNHR provides species-specific occurrence data and natural communities data at a 1-mile resolution that are evaluated and ranked based off statewide and global status to assist environmental planning, review, and development. The MNHR identified species and habitats within the Project area shown in Figure 2-2 and the letter is provided in Appendix B. The species that were highlighted include state-listed species and COAs.


IOWA
ILLINOIS
KANSAS
MISSOURI
OKLAHOMA
ARKANSAS
Muscatine
Ottumwa
Galesburg
Burlington
Peoria
Normal
Macomb
Quincy
Topeka
Lawrence
Olathe
Leavenworth
Saint Joseph
Chillicothe
Jefferson City
Columbia
Warrensburg
Sedalia
Fort Scott
Chanute
Independence
Joplin
Springfield
Rolla
Park Hills
Farmington
Cape Girardeau
Poplar Bluff
Plains
Rogers
Springdale
Fayetteville
Harrison
Mountain Home
Batesville
Jonesboro
Broken Arrow
Muskogee
BOSTON MOUNTAINS
ATCHISON
NODAWAY
HOLT
WORTH
GENTRY
HARRISON
MERCER
PUTNAM
GRUNDY
SULLIVAN
ADAIR
KNOX
CLARK
LEWIS
ANDREW
DEKALB
DAVIESS
LINN
MACON
SHELBY
MARION
CLINTON
PLATTE
CLAY
RAY
CARROLL
CHARITON
MONROE
RALLS
PIKE
AUDRAIN
LINCOLN
SALINE
HOWARD
BOONE
CALLAWAY
LAFAYETTE
JACKSON
COOPER
WARREN
ST. CHARLES
ST. LOUIS
JOHNSON
CASS
HENRY
MORGAN
COLE
OSAGE
FRANKLIN
BATES
BENTON
MILLER
MARIES
ST. CLAIR
CAMDEN
HICKORY
PULASKI
PHELPS
PERRY
VERNON
CEDAR
POLK
LACLEDE
DENT
REYNOLDS
IRON
MADISON
BARTON
DADE
WRIGHT
TEXAS
JASPER
GREENE
SCOTT
WAYNE
CHRISTIAN
SHANNON
CARTER
STODDARD
NEWTON
DOUGLAS
HOWELL
OREGON
RIPLEY
BUTLER
BARRY
MCDONALD
TANEY
OZARK
NEW MADRID
DUNKLIN
SD
WI
IA
NE
IL
IN
KS
MO
KY
OK
AR
TN
MS
AL
TX
Legend
Project Boundary
Conservation Opportunity Area
Figure No.
2-1
Title
Missouri Conservation Opportunity Areas
Client/Project
Tenaska Clear Creek Wind, LLC
Tenaska Clear Creek Energy Center
Project Location
Nodaway Co., MO
0
25
50
Miles
N
Data Sources: Tenaska, Stantec, Esri, MDC


PAGE
Braddyville
IOWA
TAYLOR
MISSOURI
NODAWAY
Hopkins
Nodaway River
Clearmont
SR FF
SR B
SR NN
Kite Rd
Burlington Junction
Empire Rd
Pickering
Nodaway Lake
200th St
JACK HOLLOW
LONG HOLLOW
SR EE
SR E
230th St
Mozingo Lake
SR CC
NORTHWEST MISSOURI RGNL AIRPORT
Maryville
One Hundred and Two River
Mills
Adams
Page
Taylor
Iowa
Missouri
Atchison
Nodaway
Worth
Gentry
Holt
Andrew
Legend
2018 Project Boundary
Project Boundary for NHR
MDC National Heritage Review Records
American Badger
Auriculate False Foxglove
Brown Bog Sedge
Dry-mesic loess/glacial till prairie
Dwarf Chinquapin Oak
Eastern Tiger Salamander
Franklin's Ground Squirrel
Least Weasel
Long-tailed Weasel
Sartwell's Sedge
Silver-haired Bat
Thirteen-lined Ground Squirrel
Wolfberry
Data Sources: Tenaska, Stantec, Esri, MDC NHR
Figure No.
2-2
Title
MDC Natural Heritage Review Report
Client/Project
Tenaska Clear Creek Wind, LLC
Tenaska Clear Creek Energy Center
Project Location
Nodaway Co., MO
0
1.25
2.5
Miles
N

2.2 BIRDS

2.2.1 Regional Avian Overview

Missouri is located within the Mississippi Migratory Flyway, a funnel shaped migration route from Canada to the Gulf of Mexico, generally following the Mackenzie River in Canada and the Mississippi River in the United States. The Mississippi Flyway encompasses 10 states above the confluence of Mississippi and Missouri Rivers (near St. Louis, MO) and narrows below to follow the path of the Mississippi River into the Gulf of Mexico. Most birds that use the flyway travel directly from their breeding grounds in North America to their wintering grounds in the south. Although mortality rates of birds are several orders of magnitude lower at wind energy facilities in North America than other sources of human-related bird mortality, four groups of birds have been shown to be impacted by wind projects in the Midwest. They include raptors (birds of prey), migratory songbirds (order Passeriformes), waterbirds (waterfowl, wading birds, and shorebirds), and grassland-dependent birds (Erickson et al. 2002; Strickland et al. 2011; Loss et al. 2013; AWWI 2017a). State and federal agencies and special interest groups have expressed concern for these groups of birds, and these species are often discussed specifically during the evaluation of potential impacts of a wind energy facility. The following is a general, broad discussion of these bird groups in northwest Missouri and the Project region.

2.2.1.1 Raptors

At the start of commercial wind energy development in the United States in the 1980s, high numbers of raptor fatalities at wind projects, particularly in California, prompted concern among interest groups about the potential impact of wind projects on raptors. Although the improvement of modern wind turbine design and siting has reduced the risk to raptors compared to first generation commercial wind projects, raptor surveys and risk evaluations continue to be a component of pre-construction due diligence (Strickland et al. 2011; USFWS 2012; AWWI 2017a).

In the Midwest, raptors typically migrate from March through mid-May and from September through mid-November. Raptor migration research and public survey information is generally limited to studies at locations where raptor migration is concentrated (e.g., the HawkWatch program; HMANA 2016). The Hitchcock Nature Center HawkWatch site (Hitchcock) is located 75 miles northwest of the Project. Hitchcock has been part of the HawkWatch program site since 1991 and currently logs 600-800 hours of survey and counts an average of 13,000 migrating raptors every fall (HMANA 2018).

While Hitchcock and the Project are both generally located within the Mississippi Migratory Flyway, there is discernable change in topography in comparison. Within the broad expanse of the adjacent Missouri River Valley, Hitchcock is ideally situated for raptors to soar on thermals and topographic-induced upward wind deflection from combination of the adjacent Missouri River and Loess Hills. The Project habitat is significantly less unique, consisting of mostly pasture/hayfields and cultivated cropland.

2.2.1.2 Migratory Songbirds

Small songbirds account for about 60% of the fatalities at wind facilities in the United States. Most of these songbirds are migratory, resulting in peaks of bird fatalities during spring and fall migration (AWWI

2017a). Therefore, an evaluation of migratory bird activity, especially during spring and fall, at a proposed wind facility site is often part of pre-construction due diligence (USFWS 2012).

Migratory songbirds are ubiquitous throughout the United States and the Project region. In the Central Migratory Flyway, songbird migration occurs primarily from late March through mid-May and from late August through mid-November (ASM 2018; Robbins 2018). Songbirds do not generally migrate in concentrated numbers, but geographical features (e.g., shorelines of large lakes) can concentrate migrating songbirds. Also, unique, isolated habitat such as wetland complexes or forest blocks can attract larger concentrations of migratory songbirds (Proctor and Lynch 1993).

2.2.1.3 Waterbirds

Although waterbirds fatalities at land-based wind farms are low compared to raptors and songbirds, there is concern that wind farms sited near waterbird concentration areas may disrupt migration and flight patterns and pose a fatality risk to waterbirds flying between foraging and roosting habitats (Kuvlesky et al. 2007). In the Midwest, waterbird migration generally occurs from February through May (spring) and then from September to December (fall). Multiple creeks and small ponds are within the Project area, and the One Hundred and Two River runs adjacent to the Project boundary. All three types of water features have potential to attract flocks of migrating and overwintering waterbirds (see Figure 1-1). Loess Bluffs National Wildlife Refuge, located approximately 25 miles southwest of the Project, is likely to attract flocks of migrating waterbirds in large numbers. In addition, the Project is characterized by cultivated cropland, which is often used by flocks of mixed geese during migration and as winter foraging habitat. However, cropland habitat is not unique within the Project and is ubiquitous throughout the region.

2.2.1.4 Grassland Specialist Birds

As a group, grassland specialist birds have shown greater long-term population declines than any other group of birds across North America. These declines have primarily been caused by the loss, fragmentation, and degradation of native grasslands due to agriculture, development, drought, and introduction of non-native grasses (NRCS 1999). Wind development can impact grassland birds through habitat loss, habitat fragmentation, and disturbance effects.

The Project is located within a region that is predominately cultivated cropland with patches of hayfields and pasture. Native prairie occurs as a small percentage of habitat within the Project (<2%). Many grasslands in the region are fragmented and, in general, have been degraded through decades of continuous grazing, fire suppression, and encroachment of non-native plants. The MDC has identified habitat loss and fragmentation to be one of the primary conservation issues for the region and some of the bird species identified by the MDC as SCC are grassland specialist birds (e.g., Short-eared Owl [*Asio flammeus*] and Northern Harrier [*Circus cyaneus*]) (MDC 2018).

2.2.2 USGS Breeding Bird Survey

Stantec reviewed the results of BBS routes in the Project vicinity to provide an indication of the bird species that may be expected during the breeding season. The BBS is a “long-term, large-scale, international bird monitoring program that was initiated in 1966 to track the status and trends of North

American bird populations" (USGS 2001). The BBS is conducted during the height of the breeding season (primarily June) by volunteers skilled at bird identification. Although the BBS has been conducted since 1966, habitats and land cover compositions along each route have likely changed since inception of the survey, with corresponding changes in the composition of the bird community. Therefore, Stantec only queried data from the last 20 years of the available survey data (1998-2017) for this BBCS. Some routes are not surveyed every year because surveys are conducted based on the availability of volunteers. Consequently, data may not be available for every year for each route reviewed for this BBCS.

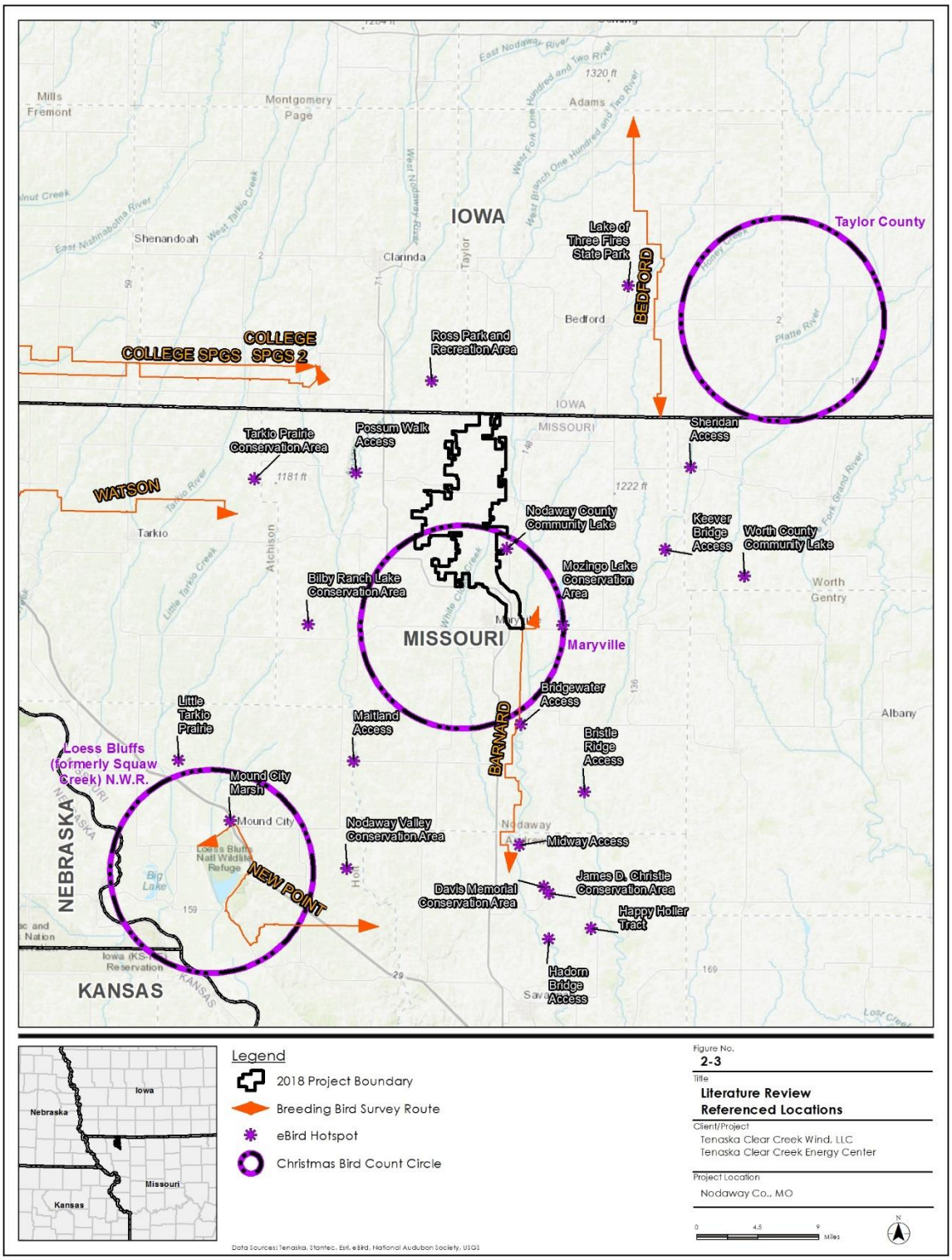
There are five active BBS routes within 25 miles of the Project: Watson, New Point, Barnard, Bedford, College Springs, and College Springs 2 are shown in Figure 2-3. The Watson route is 14 miles from the the Project's western boundary and has been surveyed 14 times in the last 20 years. The New Point route is 24 miles from the Project's southwest boundary and has been surveyed 13 times in the last 20 years. The Barnard route runs north/south from the southern edge of the Project boundary and has been surveyed 15 times in the last 20 years. The Bedford route is approximately 12 miles northeast of the Project and has been surveyed 18 times in the last 20 years. The College Springs and College Springs 2 routes are approximately 12 miles northwest of the Project. College springs was only surveyed 2 times in the past 20 years and College Springs 2 has been surveyed 13 times in the past 20 years.

As presented in Table 2-1, Stantec compared the land cover along each route to the land cover within the Project. All BBS routes reviewed have higher proportions of croplands, grasslands, and wetlands than are present at the Project (USGS 2014). Pasture and developed land covers are higher within the Project than the BBS routes reviewed. Although land cover compositions are different between the BBS routes compared to the Project, the bird community recorded from the BBS routes are expected to represent species that favor the habitat mosaics within the region.

Table 2-1 Proportions of Land Cover within the Project and Six Nearby Breeding Bird Survey Routes

	Proportion of Land Cover Type						
		Breeding Bird Survey Route[2]					
Land Cover Type	**Project[1]**	**Watson**	**New Point**	**Barnard**	**Bedford, IA**	**College Springs IA**	**College Springs 2 IA**
Grassland/Herbaceous	1.4%	4.1%	3.4%	8.6%	11.0%	9.0%	9.0%
Cropland	36.3%	59.7%	68.5%	50.3%	43.9%	64.1%	64.1%
Developed Land	5.6%	1.8%	1.2%	0.3%	1.5%	2.6%	2.6%
Pasture/Hay	44.0%	26.3%	18.7%	16.7%	37.3%	19.8%	19.8%
Forest	10.7%	4.8%	6.9%	15.6%	4.1%	2.4%	2.4%
Open Water	0.4%	1.0%	0.2%	0.1%	0.1%	0.2%	0.2%
Wetlands	0.1%	2.0%	1.2%	5.6%	2.0%	0.8%	0.8%
Shrubland	1.4%	0.2%	0.1%	0.1%	0.0%	1.0%	1.0%

Sources: USGS 2014; Homer et al. 2015
[1] Land cover within 2018 Project boundary.
[2] Land cover within 1-mile of the survey route.


IOWA
MISSOURI
KANSAS
NEBRASKA
Taylor County
Lake of Three Fires State Park
BEDFORD
COLLEGE SPGS
COLLEGE SPGS 2
Ross Park and Recreation Area
Tarkio Prairie Conservation Area
Possum Walk Access
WATSON
Sheridan Access
Nodaway County Community Lake
Keever Bridge Access
Worth County Community Lake
Bilby Ranch Lake Conservation Area
Mozingo Lake Conservation Area
Maryville
Bridgewater Access
BARNARD
Maitland Access
Bristle Ridge Access
Little Tarkio Prairie
Loess Bluffs (formerly Squaw Creek) N.W.R.
Mound City Marsh
Nodaway Valley Conservation Area
Midway Access
James D. Christie Conservation Area
Davis Memorial Conservation Area
Happy Holler Tract
Hadorn Bridge Access
NEW POINT
Legend
2018 Project Boundary
Breeding Bird Survey Route
eBird Hotspot
Christmas Bird Count Circle
Figure No.
2-3
Title
Literature Review
Referenced Locations
Client/Project
Tenaska Clear Creek Wind, LLC
Tenaska Clear Creek Energy Center
Project Location
Nodaway Co., MO
Miles

In the last 20 years, 119 bird species have been observed across the Watson, New Point, Barnard, Bedford, College Springs, and College Springs 2 BBS routes (Pardieck et al. 2017). The average number of birds recorded per year per BBS route from 1997 through 2016 is listed by species in Appendix E, Table E-1. No T/E species were recorded along these routes between 1997 and 2016. One Bald Eagle was observed along the New Point BBS route in 2015. Missouri SCCs were observed along all BBS routes within 25 miles of the Project. Loggerhead Shrike (*Lanius ludovicianus*), a MO SCC, was recorded over multiple years (54 individuals over 20 years) along all BBS survey routes except New Point. One state endangered Northern Harrier was observed in 1999 and one MO SCC Sharp-shinned Hawk (*Accipiter striatus*) was observed in 2007 along the Bedford route. Another MO SCC, Swainson's Hawk (*Buteo swainsoni*), was recorded along the Watson Route in low numbers (one individual) in 2013 and 2016. One MO SCC, Sandhill Crane (*Grus canadensis*), was recorded in 2013 along the New Point route.

2.2.3 Birds in Missouri

Stantec also reviewed the results of the BiM (Jacobs 2003) to provide an indication of the birds that may be expected in the Project area throughout the year.

BiM contains records and an annotated checklist compiled by the Missouri Birds Record Committee. The Annotated Checklist of Birds of Missouri (2018) includes 423 positively recorded species, including 3 species formerly occurring in Missouri, 5 that have become extinct, and 12 provisional (unconfirmed) species. Species were assigned as permanent residents, summer residents (breeding), summer visitors (non-breeding), winter residents, winter visitors (present for only a short period of winter), and transient species present in spring and/or fall migration (ASM 2018).

There were 262 bird species with accepted sight records, confirmed breeding records, or seasonal ranges recorded in Nodaway County. Each species status is detailed in Appendix E, Table E-1. No federal T/E species were observed in Nodaway County. Thirteen state-listed E/SCC had accepted sight records in Nodaway County including: Trumpeter Swan (*Cygnus buccinator*), American Bittern (*Botaurus lentiginosus*), Snowy Egret (*Egretta thula*), Osprey (*Pandion haliaetus*), Northern Harrier, Sharp-shinned Hawk, Swainson's Hawk, Virginia Rail (*Rallus limicola*), Sora (*Porzana Carolina*), Sandhill Crane, Short-eared Owl, Peregrine Falcon (*Falco peregrinus*) and Loggerhead Shrike. One of these SCC, Loggerhead Shrike, was recorded as having potential breeding range in Nodaway County.

2.2.4 Christmas Bird Count

Stantec reviewed the results of the Audubon's CBC to provide an indication of the bird community that might be expected to occur in the Project area during the winter. The CBC is a citizen-science program that collects data on bird populations throughout the Americas during the months of December and January. The CBC began in the early 1900s and is the longest-running dataset in ornithology. The CBC allows researchers, conservationists, wildlife agencies, and other interested individuals to study the long-term status of winter bird populations across the Western Hemisphere (Audubon 2018a). Although the survey has been conducted for over 100 years, Stantec queried only the last 20 years of CBC data for this BBCS (1998 to 2017). Each year, in the course of one day, tens of thousands of volunteers attempt to count all the birds within circular 15-mile diameter survey areas distributed across the Western

Hemisphere. Stantec reviewed the CBC circles within 25 miles of the Project for comparison for this BBCS.

There are three CBC circles (Loess Bluffs, Maryville, Taylor County) within 25 miles of the Project (see Figure 2-3). All three CBC circles have been surveyed 20 years (1998-2017). As presented in Table 2-2, landcover within the Loess Bluffs CBC circle is primarily cropland and wetland habitat due to the presence of Loess Bluffs National Wildlife Refuge. This CBC can be expected to include greater abundances and diversity of waterbird species than the habitat within the Project. Habitat within the Maryville CBC circle includes a higher proportion of cropland than the Project. The Taylor County CBC circle is comparable to the Project in distribution and percentage of landcover.

Table 2-2 Proportions of Land Cover within the Project and Three Nearby Christmas Bird Count Survey Circles

	Proportion of Land Cover Type			
		Christmas Bird Count Circle[2]		
Land Cover Type	Project[1]	Loess Bluff	Maryville	Taylor Co.
Grassland/Herbaceous	1.4%	3.0%	1.3%	1.6%
Cropland	36.3%	55.0%	53.5%	46.9%
Developed Land	5.6%	7.6%	7.9%	4.4%
Pasture/Hay	44.0%	5.1%	28.8%	32.7%
Forest	10.7%	7.9%	6.6%	11.6%
Open Water	0.4%	4.2%	1.0%	0.5%
Wetlands	0.1%	17.2%	0.8%	1.4%
Shrubland	1.4%	0.0%	0.1%	0.8%
Barren Land	1.4%	0.0%	0.0%	0.0%

Source: Homer et al. 2015
[1] Land cover within 2018 Project boundary
[2] Land cover within the circle (180 mi^2)

Since 1998, 130 bird species have been recorded within the Loess Bluffs CBC circle (Audubon 2018a). The average number of birds recorded from 1998 through 2017 is listed by species in Appendix E, Table E-1. Nine special status bird species have been recorded during the Loess Bluffs CBC, including Bald Eagle (3,550 individuals), Trumpeter Swan (3,938 individuals), Golden Eagle (5 individuals), Northern Harrier (356 individuals), Sharp-shinned Hawk (33 individuals), Sandhill Crane (113 individuals), Short-eared owl (110 individuals), Peregrine Falcon (1 individual), and Loggerhead Shrike (18 individuals). The number of years these species were observed in the Loess Bluffs CBC circle and the maximum count are provided in Table 2-3.

Table 2-3 Special Status Bird Species Recorded during the Loess Bluffs Christmas Bird Count from 1998 to 2017

Species	Federal Status	Missouri Status	Number of Years Recorded	Maximum Count (Year)
Bald Eagle	BGEPA	--	20	390 (2003)
Golden Eagle	BGEPA	--	5	1 (1998-2000, 2011, 2015)
Northern Harrier	--	E	20	42 (2006)
Sharp-shinned Hawk	--	SCC	17	4 (2011, 2014)

Species	Federal Status	Missouri Status	Number of Years Recorded	Maximum Count (Year)
Sandhill Crane	--	SCC	9	30 (2015)
Short-eared Owl	--	SCC	14	22 (2015)
Trumpeter Swan	--	SCC	14	1163 (2017)
Peregrine Falcon	--	E	1	1 (2006)
Loggerhead Shrike	--	SCC	10	5 (2004)

Source: Audubon 2018a
Key:
BGEPA = Protected under the Bald and Golden Eagle Protection Act.
E = endangered
SCC = Missouri Species of Conservation Concern

The Maryville CBC circle was sampled from 1998 – 2018 and 115 bird species were recorded (Audubon 2018a; Appendix E, Table E-1). Seven special status bird species were recorded over the 20-year period including Bald Eagle (159 individuals), Trumpeter Swan (137 individuals), Golden Eagle (1 individual), Northern Harrier (65 individuals), Sharp-shinned Hawk (9 individuals), Short-eared Owl (1 individual), and Loggerhead Shrike (28 individuals) were recorded. The number of years these species were observed in the Maryville CBC circle and the maximum count are provided in Table 2-4.

Table 2-4 Special Status Bird Species Recorded during the Maryville Christmas Bird Count from 1998 to 2017

Species	Federal Status	Missouri Status	Number of Years Recorded	Maximum Count (Year)
Bald Eagle	BGEPA	--	19	23 (2013)
Golden Eagle	BGEPA	--	1	1 (2007)
Northern Harrier	--	E	18	17 (2001)
Sharp-shinned Hawk	--	SCC	11	2 (2001, 2005)
Short-eared Owl	--	SCC	2	3 (1998)
Trumpeter Swan	--	SCC	8	67 (2016)
Loggerhead Shrike	--	SCC	14	9 (2003)

Source: Audubon 2018a
Key:
BGEPA = Protected under the Bald and Golden Eagle Protection Act.
E = endangered
SCC = Missouri Species of Conservation Concern

Across 20 years, 94 bird species have been recorded within the Taylor County CBC circle (Audubon 2018a; Appendix E, Table E-1). Seven special status species including Bald Eagle (288 individuals), Golden Eagle (2 individuals), Trumpeter Swan (10 individuals), Northern Harrier (81 individuals), Sharp-shinned Hawk (10 individuals), Short-eared Owl (6 individuals), and Loggerhead Shrike (12 individuals) were observed. The number of years these species were observed in the Taylor County CBC circle and the maximum count are provided in Table 2-5.

Table 2-5 Special Status Bird Species Recorded during the Taylor County Christmas Bird Count from 1998 to 2017

Species	Federal Status	Missouri Status	Number of Years Recorded	Maximum Count (Year)
Bald Eagle	BGEPA	--	15	74 (2017)
Golden Eagle	BGEPA	--	2	1 (2005, 2016)
Northern Harrier	--	E	18	14 (2003)
Sharp-shinned Hawk	--	SCC	7	3 (2011)
Short-eared Owl	--	SCC	3	3 (2012)
Trumpeter Swan	--	SCC	2	9 (2016)
Loggerhead Shrike	--	SCC	9	3 (2001)

Source: Audubon 2018a
Key:
BGEPA = Protected under the Bald and Golden Eagle Protection Act.
E = endangered
SCC = Missouri Species of Conservation Concern

2.2.5 eBird

Stantec queried the eBird program's online database to provide an indication of the bird activity within the Project's vicinity. The eBird program was first launched in 2002 by Cornell and Audubon to collect and compile data from bird watchers across the world. The goal of the eBird program is to accumulate information on bird abundance (i.e., total individuals) and distribution from observations submitted to an internet database by professional and recreational bird watchers (eBird 2018). eBird is a real-time database where sightings are available via the website almost instantly after being submitted by participants. A web-interface allows users to submit checklists of birds detected at Global Positioning System locations, which are called either "hot spots" or "personal locations." Hot spots are locations, such as wildlife refuges or bird sanctuaries, that are frequented by many bird watchers. Personal locations are sites used for one instance to report an interesting sighting and/or used by only one observer. Records of historical data (prior to the establishment of eBird in 2002) are also included within eBird data available for download. These data are available to the public through eBird's website (eBird 2018). Unlike the BBS and CBC, eBird data are not limited to any specific time of year and can provide information on bird activity during migration, as well as during the breeding and winter seasons.

There are some limitations to eBird data because it was designed to collect data from recreational bird watchers as well as professionals. The data are not standardized, and the level of effort will not be evenly distributed across the landscape or among habitats. Therefore, there is more information for areas favored by bird watchers (e.g., wildlife refuges) and areas with higher human densities (e.g., metropolitan areas). Data collected by recreational bird watchers may be missing cryptic or difficult to identify species. However, there are automated data quality control features integrated into the submission process whereby unusual records are flagged and reviewed by local experts (eBird 2018).

As with the other data sources reviewed for this BBCS, Stantec queried the last 20 years of available eBird data (1999 to 2018) submitted up to January 31, 2018 for "hotspots" within 25 miles of the Project and all special status bird species observations within 25 miles. The results of the query included 21 general hotspot locations, which are displayed in Figure 2-3.

In the last 20 years, 243 bird species were recorded at eBird hotspots within 25 miles of the Project (eBird 2018). Of these 243 species, 64 species were not recorded elsewhere in this literature review or at the Project during pre-construction surveys (see Appendix E, Table E-1). These species were primarily waterbirds (waterfowl, wading birds, shorebirds, and terns) and warblers, most of which are only present in northwest Missouri during spring and fall migration (Thompson et al. 2011).

Fourteen special status species were included in the eBird results, as shown in Table 2-6, three of which were not recorded elsewhere in the literature review and/or at the Project (see Appendix E, Table E-1). Bald Eagle, Osprey, Northern Harrier, Sharp-shinned Hawk, Short-eared Owl, Snowy Egret, and Loggerhead Shrike were the only special status species observed within the Project boundary. The Trumpeter Swan sighting was within 3 miles of the Project within the last 3 years. Golden Eagle, Peregrine Falcon, Sandhill Crane, American Bittern, Virginia Rail, and Sora sightings were all over 20 miles from the Project within the last 10 years (eBird 2018).

Table 2-6 Special Status Bird Species Records from eBird from 1999 through January 31, 2018 within 25 Miles

Species	Federal Status	Missouri Status	Year of Most Recent Sighting	Nearest Sighting (Year)[1]
Bald Eagle	BGEPA	--	2016	Within Project (2018)
Golden Eagle	BGEPA	--	2014	22.0 miles (2014)
Osprey	--	SCC	2016	Within Project (2017)
Northern Harrier	--	E	2016	Within Project (2018)
Peregrine Falcon	--	E	2008	22.0 miles (2008)
Sharp-shinned Hawk	--	SCC	2017	Within Project (2017)
Short-eared Owl	--	SCC	2009	Within Project (2018)
Trumpeter Swan	--	SCC	2017	3.0 miles (2016)
Snowy Egret	--	E	2014	Within Project (2017)
Sandhill Crane	--	SCC	2015	22.0 miles (2015)
American Bittern	--	SCC	2013	22.0 miles (2013)
Virginia Rail	--	SCC	2013	22.0 miles (2013)
Sora	--	SCC	2015	22.0 miles (2015)
Loggerhead Shrike	--	SCC	2012	Within Project (2017)

Source: eBird 2018
[1] Approximate distance to the Project boundary

Key:
BGEPA = Protected under the Bald and Golden Eagle Protection Act.
E = Endangered
SCC = Missouri Species of Conservation Concern

2.2.1 Audubon Important Bird Areas

Audubon developed the IBA program to identify a network of sites with essential habitat for birds and to implement protection of those sites. IBAs are selected according to standardized criteria through a collaborative effort with nongovernmental organizations, government agencies, local conservation groups,

academics, birders, and other wildlife specialists. IBAs do not receive regulatory protection but have been designated as such because they support at least one of the following: species of conservation concern; restricted-range species; species that are vulnerable because their populations are concentrated in one habitat type or biome; or species, or groups of similar species, that are vulnerable because they occur at high densities due to their flocking behavior (Audubon 2010). Stantec conducted a review of IBAs within the Project plus a 25-mile radius and one state IBA and one global IBA were identified (Audubon 2018). The state IBA is Nodaway Valley Conservation Area approximately 18 miles southwest of the Project. Loess Bluffs (formerly Squaw Creek) National Wildlife Refuge is a global IBA approximately 25 miles southwest of the Project. Three additional state IBAs were greater than 25 miles southwest of the Project: Big Lake State Park, Big Brown Conservation Area, and Indian Cave State Park. IBAs near the Project are shown in Figure 2-4.

2.2.2 Recent Bird Studies

Pre- and post-construction survey results from other wind projects can provide useful information about bird activity in the Project's vicinity or potential bird mortality rates post-construction. Results of post-construction studies indicate that patterns of bird fatalities are highly variable among wind energy facilities and throughout the Great Plains. The greatest number of avian fatalities at United States wind facilities have been songbirds during spring and fall migration (AWWI 2017a). Raptors have also been impacted by wind projects; however, except for Altamont Pass and other older wind facilities in California, high numbers of raptor fatalities have been relatively low to absent at wind facilities elsewhere in the United States (Erickson et al. 2002; Kuvlesky et al. 2007; Strickland et al. 2011; Watson et al. 2018). The high mortality rate for raptors observed at Altamont Pass has been attributed to the turbine technology used, specific siting locations of the turbines, and the site-specific behavior of the affected raptors (AWWI 2016; Strickland et al. 2011). Additionally, research has indicated that human-related bird fatalities (e.g., feral and domestic cats, buildings, and communication towers) account for 98.6% of predicted annual avian mortality, with wind facilities comprising less than 0.01% (Erickson et al 2005).

2.3 BATS

2.3.1 Regional Bat Overview

A total of 15 bat species are known to exist in Missouri, 9 of which have geographic distributions that include Nodaway or adjacent counties (Boyles et al. 2009; Harvey et al. 2011; Schwartz and Schwartz 2016). These nine species are listed in Table 2-7. Federal and state-listed T/E bat species documented within Nodaway County, or adjacent counties, include IBAT and NLEB (Stantec 2017b, USFWS 2017b). Based on Project bat surveys, the NLEB is the only species known to occur within the Project that is ESA listed (threatened, Stantec 2018b). There are three state-listed bat Species of Conservation Concern (SCC) in Missouri with potential to occur in Nodaway County: Little Brown Bat (*Myotis lucifugus*), Silver-haired Bat (*Lasionycteris noctivagans*), and Tri-colored bat (*Perimyotis subflavus*). Additionally, the Tri-colored Bat has been petitioned for federal listing under the ESA (82 FR 60364, Dec. 20, 2017). All bat species that possibly occur in Nodaway County or adjacent counties use woodland habitat along stream corridors for feeding and roost in trees during the spring and summer (Stantec 2017b).

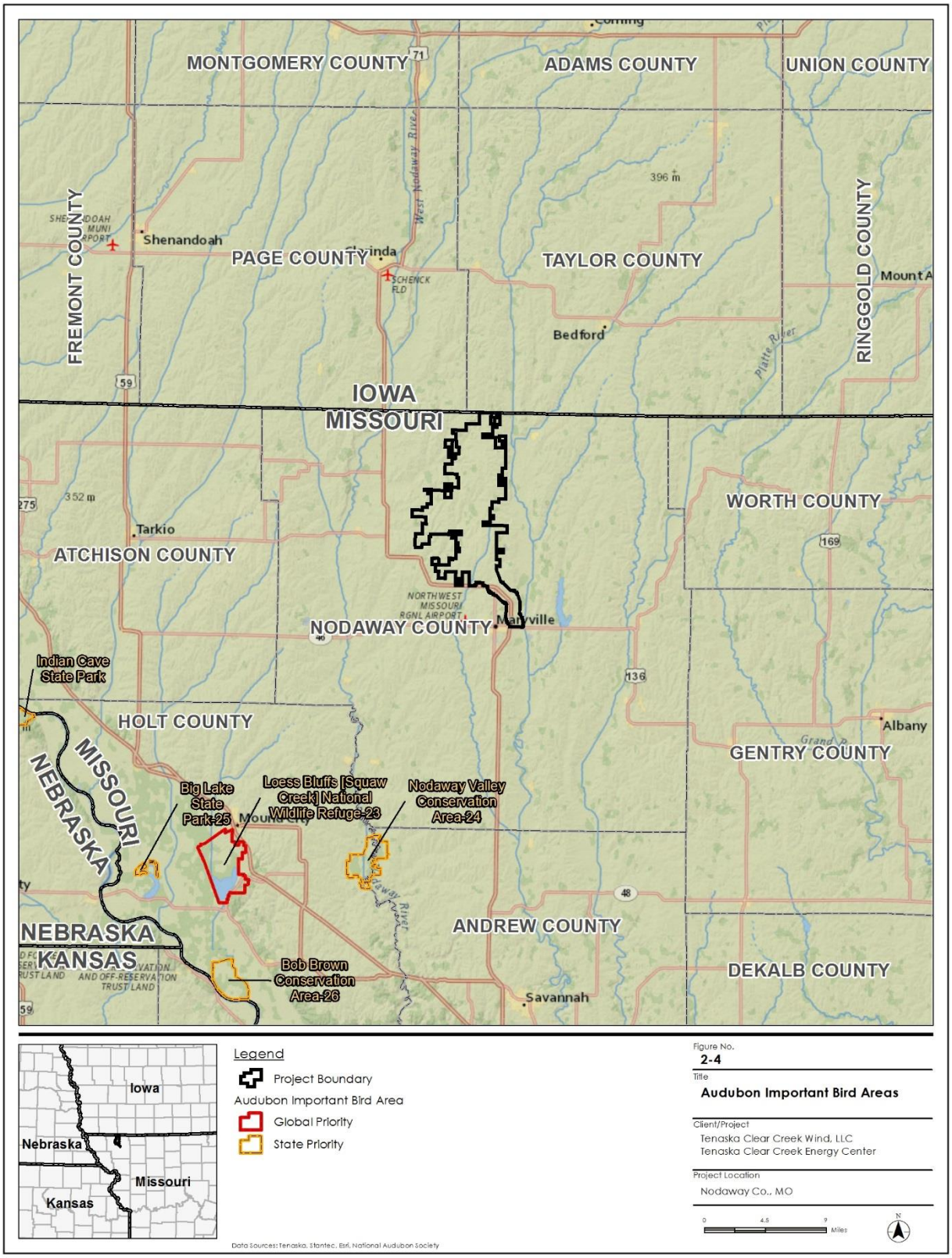

MONTGOMERY COUNTY
ADAMS COUNTY
UNION COUNTY
FREMONT COUNTY
PAGE COUNTY
TAYLOR COUNTY
RINGGOLD COUNTY
Shenandoah
Bedford
IOWA
MISSOURI
WORTH COUNTY
Tarkio
ATCHISON COUNTY
NODAWAY COUNTY
Maryville
Indian Cave State Park
HOLT COUNTY
Albany
GENTRY COUNTY
MISSOURI
NEBRASKA
Big Lake State Park-25
Loess Bluffs [Squaw Creek] National Wildlife Refuge-23
Nodaway Valley Conservation Area-24
ANDREW COUNTY
NEBRASKA
KANSAS
Bob Brown Conservation Area-26
DEKALB COUNTY
Savannah
Iowa
Nebraska
Missouri
Kansas
Legend
Project Boundary
Audubon Important Bird Area
Global Priority
State Priority
Figure No.
2-4
Title
Audubon Important Bird Areas
Client/Project
Tenaska Clear Creek Wind, LLC
Tenaska Clear Creek Energy Center
Project Location
Nodaway Co., MO
Miles
Data Sources: Tenaska, Stantec, Esri, National Audubon Society

Table 2-7 Bat Species with the Potential to Occur in the Project Region

Species	Scientific Name	Group	Federal Rank	State Rank
Big Brown Bat	*Eptesicus fuscus*	LFSG	-	-
Eastern Red Bat	*Lasiurus borealis*	HFSG	-	-
Evening Bat	*Nycticeius humeralis*	HFSG	-	-
Hoary Bat	*Lasiurus cinereus*	LFSG	-	-
Indiana Bat	*Myotis sodalis*	HFSG	Endangered	Endangered
Little Brown Bat	*Myotis lucifugus*	HFSG	-	SCC
Northern Long-eared Bat	*Myotis septentrionalis*	HFSG	Threatened	Endangered
Silver-haired Bat	*Lasionycteris noctivagans*	LFSG	-	SCC
Tri-colored Bat	*Perimyotis subflavus*	HFSG	Under Review	SCC

Sources: Boyles et al. 2009; Harvey et al. 2011; Schwartz and Schwartz 2016.
Key:
HFSG = High Frequency Species Group
LFSG = Low Frequency Species Group
SCC = Species of Conservation Concern

Bats use echolocation for foraging and maneuvering throughout their environment, and different bat species use various frequencies for their echolocation call structure. The minimum frequency of a bat pass (measured in kilohertz [kHz]) is a characteristic typically used to differentiate species or groups of species from one another. Bat species can be separated into two species groups based on their minimum frequency (see Table 2-7). Bats with echolocation pulses typically less than or equal to 30 kHz are placed into the Low Frequency Species Group (LFSG). Bats with minimum echolocation pulse frequencies higher than 30 kHz are identified as High Frequency Species Group (HFSG).

Bat fatalities at wind energy facilities in North America are primarily composed of tree bats (e.g., Eastern Red Bat, Hoary Bat, and Silver-haired Bat) in overall numbers (Cryan and Barclay 2009). Across the United States and Canada, these 3 species comprise 78.4% of bat fatalities found during carcass searches at wind facilities (Arnett and Baerwald 2013). All 3 species are known to occur within the Project vicinity (Schwartz and Schwartz 2016). These species are considered long distance migrators, routinely traveling hundreds of miles from winter to summer habitats (Reynolds and Veilleux 2008). The timing of bat fatalities occurs predominantly during the late summer through fall months when these bats are migrating from their summer habitats (Cryan and Barclay 2009). One hypothesis that attempts to explain this influx of activity involves the mating habits of these species to congregate and fly around tall features in the landscape during migration (Cryan 2008).

2.3.2 Recent Bat Studies

Pre- and post-construction survey results from other wind projects can provide useful information about bat activity in the Project's vicinity and/or potential bat mortality rates post-construction. Bat mortality rates for post-construction surveys are highly variable throughout the United States, and largely depend on the geographical location of the wind facility (Arnett et al. 2008). Data collected from mortality surveys in the United States and Canada have indicated higher fatality rates for migratory tree-roosting bat

species (e.g., Eastern Red Bat) during fall migration (Arnett et al. 2016). In the Midwest, higher percentages of fatalities for cave-dwelling species have been reported (AWWI 2017a).

2.4 SPECIAL STATUS BIRD AND BAT SPECIES

Stantec reviewed the range, habitat preferences, and dates of occurrence for eagles; ESA-listed birds and bats that occur in Missouri; and Missouri SCC birds and bats to compile a list of special status bird and bat species that may be impacted by development of the Project. Special status bird and bat species that have the potential to occur in the Project region (i.e., Nodaway County and adjacent counties) are listed in Table 2-8. Special status species were included if there were observations within the 25-mile buffer (Appendix E, Table E-1). The list includes 2 species protected by BGEPA, 7 species listed as endangered in Missouri, and 12 species listed as SCC in Missouri. The following sections provide brief descriptions of each species, its range, its population status, its habitat requirements for the seasons of its life cycle when it is expected to occur in the region, and its reason for listed status. This information, along with the results of the literature review and field surveys, was used to determine the potential risk the construction and operation of the Project may have on special status species. The risk assessment for each of these species is presented in Section 5.3.

Table 2-8 Special Status Bird and Bat Species with the Potential to Occur in the Project Region

Species	Federal Status	Missouri Status	Dates Potentially Present	Preferred Habitat in Northwestern Missouri	Reason for Listed Status
BIRDS					
American Bittern	-	E	Mid-April – mid-Oct	Wetlands with tall, emergent vegetation	Loss and degradation of wetland habitats, conversion of habitat for urban development
Bald Eagle	BGEPA	-	All Year	Rivers, lakes, and reservoirs with sufficient food; woodlands near water; open areas with animal carcasses	Although they have dramatically increased in population, they are still vulnerable and remain protected due to historical decline from eggshell thinning caused by DDT
Golden Eagle	BGEPA	-	Early Nov– late March	Vast open grasslands, frequents prairie dog towns	Historical population decline, still considered vulnerable
Greater Prairie-Chicken	---	E	Year Round	Intact native prairie	Loss and fragmentation of prairie habitat
Loggerhead Shrike	-	SCC	Year Round	Open country and grasslands, fields with shrubs and scattered trees	Rapidly declining population, believed to be due to pesticides and habitat loss.
Northern Harrier	-	E	Spring/Fall Migration, rare year-round	Prairies, marshes, and hay fields	Wetland drainage, conversion of native prairies to agriculture, reforestation projects, untimely mowing or haying, and DDT-related egg shell thinning
Osprey	-	SCC	Spring/Fall Migration	Lakes, rivers, and other water sources	Population decline due to DDT and other chemical toxins.
Peregrine Falcon	-	E	Spring/Fall Migration	Open areas, cliffs and bluffs	Formerly extirpated in Missouri and most of North America due to egg-shell thinning from DDT. Overgrown vegetation on cliffs reduce nesting habitat.
Sandhill Crane	-	SCC	mid-March – mid-April	Crop fields and marshes	No breeding records in the state, rare migrant
Sharp-shinned Hawk	-	SCC	Early Sept-late March, rare in summer	Hedgerows, forests, treelines. Nests in shortleaf pines	Habitat loss and fragmentation resulting in decline of dense tracts of forest required for breeding.

Species	Federal Status	Missouri Status	Dates Potentially Present	Preferred Habitat in Northwestern Missouri	Reason for Listed Status
Short-eared Owl	-	SCC	Mid-Oct – mid April	Almost exclusively in grassland; especially native prairie. Roosts on the ground or in low bushes	Declining population
Snowy Egret	-	E	Early March-late Sept	Wetlands, lakeshores, ponds, and small rivers. Nests in trees or low-growing marsh plants	Loss of suitable nesting sites and habitat due to destruction of wetland/riparian corridors, human disturbance, degrading wetland quality
Sora	-	SCC	Mid-April to late Oct	Marshes, swamps, wet pastures, and flooded fields with dense emergent vegetation	Habitat Loss
Swainson's Hawk	-	SCC	Early April-late Oct	Open country prairies, and pastures	Lower reproduction due to decline of main prey species (ground squirrel), mortality due to pesticide use
Trumpeter Swan	-	SCC	Late Nov – late March	Marshes, lakes, rivers, and freshwater habitats with dense emergent vegetation	Breeding in Missouri is extremely rare
Virginia Rail	-	SCC	Spring/Fall Migration	Marshes, swamps	Habitat loss
BATS					
Indiana Bat	E	E	Mid-April to late Oct	Woodlands associated with riparian corridors	Hibernacula disturbance, summer habitat loss, White-nose Syndrome
Little Brown Bat	-	SCC	Mid-April to late Oct	Woodlands associated with riparian corridors	Rapidly declining population resulting from impacts of White-nose Syndrome
Northern Long-eared Bat	T	E	Mid-April to late Oct	Woodlands associated with riparian corridors	Rapidly declining population resulting from impacts of White-nose Syndrome
Silver-haired Bat	-	SCC	Mid-April to late Oct	Woodlands associated with riparian corridors	Unknown status and distribution within the state
Tri-colored Bat	Under Review	SCC	Mid-April to late Oct	Woodlands associated with riparian corridors	Rapidly declining population resulting from impacts of White-nose Syndrome

Sources: Jacobs 2003, ASM 2018; Boyles et al 2009
Key:
BGEPA = Bald and Golden Eagle Protection Plan
E = endangered
SCC = Missouri Species of Conservation Concern
T = threatened

3.0 DESKTOP ASSESSMENTS

This section provides a summary of the results and conclusions of Clear Creek's pre-construction desktop assessments. Complete assessment methods, results, and conclusions are available in referenced reports listed below:

- Site Characterization Study (SCS; Stantec 2017c).
- Stage 1 Eagle Risk Assessment (ERA; Stantec 2017d).
- Bat Risk Assessment (Stantec 2017b).

3.1 SITE CHARACTERIZATION STUDY

A SCS was completed for the Project per the WEG. This section provides a summary of the results and conclusions of the SCS (Stantec 2017c) which were used to identify the potential Tier 3 surveys described in Section 4.0. Publicly available data sources were reviewed for information on potential environmental impacts, state and federal protected species, and other protected species.

Based on the assessment (see Stantec 2017c), several at-risk environmental resources were identified that could be impacted by the construction and development of the Project. The SCS identified potential collision risk to migratory birds, including eagles. Bald Eagle occurrence in the Project was identified as possible due to the presence of nearby foraging habitat: Nodaway County Lake, Mozingo Lake, Nodaway River, and One Hundred and Two River. The federally endangered IBAT and threatened NLEB were also identified based on the species ranges. In addition, the federally-listed threatened Mead's Milkweed, Western Prairie Fringed Orchid, and Prairie Bush Clover were identified based on ranges; however, suitable meadow habitats or native rangeland were absent from the Project (Section 1.2.1) and no individuals were identified during wetland surveys (See section 4.8). For additional details regarding the assessment of state and federal T/E species which are not detailed in this BBCS, please refer to the Project's SCS (Stantec 2017c).

3.2 STAGE 1 EAGLE RISK ASSESSMENT

As per the ECPG, a Stage 1 ERA was completed for the Project. This section provides a summary of the results and conclusions of the Project's ERA (Stantec 2016f). The ERA focused on Bald Eagles due to the rarity of Golden Eagles in northwestern Missouri and the Project's location within the Bald Eagle winter range (Kochert et al. 2002; Robbins 2018). Stantec reviewed the following sources for eagle-related information: State and Federal data, publications, and correspondence; the BiM (Jacobs 2003); Audubon's CBC; Audubon and Cornell's eBird program; scientific publications; publicly available GIS data; and publicly available survey data. The definition of a Bald Eagle Local Area Population (LAP) as a 43-mile buffer around a project in the ECPG has since been updated to an 86-mile buffer (50 Code of Federal Regulations §22.26, as amended). Locations and datasets referenced in the ERA are shown in Figure 3-1. Data sources were reviewed for information on eagle seasonal abundance, nesting records, migration corridors, communal roosts, and prey availability or potential foraging hotspots within the 2016

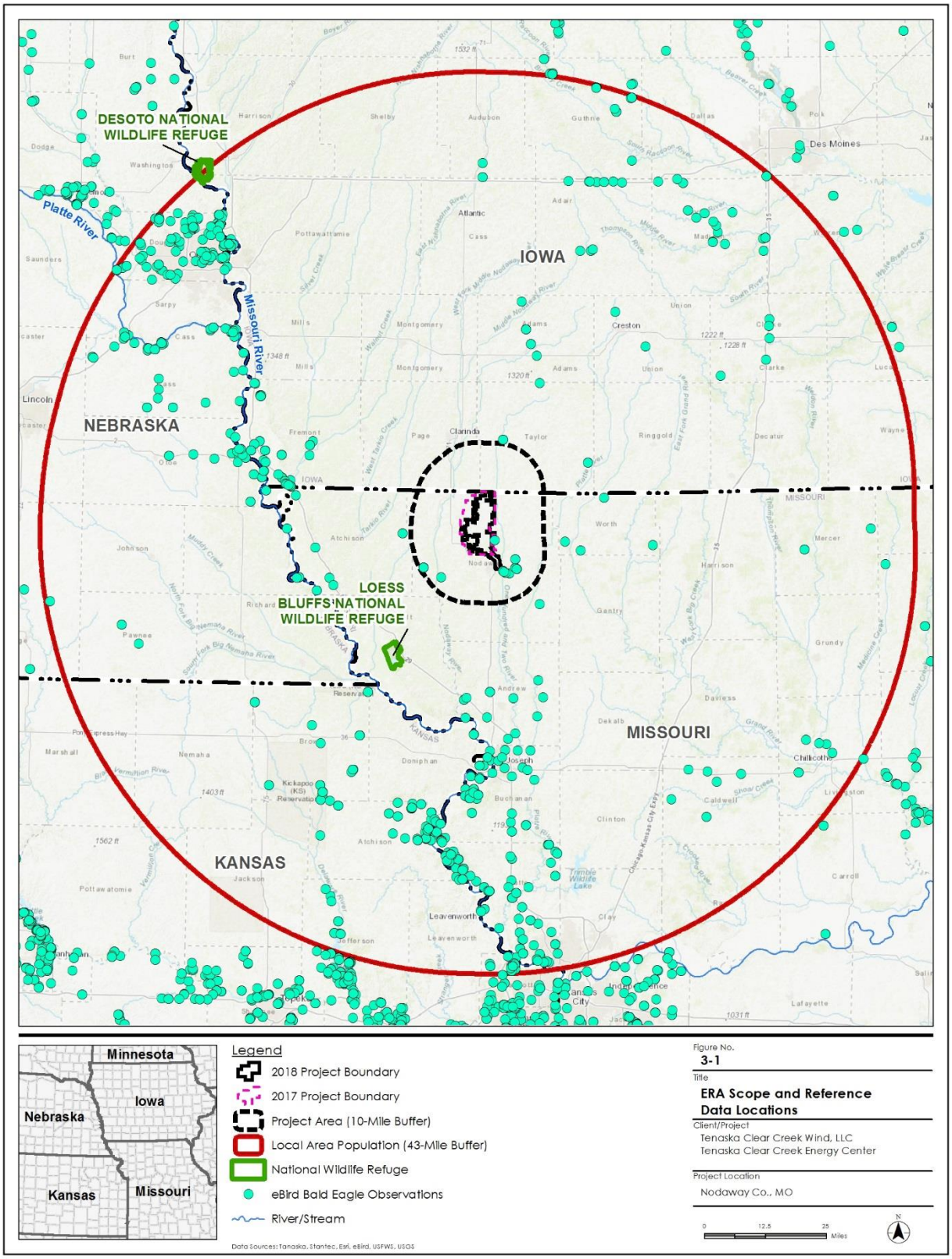
Project boundary, the Project Area (2016 Project boundary and a 10-mile buffer), and Bald Eagle LAP (2016 boundary and a 86-mile buffer) based on ECPG.

Based on the complete assessment (see Stantec 2017d), suitable habitat for breeding, migrating, or wintering Bald Eagles was identified within the LAP along the Missouri River, the Platte River, Loess Bluffs National Wildlife Refuge, and Smithville Lake. The LAP refers to the eagle population within the area of human activity or project bounded by the natal dispersal distance for the respective species (86 miles for Bald Eagles) (USFWS 2016). The Project LAP spans portions of southwest Iowa, southeast Nebraska, northeast Kansas, and northwest Missouri. Current and historical records of Bald Eagle nests in Nebraska are concentrated around the Missouri River, Platte River, and in the eastern half of the state. Iowa reported 84 active nests in 1998 spread among 42 Iowa Counties (Iowa DNR 2017). Bald Eagle nesting records in Kansas from 1989-1998 provided in Watkins and Mulhern (1999) were located near reservoirs. In Missouri, recent Bald Eagle nest counts reveal an increase in nests to 284 active nests as of the 2016 spring statewide survey (MDC 2016) (see Figure 3-1). Suitable habitat for breeding, migrating, or wintering Bald Eagles is present within the LAP along the Missouri River, Platte River, Smithville Lake, Indian Cave State Park, and Loess Bluffs National Wildlife Refuge.

In addition, Bald Eagles occur along the One Hundred and Two River, Mozingo Lake, Nodaway County Lake, and Nodaway River; all of which occur in the Project Area. The Project Area is defined as the area that includes the Project Footprint plus a 10-mile buffer around the Project Footprint, which is a conservative approximation of the largest recorded Golden Eagle breeding territory size (USFWS 2013). Bald Eagles occur in the highest concentrations around major waterbodies with reliable food sources, as demonstrated by the distribution of eBird Bald Eagle sightings from 2011-2016 within the LAP (Figure 3-1). In addition, suitable habitat within the Project Area is present at Nodaway County Lake, Mozingo Lake, One Hundred and Two River, and Nodaway River. During the Site Visit on February 23, 2017 a Bald Eagle nest was observed along the One Hundred and Two River.

Bald Eagle occurrence within the Project Footprint is also possible due to the proximity of the One Hundred and Two River, Nodaway River, and Mozingo Lake. The Project Footprint is defined as the boundary that encompasses the wind project inclusive of the hazardous area around all turbines and any associated infrastructure, including utility lines, out-buildings, roads, etc. (USFWS 2013). In addition, the presence of ponds and grasslands may provide foraging opportunities (e.g., waterfowl, cattle carcasses) within the Project Footprint. The current presence of nesting, foraging, or migrating Bald Eagles within the Project Footprint is unknown.

Based on the desktop information reviewed in the ERA, the Project was determined to likely meet the criteria for Category 2 – High or Moderate Risk to Eagles as defined by USFWS in the ECPG. As per the ECPG, projects in Category 2 may have opportunities to mitigate impacts and reduce risks to eagles. Clear Creek initiated site-specific surveys (see Section 4.0) to provide additional data to adequately determine the risk category for the Project.


DESOTO NATIONAL WILDLIFE REFUGE
LOESS BLUFFS NATIONAL WILDLIFE REFUGE
Platte River
Missouri River
NEBRASKA
IOWA
MISSOURI
KANSAS
Des Moines
Creston
Clarinda
Chillicothe
Kansas City
Leavenworth
Lafayette
Minnesota
Iowa
Nebraska
Kansas
Missouri
Legend
2018 Project Boundary
2017 Project Boundary
Project Area (10-Mile Buffer)
Local Area Population (43-Mile Buffer)
National Wildlife Refuge
eBird Bald Eagle Observations
River/Stream
Data Sources: Tanaska, Stantec, Esri, eBird, USFWS, USGS
Figure No.
3-1
Title
ERA Scope and Reference Data Locations
Client/Project
Tenaska Clear Creek Wind, LLC
Tenaska Clear Creek Energy Center
Project Location
Nodaway Co., MO
0
12.5
25
Miles
N

3.3 BAT RISK ASSESSMENT

In 2017, Stantec conducted a desktop Bat Assessment (Stantec 2017b) to evaluate the potential risk on special status bat species from construction and operation of the Project as part of the voluntary guidelines detailed in the WEG Tier 1 and Tier 2 (USFWS 2012). The purpose of the desktop Bat Assessment was to collect information on the potential occurrence and distribution of special status species of bats that could potentially interact with the Project, determine whether the Project contains suitable habitat, and provide a preliminary risk evaluation on listed bat species.

Stantec conducted a literature and database review to obtain information about bat resources that may occur within the Project boundary, plus a 50-mile buffer. Data sources were reviewed for information on seasonal abundance, known winter hibernacula locations, migration corridors, known roosts tree locations, and potential impacts from construction and operation of the proposed Project.

Nine bat species have known ranges that extend into Nodaway County, Missouri. At the time of the desktop Bat Assessment, four special status bat species had known ranges that included Nodaway County, Missouri: (1) the federal and state endangered IBAT, (2) the federal threatened and state endangered NLEB, (3) the Missouri SCC Little Brown Bat and (4) Silver-haired Bat (Stantec 2017b). After the publication of the Bat Assessment, MDC listed the Tri-colored Bat as a SCC (MDC 2018). Additionally, the Tri-colored Bat has been petitioned for federal listing under the ESA (82 FR 60364, Dec. 20, 2017). Fatalities of all five species have been documented at operational wind power projects (Kunz et al. 2007, Jain et al. 2011, and Pruitt and Okajima 2013).

Throughout the year bat abundance is closely tied to seasonal migrations, locations of overwintering hibernacula, and summer roost habitat. Natural habitat features or resource areas that typically attract foraging and roosting bats are limited within the Project (5,970 ac of woodlands). Due to the predominance of row-crop agriculture and pasture/hay habitats, the presence of suitable summer bat habitat (forested areas) is likely confined to riparian and stream corridors. Forested riparian areas found in or near the Project are associated with One Hundred and Two River, Nodaway River, and numerous small tributaries within the Project.

Known hibernacula records for IBATs are over 150 miles from the Project (USFWS 2007). Maternity colonies of IBATs have been recorded in Nodaway County, Missouri, and within 50 miles of the Project, but none have been recorded in the Project Footprint (USFWS 2007c; USFWS 2017a, MDC 2017b). In addition, no records exist in Nodaway County west of the One Hundred and Two River (MDC 2017). The closest record to the Project is near the southeast edge of the Project boundary where the transmission line will be located; the other is approximately 3 miles east of the Project boundary (MDC 2017; Stantec 2017c). Additionally, one extant maternity colony occurs in Ringgold County, Iowa, northeast of the Project (USFWS 2007, Iowa 2017).

There are over 60 known occupied NLEB maternity roost trees across Missouri. No occupied maternity roost trees were known from the Project vicinity prior to the publication of the Bat Assessment. However, bat mist-netting and subsequent radio-tracking surveys associated with the Project were able to document roosts within the Project (see section 4.0; Stantec 2018b).

Based on publicly available information, the Project's potential for construction impacts on habitat would be caused by ground disturbance and tree removal. Wind turbines placed along ridge tops could create or coincide with favorable bat migration corridors or foraging sites. Linear clearings through forested areas associated with the wind energy facility may be attractive to bats for foraging and put them at increased risk of collision. Avoidance and minimization measures to reduce overall risk to bats is discussed in Section 7.0.

4.0 FIELD SURVEYS

This section provides a summary of the results for the pre-construction surveys conducted for the Project. Although bird or bat surveys were not required for the Project, pre-construction surveys were nonetheless completed as part of the standard pre-construction due diligence per the WEG, and in consultation with the USFWS and MDC. Some of the survey efforts completed were specifically recommended during agency consultation including bat mist-netting surveys (see Section 4.6). Complete survey methods, results, and conclusions are available in referenced reports listed below. The following is a list of pre-construction biological surveys completed for the Project and discussed in this section:

- **Avian point count surveys**: Conducted monthly since May 2017 and currently ongoing
- **Large bird surveys**: Conducted monthly since May 2017 and currently ongoing
- **Aerial raptor nest survey**: March 2017 and March 2018 (Stantec 2017a, 2018c).
- **Aerial eagle nest survey**: March 2017 and March 2018 (Stantec 2017a, 2018c).
- **Acoustic bat monitoring**: August – November 2017, March 2018 – currently ongoing (Stantec 2018d).
- **Bat mist-net surveys:** Conducted June 2018 (Stantec 2018b).
- **Habitat Assessment Survey:** Conducted September 2017 (Stantec 2018e)
- **Wetland Delineation Surveys:** Conducted July/August 2018 (Stantec 2018f)

4.1 AVIAN POINT COUNT SURVEYS

To date, 16 months of avian point count surveys have been completed at the Project. Avian point count surveys are currently ongoing and scheduled to occur for a total of two years. The May and June 2017 avian point count surveys were conducted from 30 survey points distributed within the 2016 Project boundary; 10 additional survey points were added in July 2017 due to a boundary change. In response to a subsequent May 2018 decrease in Project size the number of survey points was reduced to 25 points. Across all monthly migratory bird surveys competed thus far, Stantec documented 9,914 birds of 104 species. No federally-listed T/E species have been observed during migratory bird surveys to date; however, Bald Eagles, one state-listed endangered species (Northern Harrier), and two Missouri SCC species (Loggerhead Shrike and Short-eared Owl), have been observed to date.

The most commonly observed species were woodland specialists or habitat generalists that frequent mosaics of grassland, woodland, and cropland. Northern Flicker (*Colaptes auratus*), Blue Jay (*Cynaocitta cristata*), American Crow (*Corvus brachyrynchos*), and Eastern Bluebird (*Sialia sialis*) have been observed during every month of surveys to date. The species with highest numbers of individuals observed were Snow Goose (*Chen caerulescens*;1,325 individuals) and Red-winged Blackbird (*Agelaius*

phoeniceus; 1,353 individuals). Migratory movement within the bird community was observable in the arrival of known summer residents during the spring surveys and departure of winter residents during the fall surveys. Common summer residents in the Project included Dickcissel (*Spiza americana*), Eastern Kingbird (*Tyrannus tyrannus),* and Bobolink (*Dolichonyx oryzivorus*). Winter residents included Dark-eyed Junco (*Junco hyemalis*) and American Tree Sparrow (*Spizella arborea*). In addition, transient species were observed at the project including Snow Goose, Greater White-fronted Goose (*Anser albifrons*), and Ring-necked Duck (*Aythya collaris*).

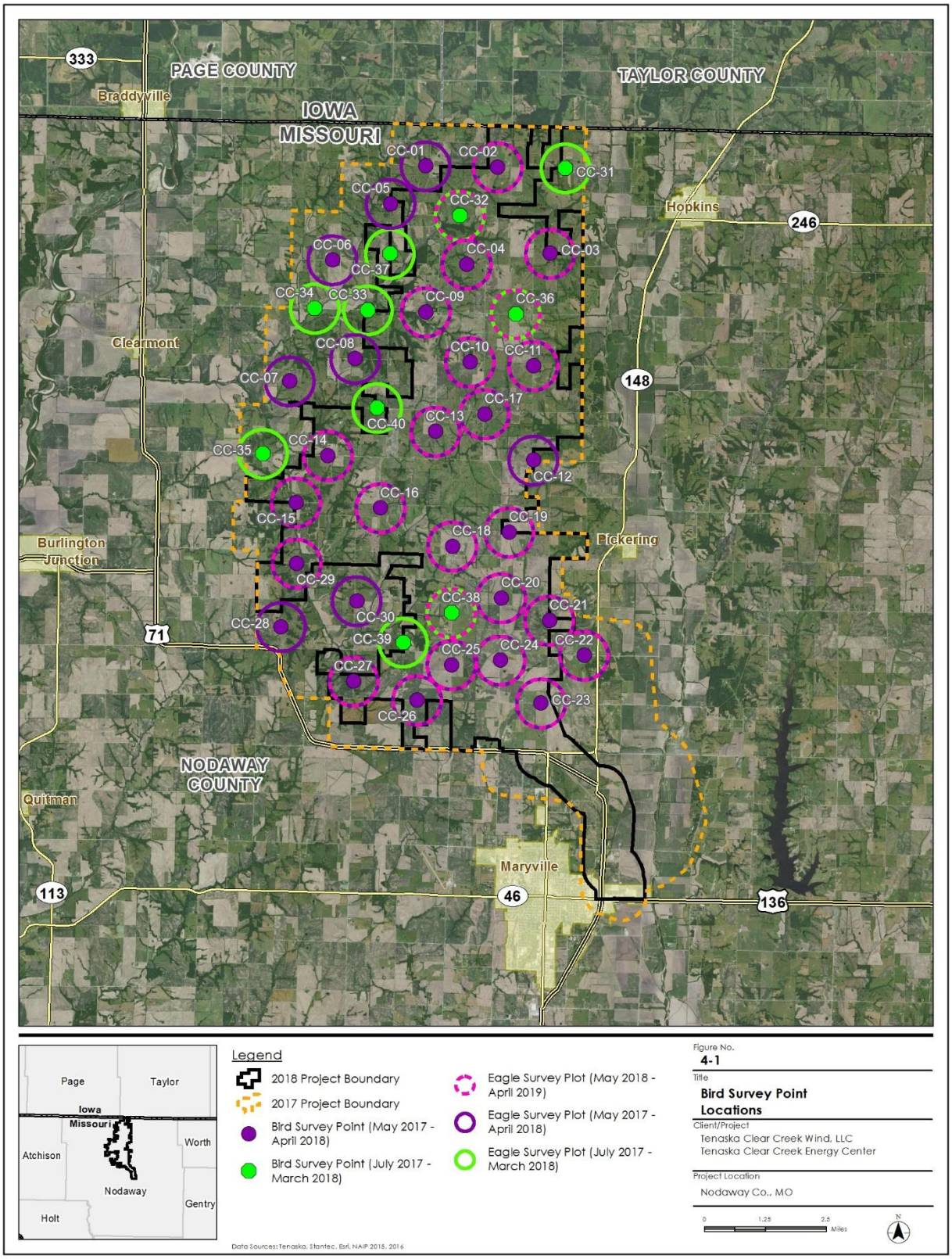
Bird abundance to date is unevenly distributed among survey points, ranging from 73 total individuals observed at CC-08 and 1,782 individuals observed at CC-36. The large number of birds observed at CC-36 was composed of groups of Snow Goose (1,000 individuals) and Greater White-fronted Goose (500 individuals). Species richness from the past 16 months of surveys ranged from 20 species at CC-39 and 48 species at CC-29. Across all pre-construction surveys, 115 bird species have been recorded at the Project, including incidental observations. These species are listed in Appendix E, Table E-1, in conjunction with the results of the literature review. Photographs of representative bird species observed during the pre-construction surveys are provided in Appendix A. Avian survey points are shown in Figure 4-1.

4.2 LARGE BIRD SURVEYS

To date, 16 months of large bird surveys have been completed at the Project and are currently ongoing and planned to conclude after two full years. The May and June 2017 large bird surveys were conducted from 30 survey points distributed within the initial Project boundary; due to expansion 10 additional survey points were added in July 2017. In response to a subsequent May 2018 decrease in Project size the number of survey points was reduced to 25 points. Across all months thus far, Stantec biologists observed 10,332 large birds of 39 species. No federally-listed T/E species have been observed during large bird surveys to date; however, 4 Missouri SCC species (Osprey, Short-eared Owl, Sharp-shinned Hawk, and Swainson's Hawk), 2 state-listed endangered species (Snowy Egret and Northern Harrier), and 93 Bald Eagles have been observed.

The most commonly observed species are year-round residents and habitat generalists that frequent mosaics of grassland, woodland, and cropland. Red-tailed Hawk (*Buteo jamaicensis)* and American Crow have been observed during every month of surveys to date. The species with highest number of individuals observed are migratory waterfowl including Snow Goose (3,681 individuals) and Greater White-fronted Goose (2,391 individuals). These species account for 58% of the total birds observed during large bird surveys to date. Migratory movement within the bird community was observable in the arrival and departure of transient and winter species throughout the past 16 months. Winter residents include Rough-legged Hawk (*Buteo lagopus*) and Short-eared Owl (*Asio flammeus*). In addition, transient species observed within the Project include Snow Goose, Greater White-fronted Goose, Swainson's Hawk, and American White Pelican (*Pelecanus erythrorynchos*).

The most abundant group of birds observed to date are waterfowl, which total 7,448 individuals or 72% of the total species observed throughout large bird surveys. These waterfowl were utilizing open water and cropland habitat throughout the Project and large groups of geese (1,500 individuals) were observed flying above 650ft above ground level. Snow Goose and Greater White-fronted Goose can be observed


PAGE COUNTY
TAYLOR COUNTY
IOWA
MISSOURI
Braddyville
Hopkins
Clearmont
Burlington Junction
Pickering
Quitman
NODAWAY COUNTY
Maryville
333
246
148
71
113
46
136
CC-01
CC-02
CC-31
CC-05
CC-32
CC-06
CC-04
CC-03
CC-37
CC-34
CC-33
CC-09
CC-36
CC-08
CC-10
CC-11
CC-07
CC-17
CC-40
CC-13
CC-14
CC-35
CC-12
CC-16
CC-15
CC-19
CC-18
CC-29
CC-20
CC-38
CC-21
CC-28
CC-30
CC-39
CC-25
CC-24
CC-22
CC-27
CC-23
CC-26
Page
Taylor
Iowa
Missouri
Atchison
Worth
Nodaway
Gentry
Holt
Legend
2018 Project Boundary
2017 Project Boundary
Bird Survey Point (May 2017 - April 2018)
Bird Survey Point (July 2017 - March 2018)
Eagle Survey Plot (May 2018 - April 2019)
Eagle Survey Plot (May 2017 - April 2018)
Eagle Survey Plot (July 2017 - March 2018)
Data Sources: Tenaska, Stantec, Esri, NAIP 2015, 2016
Figure No.
4-1
Title
Bird Survey Point Locations
Client/Project
Tenaska Clear Creek Wind, LLC
Tenaska Clear Creek Energy Center
Project Location
Nodaway Co., MO
0
1.25
2.5
Miles
N

in large numbers statewide, however; the species are more abundant in the western part of the state (Robbins 2018). Raptors observations total 1,882 individuals to date, which makes up 18% of all large bird survey observations. The most abundant raptor species observed to date are Turkey Vulture (*Cathartes aura;* 1,136 individuals), Red-tailed Hawk (394 individuals), and Northern Harrier (94 individuals).

4.3 AERIAL RAPTOR NEST SURVEYS

Stantec completed two years of aerial raptor nest surveys for the Project (Stantec 2017a, 2018c). The March 2017 surveys were conducted within the 2017 boundary plus a 1-mile buffer (Raptor Nest Survey Area). The 2018 aerial raptor nest surveys were conducted from an expanded 2018 Project boundary. The raptor nest surveys were completed simultaneously with the aerial eagle nest surveys (see Section 4.5). In 2018, biologists systematically searched the Raptor Nest Survey Area for new raptor nests, but also checked raptor nests observed in 2017.

Over 2 years, Stantec recorded 102 raptor nests within the Raptor Nest Survey Area. In 2017, Stantec recorded 92 raptor nests, including 6 active Great Horned Owl nests, 34 active and 4 occupied Red-tailed Hawk nests, 2 active nests of unknown species (eggs present; adults absent), and 46 nests with "unknown" activity status; of which all but one was usable. In 2018, Stantec recorded 73 raptor nests, including 3 occupied/active and 2 occupied/inactive Great Horned Owl nests, and 23 occupied/active Red-tailed Hawk nests. Additionally, there were 40 unoccupied/inactive, 2 occupied/inactive, and 3 occupied/active nests of unknown species. Thirty-one of the raptor nests observed in 2017 could not be relocated in 2018 (Stantec 2018c).

The area sampled within the Raptor Nest Survey Area in 2017 was approximately 121 mi^2, which results in an active/occupied or inactive/occupied raptor nest density of 0.35 nests/mi^2. In 2018, the Raptor Nest Survey Area was approximately 142 mi^2, which results in an active/occupied or inactive/occupied raptor nest density of 0.18 nests/mi^2. Species composition was consistent with birds expected for this region of Missouri (Robbins 2018). It is possible that some raptor species that have the potential to breed in the area were not detected because they nest later in the year (e.g., Red-shouldered Hawk [*Buteo lineatus*] or Broad-winged Hawk [*Buteo platypterus*]) or do not build nests in open tree canopies (e.g., Northern Harrier [*Circus cyaneus*], Barn Owl [*Tyto alba*], and American Kestrel [*Falco sparverius*]) (Davit 2009). A raptor nest survey later in the breeding season (i.e., May or June) would be infeasible due to leaves on the trees obstructing the view of potential nests. Raptor nests with an unknown activity status observed during the March survey may be used by other raptors later in the year.

4.4 AERIAL EAGLE NEST SURVEYS

Stantec completed two years of aerial eagle nest surveys for the Project (Stantec 2017a, 2018c). The March 2017 surveys were conducted within the 2017 Project boundary plus a 10-mile buffer (Eagle Nest Survey Area). The 2018 aerial eagle nest surveys were conducted from an expanded 2018 boundary plus a 10-mile buffer.

Stantec documented 12 Bald Eagle nests within the Eagle Nest Survey Area during the 2 years of aerial nest surveys. Nine Bald Eagle nests were observed in 2017. The Bald Eagle nests observed during the

2017 aerial surveys included five active eagle nests (EN-01 – EN-03, EN-05, and EN-07), one eagle nest of unknown status (EN-08), and three eagle nests occupied by other species at the time of the survey (EN-04 [Great Horned Owl], EN-06 [Canada Goose]); and EN-09 [Canada Goose]). EN-07 is located outside of the Eagle Nest Survey Area but was included due to its proximity.

In 2018, one occupied/active Bald Eagle nest not observed in 2017, EN-11, was documented within Project boundary along the One Hundred and Two River. Stantec documented 11 Bald Eagle nests within the Eagle Nest Survey Area; including 8 occupied/active eagle nests (EN-01, EN-02, EN-03, EN-05, EN-10, EN-11, EN-12, and EN-13), 2 occupied/inactive nests (EN-06 and EN-08), and 1 unoccupied/inactive eagle nest (EN-04). One incidental nest (EN-07) was observed south of the Project's Eagle Nest Survey Area.

4.5 ACOUSTIC BAT MONITORING

Acoustic bat surveys within the Project began on August 14, 2017 and conducted through November 21, 2017 for fall migratory activity using SM3BAT (Wildlife Acoustics, Maynard, Massachusetts) bat detectors (Stantec 2018d). The detectors were configured to monitor bat activity near ground level (10 ft agl; low microphone) and at heights within the proposed rotor-swept area (180 ft agl; high microphone) at 3 meteorological evaluation towers (METs; Tower 01, Tower 0702, and Tower 1702) within the Project. No surveys occurred during the winter period (late November – mid March) when bats are typically hibernating. Surveys resumed on March 21, 2018 to monitor for a full year's worth of bat activity periods (i.e., spring migration, summer occupancy, fall migration) and are currently scheduled to stop in late November 2018. Appendix F provides acoustic monitoring results by met tower for 2017.

During the 2017 acoustic bat survey, 4,496 bat passes were recorded, and the overall bat passage rate was 8.9 bat passes per detector night (BP/DN). Total average bat passage rate for each MET tower was 10.3 BP/DN at Tower 01 in the north portion of the Project, 10.2 BP/DN at Tower 0702 and 6.4 BP/DN at Tower 1702 which are both located in the southeastern section of the Project. The high microphones recorded slightly higher bat passes (10.2 BP/DN) than the low microphones (7.7 BP/DN). All 3 towers experienced peak activity around the time of deployment, with the highest total bat activity occurring on the deployment date with 422 bat passes. Activity remained at the Project's highest levels through August (average of 34.2 BP/DN). From peak activity in mid- to late-August, activity decreased rapidly to 8.6 BP/DN in September and 3.6 BP/DN in October. The last bat pass recorded for the Project occurred on November 17, 2017. The majority (75.2%) of classifiable bat passes for the Project were grouped as LFSG (Table 2-7).

During the spring monitoring efforts (March 21 – May 31, 2018) a total of 2,745 bat passes were recorded, and the overall bat passage rate was 7.0 BP/DN. Total average bat passage rate for each MET was 8.2 BP/DN at Tower 01, 6.5 at Tower 0702, and 6.0 BP/DN at Tower 1702. The high microphones recorded fewer bat passes (4.8 BP/DN) than the low microphones (9.2 BP/DN). Monthly activity began in March and increased through April and May when the overall average was 15.2 BP/DN.

During the summer portion of the 2018 survey (June 1 – August 29, 2018) 10,203 bat passes were recorded, and the overall bat passage rate was 22.1 BP/DN. Total average bat passage rate for each MET was 33.0 BP/DN at Tower 01, 13.5 at Tower 0702, and 23.0 BP/DN at Tower 1702. The high and

low microphones recorded similar amounts of activity (21.5 BP/DN, and 22.6 BP/DN, respectively). Activity peaked in July through August. Activity increased from June through July which had the highest monthly average for the Project (26.7 BP/DN). Table 4-1 summarizes the total bat passes and associated BP/DN across all seasons monitored to date.

Table 4-1 2017 and 2018 Summary of Bat Passes

Microphone Location	2017 (August 14 – November 21)		2018 (March 21 – May 31)		2018 (June 1 – August 29)		Combined Average BP/DN
	Bat Passes	BP/DN	Bat Passes	BP/DN	Bat Passes	BP/DN	
01 High	843	10.2	383	5.3	1,852	31.4	14.4
01 Low	861	10.4	793	11.0	2,468	34.3	18.2
01 Total	**1,704**	**10.3**	**1,176**	**8.2**	**4,320**	**33.0**	**16.3**
0702 High	1,152	11.6	313	4.3	778	8.6	8.6
0702 Low	880	8.9	628	8.7	1,648	18.3	12.1
0702 Total	**2,032**	**10.3**	**941**	**6.5**	**2,426**	**13.5**	**10.3**
1702 High	851	8.7	240	4.6	1,872	31.2	14.1
1702 Low	409	4.2	388	7.5	1,585	17.6	9.9
1702 Total	**1,260**	**6.4**	**628**	**6.0**	**3,457**	**23.0**	**11.9**
High Microphones Total	2,846	10.2	936	4.8	4,502	21.5	12.1
Low Microphones Total	2,150	7.7	1,809	9.2	5,701	22.6	13.3
Grand Total	**4,996**	**8.9**	**2,745**	**7.0**	**10,203**	**22.1**	**12.7**

Key:
BP = bat pass
DN = detector night

Based on 3 seasons of acoustic bat activity at Clear Creek, bat activity is higher than expected for the Midwest region (7.29 BP/DN; Hein et al. 2013). Overall activity is within the ranges observed at other Midwest projects (0.73 – 33.88 BP/DN); however, combined activity rates at Tower 01 in 2018 did exceed the maximum in July and August (41.3 and 39.1 BP/DN, respectively). Bat activity patterns are consistent with bat activity elsewhere in Missouri, with peak activity occurring between late July and early September, which coincides with fall migration (Cryan 2003).

4.6 BAT MIST-NETTING SURVEYS

Stantec conducted mist-net surveys to evaluate the presence and/or presumed absence of the endangered IBAT and the threatened NLEB. Survey methods were designed to identify and document the presence of T/E bats and their roosting locations in accordance with the USFWS "*2018 Range-wide Indiana Bat Summer Survey Guidelines*" and in consultation with the USFWS field office in Columbia, Missouri (Bat Work Plan, Stantec 2018h). NLEBs were documented within the Project area prior to surveys (MDC Natural Heritage Report; Appendix B) but no records of IBATs were documented. For full survey methodology and results please refer to the Tenaska Clear Creek Energy Center Bat Surveys report (Stantec 2018d).

From June 1 – 28, 2018, Stantec captured 182 bats comprised of 5 species across 38 sites. Bat use varied among sites; captures ranged from 0 to 49 bats per netting site. The number of bat species per site (i.e., species richness) ranged from 0 – 4 species. Biologists did not capture bats at 5 sites. Captures by species included:

- Big Brown Bat – 56 (30.8%)
- Eastern Red Bat – 36 (19.8%)
- Evening Bat – 66 (36.3%)
- Hoary Bat – 5 (2.7%)
- NLEB – 19 (10.4%)

A total of 19 NLEBs were captured at 15 sites (39% of total sites) across the Project. No other T/E species were captured during the survey. Evening Bats were the most common species captured (66 bats), followed by 56 captures of Big Brown Bats. At each site where NLEBs were captured, only 1 individual NLEB was captured except for site P-30 in the east-central portion of the Project, where 5 males were captured. The highest number of bats captured occurred at site P-05 in the northwestern section of the Project on June 26 and 27, when 49 total bats, representing 4 species were captured.

All 19 NLEBs captured were adults and included 12 males (63.2%) and 7 females (36.8%). The females all showed signs of reproduction (4 pregnant and 3 lactating). Of the NLEBs captured, 6 females and 2 males were fitted with radio-transmitters to find their roost locations. Tracking efforts were able to locate 4 of the bats to 10 roosts located in the northwest, west-central, and southwest portions of the Project boundary (for a map of roost sites, refer to Stantec 2018d). An additional bat was triangulated to an area on land outside the Project boundary. Biologists were unable to find two females and one male during the tracking efforts which likely roosted outside of the Project boundary. Roosts were in five species of trees, which consisted of both live and dead trees of multiple sizes, and two outbuildings. There was no discernable pattern for NLEB habitat use observed but were all associated with relatively large riparian forests. Emergence count numbers ranged from 0 to 13 bats per roost with an average of 2.6 bats per count. Of the roosts, only 1 had more than 10 bats emerge during counts.

The results of the bat mist-net survey indicate that NLEBs are present within the Project during the active pup rearing season (June 1 to July 31). In addition, the capture of pregnant and lactating NLEBs within the Project boundary as well as the results of the radio-tracking and emergence counts lends credence to the supposition that there are maternity colonies present. NLEBs were the only *Myotis* bat species captured. No IBATs or other T/E species were captured during the survey; therefore, they are presumed absent which was concurred with by the USFWS during an in-person meeting on August 16, 2018. IBATs have been recorded in Nodaway County (USFWS 2017a, MDC 2017); however, no records exist in Nodaway County west of the One Hundred and Two River (MDC 2017).

4.7 HABITAT ASSESSMENT SURVEY

Stantec completed a field habitat assessment survey in 2017 following a literature and database review to define habitat categories that occur in northwest Missouri and could potentially occur within the Project (Stantec 2018e). A field study was then conducted from public roads to assign habitat categories to each delineated habitat. The objective of the study was to identify sensitive habitats that might be used by ESA listed species or Missouri SCC. Natural communities are ranked based on the number and quality

of occurrences, acres and number of counties occupied, community type and number of protected occurrences, as well as threats to the habitat. The rankings are: SCC1 – Critically Imperiled, SCC2 – Imperiled, SCC3 – Vulnerable, SCC4 – Apparently Secure, and SCC5 – Secure.

Within the Project boundary, three priority areas for avoidance were defined which include Priority 1 Mixed Forest Habitat, Priority 2 Native Grasslands and Wetlands, and Priority 3 Grassland Matrix, Savannah Matrix, and Wet Matrix. These habitat categories were deemed priorities because they are preferred habitat for federally-listed T/E species and Missouri SCC that may occur in the Project vicinity. Priority 1 provides habitat for federally-listed species, Missouri-listed species, and species ranked as SCC1; Priority 2 provides habitat for species ranked SCC2; and Priority 3 provides habitat for generalist species ranked as SCC2 and SCC3. However, this designation does not mean any T/E or SCC species are present. Clear Creek used the results of the survey to modify the Project's boundary to reduce impacts to woodland habitats, and to identify avoidance areas.

4.8 WETLAND DELINEATION SURVEYS

Potential waters of the United States (WOUS) were recorded within defined survey corridors where ground disturbance is anticipated during construction of the Project. Project survey corridors included a 196 ft corridor (98 ft on each side of the center line) along all linear structures (e.g., collection lines, access roads, crane paths, utility lines) and a 100-meter radius around all turbine pads, substations, laydown yards, and METs. Additionally, a 25 ft by 50 ft survey area was investigated at road culvert locations within the Project boundary and the surrounding area.

Determinations included data from a desktop analysis and field-based surveys. Initial steps in locating potential WOUS included a review federal and state wetland data layers, soil surveys, and hydrography datasets. Field-based wetland delineations followed the Routine On-Site Determination Method defined in the USACE Wetland Delineation Manual (Environmental Laboratory 1987), subsequent guidance documents (USACE 1991, 1992), and the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Midwest Region (USACE 2010).

[Stantec delineated a total of 124 wetlands within Project survey corridors (Stantec 2018f). In total, 18.475 ac of wetland were delineated; 16.01 ac of palustrine (non-flowing, non-tidal) emergent wetlands, 0.49 ac of palustrine scrub-shrub wetland and 1.88 ac of palustrine forested wetlands. No threatened or endangered plant species were observed during the wetland surveys.][3]

5.0 EVALUATION OF POTENTIAL RISK TO BIRDS

Renewable energy, including wind energy, can be beneficial to birds and their environment by reducing carbon emissions and thus potentially mitigating the effects of climate change. However, wind energy facilities also have the potential to impact birds by causing injury or death through collisions with turbines, and by causing habitat loss, degradation, fragmentation, or displacement. As a result, these population declines have increased the concern over the potential effects of energy development compounding the effects of some of these factors (AWWI 2017a).

The factors influencing bird mortality rates at wind facilities are not fully understood, but current research suggests fatalities are a function of bird abundance, local concentrations, behavioral characteristics of species, weather, and characteristics of the wind facility (Strickland et al. 2011). Although songbirds constitute most of bird fatalities recorded at wind facilities, songbirds are also the most abundant group of birds. In contrast, raptors constitute fewer fatalities than songbirds at wind farms, but raptors are far less abundant than songbirds. The relatively higher mortality rate for raptors in comparison to other birds suggests raptors are more vulnerable to collision (Strickland et al. 2011; AWWI 2017a). Some studies suggest there is a relationship between raptor fatalities and raptor abundance, which can be influenced by landscape features such as ridge lines, slopes, and canyons (Strickland et al. 2011; AWWI 2017a). Behavioral characteristics such as flight patterns (e.g., slope-soaring, aerial mating displays, and nocturnal migration) also contribute to the higher mortality rates among some species (NRC 2007; Strickland et al. 2011; AWWI 2017a). Most migrating birds fly above turbine height (400 to 600 ft agl) during favorable weather conditions (Richardson 1998). Therefore, only a small percentage of migrating birds are expected to be at risk of collision with turbine rotors, but collision risks may increase during inclement weather (e.g., opposing winds, fog, rain).

Weather conditions such as precipitation, low cloud ceilings, and strong opposing winds will usually lower the altitude of migrating birds, putting more birds at risk of a collision (Avery et al. 1980; Kerlinger et al. 2010). However, fewer birds typically migrate under such unfavorable conditions. Various studies have demonstrated that when weather conditions allow for the visible detection of turbines (e.g., absence of fog, mist, precipitation), most birds detect the presence of wind turbines and react through avoidance behaviors (Osborn et al. 1998; Garvin et al. 2011). Furthermore, should a bird pass through the rotor-swept area of a turbine, it is not a certainty that the bird will be struck. Although there are no empirical data that predict a bird's ability to pass safely through the rotor-swept area, there are predictive models based on physics and field observations which indicate that interactions among wind speed, cut-in speed, and the bird's angle of approach affect the probability of collision (Holmstrom et al. 2011).

The characteristics of the wind facility (turbine height, rotor-swept zone, support structure, turbine layout, etc.) can also influence the morality rates at the facility. The effect of turbine size (either height or the size of the rotor-swept zone) on bird mortality rates remains unknown. It is hypothesized that taller turbines might reach into the flight path of nocturnal migrants who might fly above smaller turbines, but the majority (>80%) of nocturnal migrants fly above most rotor-swept zones (above 500 ft agl; AWWI 2017a). There have been several studies regarding the behavioral effects and fatalities from turbine position and alignment within a wind energy facility. Results have varied, and the differences are likely

due to site-specific conditions such as topography and the flight behavior of local species. BirdLife International concluded that a string of turbines parallel to the flight line of flying birds, or turbines in a loose cluster, are the best arrangements for deterring migrating birds from wind turbine developments (Langston and Pullan 2004). While modern turbines do not have guy wires, other structures such as meteorological towers with guy wires can be a hazard to birds and increases the risk of bird collisions. Also, Federal Aviation Administration approved lighting does not appear to increase the risk of bird collisions at turbines as opposed to unlit turbines (AWWI 2017a).

This section provides an evaluation of the Project's potential impacts on birds based on research and reports from the literature, publicly available reports from other wind facilities, and data collected through pre-construction surveys. This section also addresses the potential impacts on birds from Project construction and operation and includes discussion on impacts on special status bird species.

5.1 IMPACTS FROM CONSTRUCTION OF THE PROJECT

Construction will involve the installation of the Project infrastructure described in Section 1.2, including the erection of 111 turbines[3] with associated infrastructure (access roads, collection lines, a substation, a transmission line, and an O&M building) and the temporary use of a laydown yard, crane paths, and existing road intersection modifications. Construction-related activities such as vegetation clearing, equipment operation and associated noise, and increased vehicle traffic can potentially impact birds through direct mortality, habitat loss, or displacement (Strickland et al. 2011). Due to the presence of historical and current farming practices, many of these impacts already occur at the site. For most bird species, the magnitude of the Project's impacts during construction activities is dependent on when construction takes place. Project construction during the breeding season will have different impacts than construction conducted outside of the breeding season. Project construction is scheduled to start in early 2019 and conclude in late 2019, which would include the both the breeding season and the spring and fall migration seasons. Construction-related risks to the four groups of birds at greatest risk from wind development (raptors, migratory songbirds, waterbirds, and grassland specialist birds) are discussed in each section below and development details are based on the A091318 design.

5.1.1 Impacts on Breeding Birds

Breeding birds are vulnerable to the effects of construction activities because of the potential for nest destruction during vegetation clearing, disturbance of incubating birds from construction-related noise, nest abandonment due to disturbance, mortality from collision with construction machinery and vehicles (Strickland et al. 2011; USFWS 2013). In northwest Missouri, the breeding season for birds common to mixed habitats occurs from arrival to nesting grounds, beginning in mid-April until young have fledged from the nest in mid-August (USGS 2018). Based on Stantec's literature review, 118 species of breeding birds have the potential to be nesting in the Project region during construction. Vegetation clearing for construction during the breeding season may disturb nesting birds or potentially destroy nests, eggs or young; however, over 90% of the turbines are located in previously disturbed areas (cropland or replanted monocultures of tall fescue for haying)[3]. The risk of direct bird collisions with vehicles will increase due to the increased traffic during construction on existing roads and the construction of new access roads. However, the speed limit on access roads at wind facilities is usually limited to 20 miles per hour or less,

which should generally give birds a sufficient amount of reaction time to avoid collision. As traffic decreases upon the completion of construction, so will the potential risk of bird-vehicle collisions.

5.1.1.1 Breeding Raptors

Raptors in northwest Missouri may begin breeding activity (e.g., nest building) as early as January and complete breeding activities (e.g., young fledging) by August (ASM 2018; USGS 2018). Construction in proximity to active raptor nests has the potential to cause nest abandonment from noise and human activity (USFWS 2013). Raptors might also experience displacement due to the loss and fragmentation of habitat from the construction of the facility (Garvin et al. 2011). Construction is projected to begin in February, and it is likely that necessary tree removal will occur before most raptors in the Project begin nesting. Forested habitat accounts for approximately 11% of total land cover at the Project, and the nesting and foraging habitat are not unique to or concentrated within the Project. All other active raptor nests recorded during the 2018 aerial survey are further than 660 ft[3] from proposed Project turbines to reduce the potential of turbine blade strike.

Raptors feeding on roadkill may be susceptible to collision with vehicles due to the increased amount of construction traffic (Kuvlesky et al. 2007). Clear Creek will reduce vehicle collision risks by instructing project personnel to drive at appropriate speeds, be alert for wildlife, and use additional caution in low visibility conditions. Additionally, Clear Creek is reducing the effect of construction on local prey abundances by disposing of animal carcasses at the Project and reducing brush piles that may attract wildlife.

Clear Creek has reduced impacts to raptors by siting turbines at least 660 ft[3] away from active nest trees, which reduces risk of displacement or disturbance of nesting raptors during construction (USFWS 2007). Based on the results of the literature review and site-specific survey, two raptor nests are located within 660 ft from proposed Project turbines. Based on the size and habitat, neither nest was constructed by a Bald Eagle. One Bald Eagle nest (EN-11) was identified 0.97 miles from the transmission line and 3.2 miles from the nearest Project turbine[3]. The risk to Bald Eagles and each special status raptor species is discussed in detail in Section 5.3. General conservation measures Clear Creek will implement to reduce risk to avian species are described in Section 7.0.

5.1.1.2 Breeding Migratory Songbirds

Construction activities during the breeding season have the potential to disturb or impact songbird nests (Strickland et al. 2011). Based on the results of the literature review and site-specific surveys, migratory songbird species can be found breeding in all habitat types at the Project. It is possible that Project construction will clear potential breeding habitat for migratory songbirds; however, habitat within the Project is locally and regionally abundant. Due to the presence of invasive species and local cattle management practice, fragmentation in quality breeding habitat may reduce risks to breeding songbirds. Clear Creek sited Project infrastructure with roughly half of the turbines in cultivated cropland[3]. The risk to each special status songbird species is discussed in detail in Section 5.3. General conservation measures the Project will implement to reduce risk to avian species are described in Section 7.0.

5.1.1.3 Breeding Waterbirds

Waterbirds expected to breed in the Project area nest from March through August in emergent and forested wetlands or waterbodies. The Project does not have an abundance of rivers, wetlands, or large waterbodies that would be ideal for nesting; however, there are aquatic features adjacent to the Project (e.g., Clear Creek, South Fork Clear Creek, Mozingo Lake, Nodaway County Lake, and One Hundred and Two River) that may attract breeding colonies of waterbirds. Vegetation clearing near wetlands or waterbodies, and tree removal during breeding season has the potential to impact waterbird nests. The risk to each special status waterbird species is discussed in detail in Section 5.3. General conservation measures the Project will implement to reduce risk to avian species are described in Section 7.0.

5.1.1.4 Breeding Grassland Specialist Birds

Breeding grassland birds will likely avoid nesting in areas where the vegetation has been cleared prior to the breeding season, but will be susceptible to egg, chick, or fledgling mortality for vegetation clearing for April to August. Grassland birds may abandon habitat and nests near construction activities due to human disturbance (The Ornithological Council 2007). In addition, areas that have been colonized by invasive species and noxious weeds post-construction may reduce the successful nesting and fledging of grassland birds (Lloyd and Martin, 2005; Flanders et al. 2006; Lautenbach et al. 2017). As described in Section 1.2.1, grassland within the Project totals less than 2% of the boundary, none of which includes permanent infrastructure. Habitat impacted by the construction of the Project will be reseeded using native grass species, and Clear Creek will use control measures to prevent invasive species from establishing in disturbed construction areas. Grassland birds are susceptible to collision with vehicles, which Clear Creek will address by instructing personnel to drive at appropriate speeds and use additional caution in low visibility conditions. The risk to each special status grassland bird species is discussed in detail in Section 5.3. General conservation measures the Project will implement to reduce risk to avian species are described in Section 7.0.

5.1.2 Impacts on Migrating Birds

In Missouri, migration periods for birds are from early March through mid-May and from late August through mid-November (ASM 2018; Robbins 2018; Jacobs 2003). Construction activities during the spring and fall migration seasons may impact migrating birds through the disturbance or removal of stopover habitat, bird avoidance of construction areas, and collisions with vehicles or Project infrastructure. Construction activities would reduce the availability of stopover habitat within the landscape directly through the removal of habitat and indirectly by inducing avoidance of suitable habitat through visual and/or noise disturbances (Strickland et al. 2011). The impact of indirect habitat loss through avoidance of disturbed areas will vary from species to species, and the amount of available information on the effects of avoidance also varies among species (AWWI 2017a).

Large construction cranes used to erect the turbine components, including the tower, nacelle, and rotors, could potentially serve as an obstacle to a small number of migratory birds. If collisions were to occur, they would most likely occur during nighttime as the cranes would be visible during daylight hours and should be easily avoided by flying birds. Erected turbines and the transmission lines may pose a collision risk to migratory birds during construction.

5.1.2.1 Migrating Raptors

Construction is scheduled to begin February 2019, which would precede the spring migratory season. If construction continues into the spring migration season, migrant raptors may be impacted by construction. There is limited stopover habitat for migrating raptors in the Project and low overall numbers of raptors were observed during migration (see Section 4-2). In addition, construction would clear a minimal amount of stopover habitat in comparison to the amount of available habitat in the area. Migrating raptors may collide with construction equipment and partially erect turbines, but large mortality events are not expected. The risk to each special status raptor species is discussed in detail in Section 5.3. General conservation measures the Project will implement to reduce risk to avian species are described in Section 7.0

5.1.2.2 Migrating Songbirds

Construction will clear potential suitable stopover habitat for songbirds, but the habitats within the Project are not unique within the surrounding landscape. The risk to each special status songbird species is discussed in detail in Section 5.3. General conservation measures the Project will implement to reduce risk to avian species are described in Section 7.

5.1.2.3 Migrating Waterbirds

Open water and wetlands within the Project total less than 1% (Section 1.2.1) and are not expected to attract large concentrations of waterbirds. However, large groups of migrating waterbirds have been observed during on-site field surveys utilizing cropland habitat and small ponds. Clear Creek and One Hundred and Two River are within the Project vicinity and have the potential to attract migrating waterbirds.

Flocks of migrating waterbirds were expected in northwest Missouri and were documented at the Project during pre-construction surveys within or flying over the Project (see Section 4.0). Large flocks of geese were observed using cropland within the Project as stopover habitat. These flocks have the potential to avoid habitat near construction activities, as suitable stopover habitat for geese and other waterbirds is abundant in the Project's vicinity. The risk to each special status waterbird species is discussed in detail in Section 5.3. General conservation measures the Project will implement to reduce risk are described in Section 7.0

5.1.2.4 Migrating Grassland Specialist Birds

Grassland within the Project totals less than 2% of the Project boundary according to NLCD land cover (see Section 1.2) and none of the existing infrastructure is occurring in native grassland[3]. As such, suitable Project construction is unlikely to impact stopover grassland habitat within the surrounding landscape which will reduce impacts to migrating grassland birds. Migrating grassland birds may collide with construction equipment and partially erect turbines, but large mortality events are not expected. The risk to each special status grassland bird species is discussed in detail in Section 5.3. General conservation measures the Project will implement to reduce risk are described in Section 7.0.

5.2 IMPACTS FROM OPERATION OF THE PROJECT

The primary potential impact on birds from Project operations is related to direct fatalities from collisions with infrastructure. Operation of the Project may also cause behavioral displacement (when birds avoid otherwise suitable habitat within the vicinity of a structure), habitat fragmentation, and habitat degradation through the introduction of non-native or invasive species. Bird collisions with turbines have received substantially more attention and research than these other potential impacts (Erickson et al. 2002; Strickland et al. 2011; Loss et al. 2013; AWWI 2017a). Therefore, bird fatalities and wind development are discussed in detail in Section 5.2.3. The impacts of operation of the Project on breeding birds and migrating birds including the four groups of birds at greatest risk from wind development (raptors, migratory songbirds, waterbirds, and grassland specialist birds) are discussed within each section below.

5.2.1 Impacts on Breeding Birds

In addition to the potential for collision fatalities, the constructed wind facility may result in loss of breeding habitat, habitat degradation through fragmentation, the introduction of invasive species, or behavioral displacement from habitats (e.g., Osborn et al. 1998; Leddy et al. 1999; Garvin et al. 2011). Intact, native grasslands are declining across the Great Plains (Sampson and Knopf 1994). The remaining grasslands provide valuable habitat for wildlife, including birds (Lloyd and Martin 2005). The habitat within the Project is fragmented from development and row crop agriculture. Project infrastructure is proposed to be located consistently with the Project's cropland/grassland mosaic landscape: cultivated cropland (55 of 111 turbines), pasture/hayfields (49 turbines), deciduous forest (4 turbines), and grassland (0 turbines)[3]. Clear Creek avoided impacting the more contiguous and pristine grassland areas of northwest Missouri. Clear Creek recognized the importance of maintaining native grassland habitats, which have not been as impacted by invasive species, degradation, or fragmentation, and the importance of these habitats for grassland bird species and other wildlife. As human development continues throughout the Great Plains and Midwest, the preservation of quality native grassland habitat is essential for healthy breeding bird populations.

The potential impacts from operation of the Project on breeding birds vary among species, and the potential impacts of wind development have not been investigated for all bird species. The flight behavior of some species makes them more susceptible to collisions with turbines (e.g., raptors), while others are more sensitive to disturbance and habitat fragmentation (e.g., grassland birds). Some studies have shown resident birds may become habituated to wind turbines and avoid flying in the immediate vicinity of them. However, some resident species have increased fatality rates, primarily due to behavior such as aerial courtship or territorial displays (NRC 2007).

5.2.1.1 Breeding Raptors

Raptors are believed to be more susceptible (in proportion with their abundance compared to other bird species groups) to collisions with turbines because of the hunting behavior of some species; for example, raptors have keen eyesight and will often focus on prey at a distance, effectively ignoring spinning rotor blades directly in their line of flight (Garvin et al. 2011). Raptors are also susceptible to collisions with turbines because their flight patterns (e.g., slope soaring or kiting while foraging) increase the amount of time they are exposed to the risk of collision (Barrios and Rodriguez 2004; USFWS 2013). There is the

potential for an increased risk to raptors from any turbine located near an active raptor nest, either from collision or from nest abandonment (Madders and Whitfield 2006; USFWS 2013); however, the majority of turbines (109 of 111) are further than 660 ft from turbines[3]. During the pre-construction aerial nest survey, raptor stick nests were observed throughout the Project (Section 4.4).

Based on studies from the Great Plains and Midwest, local breeding raptors may decrease in density within a wind project area after construction, but there is also evidence that some species acclimate to the turbines over time (Madders and Whitfield 2006; Garvin et al. 2011). In general, research has shown displacement effects on raptors at wind facilities have been negligible. To reduce risks of operation to raptors, Clear Creak has implemented a 660 ft turbine setback distance from Bald Eagle nests identified during the 2018 aerial nest survey in accordance with USFWS standard recommendation for setback distances to reduce risk of turbine collision and potential nest abandonment on Bald Eagles (USFWS 2007). Additionally, Clear Creek will be designing the transmission line using applicable Avian Power Line Interaction Committee (APLIC) standards, which may reduce impacts to local and migrating raptors (APLIC 2012). The risk to each special status raptor species is discussed in detail in Section 5.3. General conservation measures the Project will implement to reduce risk to avian species are described in Section 7.0.

5.2.1.2 Breeding Songbirds

A potential risk exists for migrant songbirds to collide with any tall structure, including wind turbines, and migrant songbirds breed throughout the Project and surrounding area; however, cropland makes up 36% of the Project's landcover and is less favorable breeding habitat for songbirds (see Section 2.2). Migratory songbird mortality rates are highest during spring and fall migration, as opposed to the breeding season, according to publicly available post-construction mortality studies (AWWI 2017a). Breeding songbirds may be susceptible to disturbance and displacement due to rotor movement and noise (Strickland et al. 2011), but such effects have not been as thoroughly studied as collision risks and fatalities. The risk to each special status songbird species is discussed in detail in Section 5.3. General conservation measures the Project will implement to reduce risk to avian species are described in Section 7.0.

5.2.1.3 Breeding Waterbirds

Waterbirds have one of the lowest mortality rates of any bird species group recorded at land-based wind facilities (AWWI 2017a). The Project does not contain large waterbodies or wetlands that would attract breeding waterbird colonies; however, the surrounding rivers, creeks, and reservoirs provide suitable habitat that could attract breeding waterbirds. Breeding waterbirds outside of the Project may utilize surrounding cropland and grassland landscapes for foraging opportunities, but such habitats are abundant throughout the region. The risk to each special status waterbird species is discussed in detail in Section 5.3. General conservation measures the Project will implement to reduce risk to avian species are described in Section 7.0.

5.2.1.4 Breeding Grassland Specialist Birds

Breeding grassland birds are at risk for collision with the Project's turbines as they travel within and among grassland patches. Grassland bird species such as Horned Lark and Vesper Sparrow that perform aerial courtship or territorial displays have been the most commonly observed fatalities at projects in the western and central United States (NRC 2007). Both species were observed at the Project during pre-construction surveys and can be abundant in cropland/grassland mosaic landscapes (see Section 4 and Appendix E, Table E-1). As currently proposed, 55 of the Project's 108 turbines are sited within cropland to reduce risks to breeding grassland birds.[3]

Grassland specialist birds are considered species of habitat fragmentation concern in the WEG (USFWS 2012). Some studies have found grassland birds avoid suitable habitat within the vicinity of a turbine (NRC 2007; The Ornithological Council 2007), but this displacement effect has not been observed for all grassland specialist birds and has not been observed consistently in all studies (Strickland et al. 2011; AWWI 2017a). For some species, behavioral displacement can be temporary (The Ornithological Council 2007) and some species are more sensitive than others. Specialist grassland bird species often prefer large tracts of intact habitat, and human development can fragment such habitat, thus reducing its quality for these species (Strickland et al. 2011). However, grassland habitat within the Project is sparce (less than 2% of the landcover), already fragmented by agriculture, roads, and residential structures, and encroached by invasive species. The risk to each special status grassland bird species is discussed in detail in Section 5.3. General conservation measures the Project will implement to reduce risk are described in Section 7.0.

5.2.2 Impacts on Migrating Birds

Project operations may impact migrating birds through direct collisions, loss of stopover habitat, and displacement through behavioral avoidance of either turbines or the Project as a whole. Most wind facilities with post-construction monitoring data have reported peaks of bird casualties during spring and fall migration, primarily due to increased migratory songbird fatalities (AWWI 2017a). Other factors affecting the collision risks for migrating birds include site topography, the presence of unique stopover habitat, and weather conditions. Migrating birds may also be affected through behavioral displacement when birds avoid suitable stopover habitat within the Project or avoid the Project altogether (i.e., alter their flight path to go around the project; Strickland et al. 2011). However, the lack of unique stopover habitat within the Project, reduces this risk (see section 1.2)

5.2.2.1 Migrating Raptors

In some instances, raptor mortality rates are lower during migration than during the breeding season, but species, raptor density, site topography, and prey abundance also influence mortality rates by influencing the flight behavior of raptors (Barrios and Rodriguez 2004; Government Accountability Office 2005). Results from the large bird surveys conducted for the Project were consistent with broad-front raptor migration as the average passage rate for migrating raptors (see Section 4.2). Also, the Project does not contain the topographic features that would congregate migrating raptors. As with breeding raptors, habitat fragmentation and displacement effects are not as important as collision risks, but habitat alterations from Project construction may alter local prey abundance (increase or decrease) and available

foraging habitat for raptors (Madders and Whitfield 2006); however, roughly half of the proposed turbines are placed in agricultural habitat.[3] The risk to each special status raptor species is discussed in detail in Section 5.3. General conservation measures the Project will implement to reduce risk are described in Section 7.0.

5.2.2.2 Migrating Songbirds

The majority (about 60%) of bird fatalities recorded at wind facilities, for which the data are publicly available, have been small songbirds (AWWI 2017a). Peaks in songbird fatalities tend to occur during the spring and fall migration periods, and most songbirds are nocturnal migrants (AWWI 2017a). There have been few documented large (hundreds of birds) single-night fatality events of nocturnal migrants at wind energy facilities, and those that have occurred were under unique conditions. For example, a mortality event of almost 500 nocturnal migrant songbirds at a wind facility in West Virginia was attributed to thick fog and the lighting at a substation. These birds appear to have been disoriented and drawn to the substation lighting and died either of exhaustion or collision with substation infrastructure, not with turbines (Stantec 2011).

Most migrating songbirds fly well above the height of a turbine (up to 3,280 ft agl and sometimes higher; Richardson 1998). These birds would be at risk of collision only while taking flight and landing. However, adverse weather conductions may increase the number of migrating birds flying at low altitudes, especially rain, fog, and winds blowing counter to the direction of migration (Richardson 1998). Pre-construction migratory bird surveys did not identify any stopover habitats that attracted large concentrations of migrating songbirds, and the birds recorded were common to the region (Section 4.1). The risk to each special status songbird species is discussed in detail in Section 5.3. General conservation measures the Project will implement to reduce risk are described in Section 7.0.

5.2.2.3 Migrating Waterbirds

Post-construction studies at existing land-based wind energy facilities have shown waterbirds are less susceptible to collision than other species groups (e.g., raptors; Erickson et al. 2002; Langston and Pullan 2004; AWWI 2017a). Areas with open water habitat tend to attract the greatest number of waterbirds and, thus, wind energy facilities located near areas of open water can result in higher-than-average mortality rates of waterbirds compared to wind energy facilities located away from open water (Erickson et al. 2002). Open water and emergent herbaceous wetlands combined make up less than 1% of the habitat within the Project boundary (Homer et al. 2015). The Project does not contain the water resources necessary to attract large numbers of waterbirds; however, proximity of Nodaway County Lake, Mozingo Lake, Nodaway River, and One Hundred and Two River and its tributaries to the Project could increase risk of waterbirds stopping over in these areas. Collision with power lines is also a source of mortality for waterbirds, especially near wetlands and open water (Erickson et al. 2002). Clear Creek is constructing an overhead transmission line as part of Project infrastructure. The Project's collection lines will be buried underground, which will prevent collisions.

Migrating waterbirds (waterfowl, wading birds, and shorebirds) were documented at the Project during pre-construction surveys (see Appendix E, Table E-1), which is not unexpected throughout the Mississippi Migration Flyway. However, suitable stopover habitat is low within the Project, even though

foraging habitat (i.e., cropland) is abundant, the Project will not attract migrating waterbirds in any higher numbers than the surrounding landscape. The risk to each special status waterbird species is discussed in detail in Section 5.3. General conservation measures the Project will implement to reduce risk are described in Section 7.0.

5.2.2.4 Migrating Grassland Specialist Birds

In general, the grassland specialist bird species that migrate through the Project vicinity are songbirds and would be affected by Project operations in similar ways to other migrating songbirds (see Section 5.2.2.2). As with breeding grassland birds, migrating grassland birds may avoid otherwise suitable habitat within the vicinity of turbines and other Project infrastructure (NRC 2007; The Ornithological Council 2007). However, there is less than 2% grassland habitat within the Project. The risk to each special status grassland bird species is discussed in detail in Section 5.3. General conservation measures the Project will implement to reduce risk are described in Section 7.0.

5.3 POTENTIAL IMPACTS ON SPECIAL STATUS BIRD SPECIES FOR ALL PHASES OF THE PROJECT

Based on the literature review, Stantec has compiled a list of 16 special status bird species that occur or have the potential to occur in the Project area. This list includes two species protected by the BGEPA, five state-listed endangered species, and nine species listed as SCC, but no federally-listed threatened or endangered species. Table 5-1 provides a summary of the results of the literature review for birds. Detailed information about the species-specific results of the bird literature review is available in Appendix E, Table E-1. The following sections provide a risk assessment for each of these bird species regarding all phases of the construction and operation of the proposed Project. Descriptions of each species' appearance, range, population status, and habitat requirements for the seasons of its life cycle when it is expected to occur in the Project area are provided in Section 2.4.

Table 5-1 Summary of Special Status Bird Species Occurrence in the Project and Vicinity

Species	Federal Status	Missouri Status	Breeding Bird Survey	Birds of Missouri	Christmas Bird Count	eBird	Field Surveys
American Bittern	--	E	--	T	--	√	--
Bald Eagle	BGEPA	--	N	PR	Lb,M,Tc	√	√
Greater Prairie-Chicken	--	E	--	PR	--	--	--
Golden Eagle	BGEPA	--	--	W	Lb,M,Tc	√	--
Loggerhead Shrike	--	SCC	W, B,Bf,Cs,Cs2	PR	Lb,M,Tc	√	√
Northern Harrier	--	E	Bf	PR	Lb,M,Tc	√	√
Osprey	--	SCC	--	T	--	√	√
Peregrine Falcon	--	E	--	T	Lb	√	--
Sandhill Crane	--	SCC	N	T	Lb	√	--
Sharp-shinned Hawk	--	SCC	Bf	W	Lb,M,Tc	√	√
Short-eared Owl	--	SCC	--	W	Lb,M,Tc	√	√

Species	Federal Status	Missouri Status	Breeding Bird Survey	Birds of Missouri	Christmas Bird Count	eBird	Field Surveys
Snowy Egret	--	E	--	T	--	√	√
Sora	--	SCC	--	T	--	√	--
Swainson's Hawk	--	SCC	W	T	--	--	√
Trumpeter Swan	--	SCC	--	W	Lb,M,Tc	√	--
Virginia Rail	--	SCC	--	T	--	√	--

Sources: Robbins 2018; Pardieck et al. 2017; Audubon 2018a; eBird 2018

Key:
BGEPA = Protected under the Bald and Golden Eagle Protection Act
E = State-listed Endangered Species
SCC = Missouri Species of Conservation Concern
√ = observed

PR= Permanent Resident
S= Summer Resident
T= Transient Migrant
W = Winter Resident

W = Watson BBS route
N = Wreford BBS route
B = Barnard BBS route
Bf = Bedford IA BBS route
Cs1 = College Springs IA BBS route
Cs2 = College Springs 2 BBS route

Lb = Loess Bluffs CBC circle
M= Maryville CBC circle
Tc = Taylor County CBC circle

5.3.1 American Bittern

Collision with turbine blades and transmission lines is the primary risk for American Bittern associated with the Project. American Bitterns are an uncommon transient that can occur in northwest Missouri during migration (Robbins 2018). This species has been observed within 25 miles of the Project from eBird observations; however, none have been recorded during pre-construction, BBS, or CBC surveys to date. The Project contains little emergent freshwater wetland habitat preferred by this species which reduces risk to the species. Opportunities to further reduce risk are discussed in Section 7.0.

5.3.2 Bald Eagle

Uniquely for Bald Eagles, the USFWS has developed the ECPG which outlines a five-stage approach to assessing the potential impacts and risks to eagles from a wind energy facility (USFWS 2013; Section 1.1.3). Due to the 2016 Eagle Rule Revisions as discussed in Section 1.1.3, Clear Creek used the Project's Stage 1 ERA (Stantec 2017d), large-bird field surveys, literature review, and agency consultation to determine potential risk to Bald Eagles. Risk is further addressed in the Eagle Conservation Plan, currently being developed (ECP; Stantec 2018). The closest active eagle nest was 0.97 miles from the transmission line and 3.2 miles from the nearest wind turbine location (A091318 design). No important eagle-use areas (e.g., nests, communal roosts) were identified within the Project boundary (see Sections 4.3 and 4.5). Furthermore, eagle activity in the Project (137 eagle-use minutes in 594 hours of surveys; Stantec 2018g) has been moderate (see Section 4.3). Eagle observation point 19 had the most eagle minutes (27) and the most eagle minutes per survey hour (1.13 minutes/survey hour). It is located adjacent to Nodaway County Lake in on the east-central edge of the Project. Suitable Bald Eagle foraging habitat within the Project includes Nodaway County Lake, Mozingo Lake, One Hundred and Two River and the Nodaway River. These waterbodies likely provide foraging opportunities in the form of fish, waterfowl, aquatic reptiles, and mammals. Based on the amount of suitable habitat and important foraging areas within the Project and overall high number of eagle-use minutes observed to

date within the area of the Project, Clear Creek considered the Project to pose risk to eagles and is developing an Eagle Conservation Plan to address the risk.

In addition, risk to eagles was discussed with both the USFWS and MDC during consultation. The USFWS requested that the Project address potential events that may change eagle use at the Project, such as significant livestock die off, which could attract scavenging eagles. The USFWS also asked that the BBCS for the Project address methods to contact and work with landowners to mitigate any issues regarding impacts to eagles, should they arise over the life of the Project and Clear Creek committed to doing so.

5.3.3 Greater Prairie-Chicken

Habitat fragmentation and displacement is the primary risk for the Greater Prairie-Chicken. Greater Prairie-Chicken are a rare permanent resident only in reintroduced populations in remnant prairies within Missouri (Robbins 2018). Individuals were not recorded from any of the CBC, BBS, or eBird observations from the literature review. In addition, no individuals have been observed during on-site field surveys to date. The Greater Prairie-Chicken requires large tracts of mixed and tallgrass native prairie habitats for breeding and nesting (Thompson et al. 2011), which are not present within the Project. Important habitat for this species includes open grounds for lekking (breeding behavior), dense grassland structure to provide cover for nesting and brood rearing, adequate cover for winter roost sites, and adjacent cropland for foraging (Robel et al. 1970; Svedarsky et al. 2000). Grassland habitat makes up only 1% of the Project area and Greater Prairie-Chicken presence is unlikely.

5.3.4 Golden Eagle

Collision with turbine blades is the primary risk for Golden Eagle associated with the Project. Golden Eagles are expected to occur infrequently and singly in northwest Missouri where it is a rare transient and winter resident (Robbins 2018). Within the past 20 years, eight individuals were observed throughout the Loess Bluffs CBC, Maryville CBC, and Taylor County CBC and there are observations within 25 miles of the Project according to eBird data (eBird 2018). Golden Eagles are most frequently found near colonies of burrowing mammals or areas with high concentrations of waterbirds during the winter (Kochert et al. 2002). No known Prairie Dog colonies are present within the Project area; however, large concentrations of waterfowl have been observed in cropland habitat during on-site field surveys but are not unique within the Project. No Golden Eagles have been recorded during the pre-construction surveys to date. There is little suitable foraging habitat (1% grassland/herbaceous) and prey availability within the Project, which in addition to their rarity in Missouri, reduces risk to this species. Opportunities to further reduce risk to Golden Eagle are discussed in Section 7.0.

5.3.5 Loggerhead Shrike

Collision with turbine blades is the primary risk for Loggerhead Shrike. In Missouri the Loggerhead shrike is an uncommon permanent resident that favors grasslands with small patches of shrubs-scrub habitat (Robbins 2018). Individuals have been observed during pre-construction surveys and all CBC surveys and several BBS routes, and identified in eBird data within the Project in the last 25 years (eBird 2018). Loggerhead shrike will forage over open habitat and pasture which can be found throughout the Project;

however, this habitat is not unique within the region. Opportunities to reduce risk to Loggerhead Shrike are discussed in Section 7.0.

5.3.6 Northern Harrier

Northern Harrier is primarily at risk from the Project due to collision with turbine blades. In Missouri, Northern Harriers are an uncommon migrant and winter resident (Robbins 2018). Northern Harriers were documented during the CBC (56 individuals) and BBS routes (1 individual). In addition, 105 individuals were observed throughout on-site field surveys to date and there are eBird records from within the Project. There is suitable foraging habitat for this species (i.e., open grasslands, pasture) within the Project and surrounding region, however; this habitat is not unique and is ubiquitous throughout the area. Northern Harriers breed in quality native prairie and grassland habitat which is not present within the Project. Individuals hunt flying low to the ground over fields and open habitat where much of their time will be spent outside the rotor swept zone which makes them less susceptible to collision with turbine blades. Section 7.0 further describes opportunities to reduce risk for this species.

5.3.7 Osprey

Collision with turbine blades is the primary risk for Osprey associated with the Project. The Project is within the migratory range of the Osprey (Robbins 2018). Individuals have been observed during on-site field surveys and eBird observations within the Project (eBird 2018). Osprey regularly forage for fish on rivers, reservoirs, and large lakes (Robbins 2018). No individuals have been observed during the CBC or BBS surveys. In addition, lack of habitat within the Project and siting of turbines away from rivers, reservoirs, and large lakes reduces risk to this species. Section 7.0 further describes opportunities to reduce risk.

5.3.8 Peregrine Falcon

Peregrine Falcon is primarily at risk from the Project due to collision with turbine blades. This species is expected to occur infrequently and singly in northwest Missouri where it is a rare transient and winter resident (Robbins 2018). One individual has been observed during the Loess Bluffs CBC and there are eBird observations within 25 miles of the Project. No Peregrine Falcons have been observed during on-site field surveys. However; individuals primarily forage on shorebird and waterfowl (Robbins 2018), which may congregate at Nodaway County Lake, Mozingo Lake, Nodaway River, and One Hundred and Two River and its tributaries. Opportunities to reduce risk to the species are discussed in Section 7.0.

5.3.9 Sandhill Crane

Collision with turbine blades and transmission lines is the primary risk for Sandhill Crane associated with the Project, but Sandhill Crane occurrence in the Project is expected to be infrequent. Sandhill Crane are a rare summer resident and rare transient in northwest Missouri. Individuals have been recorded during the Loess Bluffs CBC and eBird data within 25 miles of the Project; however, there are no observation from BBS routes or on-site field surveys to date. Sandhill Cranes' rarity in Missouri and lack of marsh habitat within the Project (Robbins 2018) reduce the risk for this species. Opportunities to further reduce risk are addressed in Section 7.0.

5.3.10 Sharp-shinned Hawk

Sharp-shinned hawk is primarily at risk from the Project due to habitat fragmentation and collision with turbine blades. This species is an uncommon migrant and winter resident in Missouri (Robbins 2018) and has been recorded from on-site field surveys, CBC's, BBS routes, and eBird observations within the Project. Sharp-shinned Hawks use forested areas as cover when hunting prey and clearing of trees may fragment habitat utilized by this species. However, forested habitat within the Project is not unique and is abundant throughout the region. Opportunities for reducing risk to this species are discussed in Section 7.0.

5.3.11 Short-eared Owl

Collision with turbine blades is the primary risk for Short-eared Owl associated with the Project. The Project is within the Short-eared Owl's winter range where they have been recorded from the Loess Bluffs, Taylor County, and Maryville CBC's and eBird observations within 12 miles of the Project. In addition, individuals have been recorded during on-site field surveys to date. Short-eared Owls forage flying low to the ground over quality grassland habitat. Risk to this species is reduced by restoring impacted grassland within the Project. Opportunities for further reducing risk to this species are discussed in Section 7.0.

5.3.12 Snowy Egret

Snowy Egret is primarily at risk from the Project due to collision with turbine blades and transmission lines. The Project is within the species' migratory range where it has been observed during on-site surveys to date as well as eBird observations within 25 miles. Snowy Egret have not been observed during any of the CBC or BBS routes. However, there is little migration stopover habitat (e.g., marshes, wetlands, flooded fields; Robbins 2018) present within the Project which reduces risk to this species. Opportunities for further reducing risk to this species are discussed in Section 7.0.

5.3.13 Sora

Collision with transmission lines is the primary risk for Sora associated with the Project. In northwest Missouri, Sora migrate through in the spring and fall, and favor wetland and marsh habitats (Robbins 2018). Sora have not been recorded during pre-construction surveys at the Project nor were they documented in the BBS or CBC near the Project. There are observations from eBird within 25 miles of the Project where suitable expanses of wetland habitat exist. The Project contains less than 1% of the preferred stopover habitat (i.e., marshes and wetlands) which reduces risk for this species. Opportunities for further reducing risk to this species are discussed in Section 7.0.

5.3.14 Swainson's Hawk

Swainson's Hawk is primarily at risk from the Project due to collision with turbine blades. This species is a migrant in northwestern Missouri and occurs in low numbers throughout the western portion of the state (Robbins 2018). There is one observation of Swainson's Hawk from the Watson BBS route and to date one individual has been observed during on-site surveys. However, there are records of Swainson's

Hawk from eBird data within 25 miles of the Project and no observations of individuals from CBC data or other BBS routes. Risk to this species is reduced due to their infrequent presence in the region. Opportunities to reduce risk to this species are discussed in Section 7.0.

5.3.15 Trumpeter Swan

Collision with turbine blades and transmission lines is the primary risk for the Trumpeter Swan associated with the Project. Trumpeter Swans are a locally common winter resident in northwest Missouri and have been observed during the Maryville and Taylor County CBCs and in high numbers at the Loess Bluffs CBC. Loess Bluffs National Wildlife Refuge is approximately 25 miles southwest of the Project and contains large expanses of quality wetland habitat that attracts many waterfowl including Trumpeter Swans. In addition, there are eBird observations from within 3 miles of the Project at Mozingo Lake. The Project contains cropland that may provide stopover habitat for individuals, however; risk is reduced due to a lack of suitable wetland habitat within the Project where individuals may congregate and to date no Trumpeter Swans have been observed within the Project. Opportunities to further reduce risk to this species are addressed in Section 7.0.

5.3.16 Virginia Rail

Virginia Rail is primarily at risk from the Project due to collision with transmission lines. This species is likely to be infrequent locally and only occur in Missouri throughout migration. Virginia Rail has been recorded in eBird observations within 25 miles of the Project, however; no records of individuals were documented in the literature review from BBS routes, CBC data, or from on-site field surveys to date. Virginia Rails are wetland specialist species that favor quality marsh and wetland habitats and risk is reduced by little stopover habitat for this species present within the Project. Opportunities to further reduce risk to this species are addressed in Section 7.0.

6.0 EVALUATION OF POTENTIAL RISK TO BATS

As with birds, renewable energy development has the potential to benefit bats and their environment by reducing carbon emissions and thus mitigating the effects of climate change. However, wind energy facilities have also been shown to result in adverse impacts on bats by causing injury or death through collisions with turbines or barotrauma. Estimates of over 500,000 bats killed annually based on observed bat mortality rates within the United States and Canada have led to increased attention on wind energy's impact to bat populations (Arnett and Baerwald 2013; Hayes 2013; Smallwood 2013; Arnett et al. 2016;). Due to overall low reproductive rates (most North American bat species have only 1-2 young a year) and increased wind energy development, Frick et al. (2017) state that migratory bat populations are at risk of population declines. Their study modeling wind mortality effects on Hoary Bat populations determined that there could be a 90% reduction to the species' population over a span of 50 years if mortality rates remain unchecked (Frick et al. 2017).

Barotrauma, or rapid decompression, occurs when bats fly near the outer portions or tips of rapidly moving turbine blades, which cause a rapid change in pressure (Strickland et al. 2011). The air pressure difference causes the lungs to expand rapidly, causing small blood vessels to break open, producing internal bleeding (Baerwald et al. 2008). Barotrauma does not appear to be as significant a cause of turbine-related mortality as once thought, but bat fatalities may be caused by the combination of direct impacts and barotrauma (Grodsky et al. 2011). Injuries such as inner ear damage from sudden changes in air pressure can indirectly cause mortality due to a decrease in foraging success for affected bats (Arnett et al. 2016).

Wind energy development can also negatively impact bat populations by causing habitat loss and degradation. Many species of bats are experiencing long-term population declines from a variety of sources such as habitat loss and fragmentation, disease (e.g., White-nose Syndrome), anthropogenic changes to the environment, and other factors. Population declines associated with non-energy related activities have increased the concern over the impacts of energy development compounding the effects of some of these factors (AWWI 2017a).

This section provides an evaluation of the Project's potential impacts on bats based on research and reports from peer reviewed literature, publicly available reports from other wind facilities, agency consultation, and onsite pre-construction data collected for the Project (public bat data, acoustic bat monitoring, and mist-netting surveys). This section addresses how Project construction and operations may affect the nine species of bats that are known or have the potential to occur within the Project (see Table 2-7). Five of these species have special status: (1) the federally and state endangered IBAT, (2) the federally threatened and state endangered NLEB, (3) the Missouri SCC Little Brown Bat, (4) Silver-haired Bat, and (5) Tri-colored Bat which is currently under review by the USFWS for listing under the ESA. The potential impacts of the Project to these species are further addressed in Section 6.3.1.

6.1 IMPACTS FROM CONSTRUCTION OF THE PROJECT

There is a potential for impacts on bats due to habitat alteration or loss in association with construction of the Project. However, these impacts are not expected to be as substantial for bats as they are for birds.

Within the Project, 10.7% of the habitat is composed of deciduous forest which has the potential to provide suitable foraging or roosting habitat for these species. Potential construction impacts on habitat would be caused by ground disturbance and tree removal. Changes in vegetation may influence the behavior of bats by changing microclimatic conditions and the quality of habitat for bats (NRC 2007). Removal of trees during the active season (April – October) when bats may use them for rearing pups would be considered a direct disturbance and would have the potential to not only cause displacement but also mortality of individuals. However, it is anticipated that bats that are present in the Project would return to areas that were temporarily disturbed following the completion of construction activity.

During the winter months (November – March) bat presence and/or activity within the Project is expected to be minimal. Most species potentially occurring within the Project (Big Brown Bat, IB, Little Brown Bat, NLEB, and Tri-colored Bat) are known to hibernate in caves/mines. There are no known underground features within the Project, thus decreasing the likelihood that large populations exist within the Project. However, the Big Brown Bat will also roost in buildings where they form colonies (Boyles et al. 2009). Concentrations of this species could be found within the Project where buildings are found. Other species are known to utilize trees and/or fallen leaves for solitary winter roosts (Boyles et al. 2009). The Evening Bat and Silver-haired Bat will roost in hollow trees or under the bark. The Eastern Red Bat and Hoary Bat commonly roost in the foliage of trees. Since individuals that utilize wooded areas for winter roosts do not roost colonially, direct mortality and/or displacement impacts is relatively low.

6.2 IMPACTS FROM THE OPERATION OF THE PROJECT

6.2.1 Factors that Influence Bat Mortality

The research regarding impacts on bats from wind developments was more limited than avian data until recent years. Consequently, there are fewer studies with bat fatality data than bird fatality data. For many bat species an understanding of their natural history, especially migration and foraging movements, remains incomplete (Miller 2008). The effect of wind turbines on bat populations (primarily collision with turbine blades) is largely not understood. As a result, the significance of wind energy's impacts on bat populations, especially those under threat from other factors such as disease, is also poorly understood (AWWI 2017a). Several hypotheses have been proposed as to why bat high mortality rates are observed at wind energy facilities, most notably by Kunz et al. (2007). In addition, research suggests that most observed fatalities are not caused by a sole factor, but a combination of multiple scenarios adding complexity to minimizing impacts of wind energy development on bat populations (Arnett et al. 2016).

6.2.1.1 Site Characteristics and Location

As with many aspects of bat and wind energy development interactions, the link between turbine siting and bat collisions is not entirely understood. Highlighting this issue, a recent study examining resource availability in relation to distance from turbines was unable to predict observed fatality rates (Bennett and Hale 2018). However, they conclude that the study was focused on predicting resident bat species resource use and that migrating bats may utilize resources differently. Wind turbines placed along ridge tops may create or coincide with favorable bat migration corridors or foraging sites. Linear clearings through forested areas associated with the wind energy facility may be attractive to bats for foraging which could put them at increased risk of collision. U.S. wind developments in the Eastern Forest Region

and the Midwest Region have reported the highest fatality rates, while developments in the Basin-Desert and Great Plains regions generally report lower rates (Hein et al. 2013; Arnett et al. 2016). It is uncertain why high fatality rates in the eastern U.S. and Midwest differ from other regions, whether they reflect actual higher risk, higher migratory bat abundance, more intensive search protocols, or a combination of factors.

There are various hypotheses indicating bats could be potentially attracted to wind turbines for foraging, roosting, or because of visual or auditory curiosity (Cryan and Barclay 2009). The clearings provided by wind turbine construction in forested areas may create favorable foraging areas for bats by creating edge habitat. Insects may be attracted to these open areas and, possibly, to the heat generated by the turbine nacelle (NRC 2007). Bats may be attracted to towers because they may perceive them as large trees that could potentially be used for roosting or mating sites (Cryan and Barclay 2009). This hypothesis is strengthened by the fact that migratory tree-dwelling bats represent the highest percentage of bat fatalities recorded at wind developments in North America (Arnett et al. 2008; AWWI 2017b) and migratory tree bats mate in the fall (Cryan 2008).

6.2.1.2 Seasonal Timing

While the seasonal distribution and migratory movements of bats are poorly understood, bat fatality from wind turbines occurs most frequently during late summer (mid-July through September) which is within the fall migration period for many bat species. This pattern of fatality is largely consistent from region to region. For the three tree bat species with the highest demonstrated mortality rates observed at wind facilities (i.e., Hoary Bat, Eastern Red Bat, and Silver-haired Bat), the spring migration period is generally between early April and mid-June, and the fall migration period is from mid-July through November (Cryan 2003; Arnett et al. 2008). Migration is a high-risk activity for bats because they become more concentrated as they move, making them vulnerable to storms, drought, contaminants, predation, and human disturbance.

6.2.1.3 Echolocation Limitations

Although the relationship between pre-construction acoustic bat activity and post-construction mortality is not clearly defined, there is a positive relationship between the two, suggesting that projects with higher pre-construction activity generally have higher post-construction mortality (Hein et al 2013). Several factors may limit the response time and avoidance behavior of bats around turbine rotors. Current research suggests that bats may not use echolocation capabilities during migration or that the short-distance use for echolocation is ineffective to detect an obstruction in time to react. The most efficient range of echolocation is 10 to 16 ft (3 to 5 m) for North American bats (Arnett 2005). Turbine rotors and the nacelle produce complex electromagnetic fields that may also interfere with echolocation activities.

6.2.1.4 Weather Conditions

The influence of weather on bat activity at wind farms has been used to develop operational mitigation (turbine curtailment), which is currently the only method demonstrated to be effective at reducing bat mortality (Arnett et al. 2013). It is generally understood that bat activity is higher during lower wind speeds and higher temperatures. Weller and Baldwin (2011) modeled bat activity as a function of several

environmental variables and found that weather, particularly lower wind speed and higher temperatures, were the best predictors of bat occupancy at a wind farm in southern California. While wind speed and temperature are seemingly the most important variables that influence bat activity, other factors such as wind direction, humidity, changes in barometric pressure, and moon phases were also important during certain times of the year and inclusion of these variables increased model performance (Weller and Baldwin 2011).

In a summary analysis of studies discussing post construction monitoring results for measuring different cut-in speeds, Arnett et al. (2015) shows a 50% decrease in bat fatality rates for wind facilities that increase 1.5 – 3.0 m/s above operational standard cut-in speeds. Coupled with operational conditions that impose a shut off or feathering of wind turbine blades during times when weather conditions are conducive to bat flight (e.g., temperatures above 50º F), more economical wind facilities that can greatly reduce the risk to bats compared to previous wind facilities can be constructed (Weller and Baldwin 2012; Hein et al 2014).

6.2.2 Bat Fatality Analysis

While post-construction bat mortality rates are variable across studies within the central United States, they are overall lower than mortality rates reported at studies conducted in the eastern United States. In a review of 21 post-construction mortality studies from 19 North American wind facilities, bat mortality rates for North America ranged between 0.2 and 53.3 bats/MW/study period and between 0.1 and 69.6 bats/turbine/study period (Arnett et al. 2008). Mortality rates were highly variable depending on geographical location of the wind facility (Arnett et al. 2008). For example, the eastern United States recorded mortality rates which ranged between 14.9 and 53.3 bats/MW/study period (23.0 and 69.6 bats/turbine/study period); in the Midwest, recorded mortality rates between 0.2 and 8.7 bats/MW/study period (0.1 and 7.8 bats/turbines/study period); and the Pacific Northwest United States recorded fatality rates between 0.8 and 2.5 bats/MW/study period (0.7 and 3.4 bats/turbine/ study period). Only one project in the south-central United States was publicly available at the time of the Arnett et al. (2008) study and they reported 0.8 bats/MW/study period or 1.2 bats/turbine/study period. These survey results provide a range of potential risk for specific regions of North America.

The National Wind Coordinating Collaborative compiled results of 63 studies that provide annual estimates of post-construction bat fatalities at wind energy facilities (Strickland et al. 2011). Most of these studies (54) found bat mortality rates of less than 10 bats/MW/study period (Strickland et al. 2011). The highest bat mortality rates in the U.S. have been documented in mountainous areas of the east, particularly along forested ridges (Arnett et al. 2008; Strickland et al. 2011; Hein et al. 2013). However, recent studies from the Northeast, Upper Midwest, Wisconsin, and Canada suggest that relatively high bat mortality rates may occur at wind energy facilities in agricultural areas as well (Strickland et al. 2011; Hein et al. 2013).

The American Wind Wildlife Institute (AWWI) conducted an analysis on public and confidential bat collision data from the United States stored within AWWI's Information Center. These data were compiled from 202 post-construction studies conducted at 137 individual wind projects (AWWI 2017b). Of these, the annual average estimate for fatality was 2.66 bats/MW, with 75% of studies reporting fewer than 5 bats/MW/study period. This summary illustrated once again the regional variations seen in

previous studies but showed that the Midwest region had a higher average annual fatality estimate of 6.2 bats/MW/year, followed by the Northeast with 3.5 bats/MW/year. Maximum range of fatality estimates was higher in the Northeast and the Southwest regions than the Midwest region (0.1 – 49.7 bats/MW and 0.1 – 36.9 bats/MW compared to 0.4 – 32 bats/MW, respectively). (AWWI 2017b).

Throughout North America, the three most common bat species found during post-construction mortality studies at wind energy facilities are Hoary Bats, Silver-haired Bats, and Eastern Red Bats, all of which are migratory, tree-roosting species (Strickland et al. 2011; AWWI 2017b). All three of these species were observed or identified as potentially occurring in the Project.

6.3 POTENTIAL IMPACTS ON SPECIAL STATUS BAT SPECIES FOR ALL PHASES OF THE PROJECT

The following section provides a review of risk for five special status bat species that occur or have the potential to occur in the Project area regarding all phases of the construction and operation of the proposed Project. See Section 2.4 for range, population status, and habitat requirements for each special status species.

6.3.1 Indiana Bat

IBATs are presumed absent within the Project based on mist-netting results conducted in 2018 (Stantec 2018b). There are no known maternity colonies within the Project, but records do occur within Nodaway County to the east of One Hundred and Two River (USFWS 2016). Based on site-specific data and USFWS concurrence, IBAT is presumed absent at the Project. However, Clear Creek has voluntarily committed to restricting tree clearing to November 1 – March 31, where practicable, which will reduce risk to all tree roosting bats.

In a summary analysis of Myotis species fatalities throughout North America wind farms, only 7 IBATs were documented contributing to less than 0.1% of all fatalities reported (Gruver and Bishop-Boros 2015). The most likely time that the species could be impacted by the Project would be during migration since 6 out of the 7 documented IBAT fatalities occurred during migration seasons (1 in the spring, 5 in the fall season) (Gruver and Bishop-Boros 2015).

6.3.2 Northern Long-eared Bat

NLEBs were captured during the 2018 bat mist-netting surveys and are thus considered present in the Project (Stantec 2018b). In addition, maternity roost trees of reproductive females (i.e., pregnant, lactating) were located within the Project. Maps of known NLEB maternity roosts within the Project with associated buffers of 150 ft where tree clearing is prohibited from June 1 – July 31 are found (USFWS 2016) in Appendix G. It is unknown where individuals that occur within the Project hibernate. Although there are no known hibernacula within the Project or Project vicinity (USFWS 2016b), recent research has documented NLEB utilizing bare rock cliffs with steep aspects for winter hibernacula (White et al. 2017). No areas similar to that type of habitat are known to occur within the Project. In a summary analysis of bat fatalities within North America, 43 individual NLEB had been constituting only 0.3% of all bats observed. Of these, 79.1% (34 individuals) were observed during the typical Fall migratory season for

bats (Gruver and Bishop-Boros 2015). If individuals travel through the Project during spring and/or fall migration, risk is assumed since this species may fly at higher altitudes within the rotor swept zone based on documented fatalities at higher rates of incidence during the fall season (Gruver and Bishop-Boros 2015). The USFWS established a 4(d) rule for the NLEB which exempts wind energy projects from take during operations as long as BMPs are implemented (USFWS 2016b). Clear Creek reduced impacts to woodlands during Tier 2 of the siting process and shifted the boundary east to eliminate potential habitat from the Project. Clear Creek will implement BMPs including removing trees only during the inactive winter period (November 1 – March 31) where practicable and will feather blades below manufacturer's cut-in speeds. Other BMPs to avoid and minimize risk to this species are detailed in Section 7.0.

6.3.3 Little Brown Bat

Little Brown Bats are the highest documented fatality for Myotis species at wind facilities in North America with 1,146 individual records contributing 8.1% of all fatalities reported (Gruver and Bishop-Boros 2015). No Little Brown Bats were captured within the Project during mist-netting surveys conducted in 2018 (Stantec 2018b). There are no known maternity colonies within the Project, but the species has been documented within Nodaway County (Boyles et al. 2009). Summer maternity roost sites are often under the sloughing bark or cavity of a tree, but they will also inhabit man-made structures including buildings and under bridges (Reynolds and Veilleux 2008; Boyles et al. 2009). Siting considerations that distance turbines away from structures possibly used by bats for roosts could reduce risk of collision during the resident season. Like other *Myotis* species, Little Brown Bats migrate regionally between summer and winter habitats. Seasonal timing of fatalities has been documented predominantly within the month of August indicating that the species is more at risk during fall migration activities (Gruver and Bishop-Boros 2015). Operational and siting considerations are further discussed in Section 7.0.

6.3.4 Silver-haired Bat

Silver-haired Bats are the third highest encountered species during post-construction monitoring in North America, comprising 16.1% - 18.4% of all species in multiple summary analyses (Gruver and Bishop-Boros 2015; Arnett et al. 2016; AWWI 2017b). These species are considered long-distance migrators, and roost solitarily in trees throughout the year, rarely using underground winter hibernacula (e.g., caves/mines; Boyles et al. 2009). No Silver-haired Bats were captured during the 2018 mist-net surveys, but they are known to occur in Nodaway County (Boyles et al. 2009). Tree removal is expected to impose a minimal risk to this species since they do not roost colonially. The majority of wind energy related fatalities occur during the spring and fall migration seasons (Arnett et al. 2016). The disproportionate numbers of these species and the other two tree roosting species (i.e., Hoary Bat and Eastern Red Bat) compared to others points to higher attractional or behavioral tendency to fly within the rotor-swept zone of turbines. Siting of turbines may not be as an effective method for mitigating population impacts to this species as the implementation of operational curtailments such as lowering cut-in speeds during migratory periods at appropriate weather conditions (e.g., temperatures greater than 50° F) (Bennett and Hale 2018; Hein et al. 2014). For further discussion, please refer to Section 8.2.

6.3.5 Tri-colored Bat

Tri-colored Bats compose 1.7 % - 4.4% of all bat fatalities observed at wind facilities in North America, making them the 5th to 6th most encountered bat species during post-construction monitoring (Gruver and Bishop-Boros 2015; AWWI 2017b). Population counts for this cave/mine winter roosting species have plummeted due to White-nose Syndrome, with an observed decrease of over 50% during 5 years of winter hibernacula counts in Missouri (Colatskie 2017). This decrease in population numbers has led to the USFWS reviewing the species for possible federal listing as threatened or endangered. Tri-colored Bats were not captured during the bat surveys in the Project (Stantec 2018) but have been recorded in Nodaway County by previous studies (Boyles et al. 2009). Risk during construction is reduced by limiting tree clearing to during the late fall and winter seasons. No known hibernacula occur within the Project. During resident seasons these bats typically stay under or closely associated with the tree canopy, below the rotor-swept zone of turbines. As with all species potentially occurring with the Project, the risk of collision with turbine blades is increased during the migratory seasons.

7.0 AVOIDANCE AND MINIMIZATION MEASURES

The USFWS's voluntary WEG defines "mitigation" as avoiding and minimizing adverse effects and, when appropriate, compensating for unavoidable significant adverse effects (USFWS 2012). This section outlines avoidance and minimization measures the Project will implement to reduce impacts on birds and bats as a result of construction and operation of the Project.

7.1 DESIGN CONSIDERATIONS

The following micro-siting and design recommendations from the WEG, ECPG, MDC, and USFWS are applicable to and implemented by the Project:

- In 2018, the Project boundary extended several miles west, adjacent to the Nodaway River. Based on early desktop and habitat mapping analyses and the potential impacts to wildlife, the Project modified the Project boundary and shifted it east to minimize impacts to woodlands.
- Clear Creek has, to the maximum extent practicable, minimized roads, power lines, fences, and other infrastructure associated with the Project to reduce habitat fragmentation and collision risks. When fencing is necessary, construction will use wildlife-compatible design standards.
- After construction, Clear Creek will close temporary facilities not needed for site operations and restore these roadbeds to native vegetation, consistent with landowner agreements.
- Clear Creek has, to the extent possible, located turbines in previously disturbed areas (e.g., crop fields and pastures with introduced grasses) to minimize habitat fragmentation (104 of 111 turbines). For turbines located in native forest habitat, the Project will remove trees during the winter to the extent practicable to avoid impacts to breeding birds and bats.[3]
- To the extent possible, the Project has avoided locating wind turbines and other facilities within wetlands, streams, ponds, and other bodies of water as they may attract waterbirds, bats, or other wildlife as foraging areas or roosting areas.
- Clear Creek will bury all electrical collection lines at the Project, which will prevent wildlife collisions.
- Clear Creek will use wooden and steel monopoles for the transmission line and tubular towers for turbines, not lattice structures, which reduces the availability of bird perches.
- Clear Creek will avoid impacts to aquatic habitat including wetlands and streams by installing electrical collection lines via boring or horizontal directional drilling at aquatic crossings.
- Clear Creek has designed the overhead transmission line to follow applicable Avian Power Line Interaction Committee (APLIC) guidelines (APLIC 2012) and will continue to protect wildlife from electrocution.
- Clear Creek will mark the overhead transmission line to reduce avian collisions per APLIC guidelines within one mile of aquatic habitat, and all areas within 2 miles of the Bald Eagle nest by installing bird diverters.

- Clear Creek will not use guyed communication towers or guyed METs. If guy wires are necessary, bird flight diverters or high visibility marking devices will be used to minimize the potential for bird collisions with the wires

7.2 CONSTRUCTION CONSIDERATIONS

Clearing for roads and other infrastructure, equipment noise, and increased vehicle traffic could affect birds and bats during construction of the Project. Possible minimization measures during these construction-related activities would include: minimizing the area of impact, reducing erosion, limiting noise and dust, preventing spread of noxious weeds, and minimizing the use of chemicals. The Project has committed to the following BMP's from the WEG to reduce potential risk to bird and bat resources during construction:

- Clear Creek will consult the local NRCS office to determine appropriate seed mixes when seeding or planting during restoration.
- Clear Creek will implement an erosion control protection plan to minimize erosion, runoff, and contamination of sediments into aquatic resources.
- Clear Creek will use construction and management practices to minimize activities or features (e.g., brush piles) that may attract prey and predators to the wind energy facility.
- Clear Creek will reduce vehicle collision risk to wildlife by instructing project personnel to drive at appropriate speeds, be alert for wildlife, and use additional caution in low visibility conditions.
- Clear Creek will use clean native seed mixes to prevent invasive species from colonizing temporary work spaces. In addition, the Project will comply with any additional requests by Nodaway County pertaining to noxious weed species control as requested.
- Clear Creek will reduce the introduction and spread of invasive species by following applicable local policies for invasive species prevention, containment, and control, such as cleaning vehicles and equipment arriving from areas with known invasive species issues and using locally sourced topsoil. Clear Creek will use invasive species prevention and control measures as specified by county or state requirements or by applicable federal agency requirements when federal policies apply (e.g., Missouri Noxious Weed Law [Missouri Law 263.190]).
- After construction is complete, Clear Creek will remove temporary facilities not needed for site operations and restore roadbeds to native vegetation where applicable, consistent with landowner agreements.
- Clear Creek minimized stream and wetland impacts to prevent loss of native habitat. All temporary aquatic resource crossings will be restored to pre-existing conditions. Per Clean Water Act requirements.

7.3 MINIMIZATION AND AVOIDANCE MEASURES DURING OPERATION

Collisions are often the primary concern during operation, but displacement within habitats and influence on migration can also impact birds and bats. Mitigation measures to reduce impacts could include reseeding of native vegetation, habitat enhancement, and post-construction monitoring to identify potential hazards. The Project has committed to the following mitigation measures during operation (as outlined in the WEG and ECPG):

- Clear Creek will employ only red, or dual red and white strobe, strobe-like, or flashing lights (not steady burning lights) to meet Federal Aviation Administration requirements for turbine lighting of turbines, met towers, and communication towers. These types of lights do not appear to attract birds or bats to wind turbines in greater numbers than unlit turbines (AWWI 2017a);
- To reduce light pollution and potentially attracting birds or bats to the Project, Clear Creek will, to the extent practicable, minimize lighting at operation and maintenance facilities and substations by:
    - Using lights with motion or heat sensors to keep lights off when not required. All internal turbine nacelle and tower lighting will be extinguished when unoccupied.
    - Using hooded lights directed downward to minimize horizontal and skyward illumination. Bright and/or steady lights facing skyward have been shown to disorient nocturnally migrating birds.
    - Minimizing the use of high-intensity lighting, steady-burning, or bright lights such as sodium vapor, quartz, halogen, or other bright spotlights;
- Clear Creek will manage garbage and waste disposal to avoid attracting wildlife with supplemental food;
- Clear Creek will implement a Wildlife Incident Reporting System (WIRS; Section 9.0) to monitor for incidental bird or bat carcasses and potentially detect events that trigger adaptive management (Section 8.2);
- Clear Creek will conduct periodic on-site training for operation and maintenance staff on T/E species identification and WIRS protocol (see Section 7.4); and
- Project operations will include measures to reduce risk of wildfire and provide a plan of action in case of wildfire.
- During migration, Clear Creek will feather turbine blades below manufacturer's cut-in speed during the bat active season from April 15 – May 15th and July 15 through October 15.

7.3.1 Northern Long-eared Bat Specific Measures

The Project is anticipated to pose a risk to the NLEB based on its location within the range of the species, the positive presence detected during the presence/absence surveys (section 4.6), several maternity roost trees located within the Project, and the availability of potentially suitable habitat. The current status of the NLEB is threatened, but the listing precludes impacts from wind generating facilities provided the

provisions in the 4(d) rule are followed. A Habitat Conservation Plan (HCP) is being developed and will be finalized and submitted if: (i) the NLEB is listed as endangered, (ii) the 4(d) rule is no longer in place, or (iii) if an additional species becomes listed that may be impacted by the Project. The Project has made the following voluntary commitments to minimize potential impacts on all bats, which are more conservative than the provisions in the 4(d) rule for the NLEB:

- The Project has committed to conduct tree removal activities outside the active season (April 1 to October 31). If changes to the construction designs require additional tree removal, the Project will follow the recommendations in the 4(d) rule and will not remove any trees during the active pup rearing season June 1 – July 31.
- The Project has avoided siting turbines near bat hibernacula, breeding colonies and maternity roosts.
- The Project has avoided siting turbines away from high-use bat areas identified during the Bat Surveys, including avoiding turbines at least 100 m from known roosts.[3]
- During construction, ensure that there is proper drainage around turbines so as not to create wetted areas or pooled water that might increase insect populations to attract bats.
- During construction, if a NLEB is sighted on the ground by on-site personnel, the sighting will be reported to the USFWS Missouri Ecological Services Field Office.
- If a dead or injured IBAT, or other T/E bat species is found due to Project operations, the USFWS will be notified as soon as possible, but within 24 hours. If the USFWS confirms it is a T/E species, then Clear Creek will also work with USFWS to determine and implement appropriate adaptive management measures at the site, if necessary. Such measures could include:
    - Working with the USFWS to determine what adaptive management or other conservation measures should be implemented at the Project during future migratory seasons, or throughout the active season.
    - Curtailing turbines determined to be high-risk as appropriate.
    - Finalize an HCP and seek an ITP that includes coverage.

7.3.2 Bald Eagle-Specific Measures

The Project is expected to pose a risk to Bald Eagles. The Project is located between several eagle-use areas (e.g., nests) and substantial food sources (i.e., major rivers). The closest active Bald Eagle nest (EN-11) is 0.97 mile from the transmission line, and 3.2 miles from the nearest turbine location.[3] Clear Creek will submit an Eagle Conservation Plan to ensure the Project's compliance with BGEPA, provide framework for post-construction monitoring, and provide information to support an application for a Bald Eagle take permit (see Stantec 2018f). All recommendations and conservation practices implemented as a part of this BBCS will be superseded by the Eagle Conservation Plan. Based on recommendations from the WEG and the ECPG, Clear Creek has incorporated the following BMPs to reduce risk to eagles:

- Clear Creek will use native species when seeding or planting during restoration after construction and will consult with appropriate state and federal agencies regarding native species to use for restoration.
- Clear Creek will use construction and management practices to minimize activities or features (e.g., brush piles) that may attract prey and predators to the facility.
- After construction is complete, Clear Creek will close temporary facilities not needed for site operations and restore roadbeds to native vegetation, consistent with landowner agreements.
- Clear Creek will reduce vehicle collision risk to wildlife by instructing Project personnel to drive at appropriate speeds, be alert for wildlife, and use additional caution in low visibility conditions.
- Clear Creek will properly manage its garbage and waste disposal to avoid attracting wildlife with supplemental food.
- Clear Creek will ensure all livestock carcasses found by site personnel are handled and disposed of per the Livestock Carcass Management Plan (see the ECP).
- Clear Creek will generally design the transmission line per applicable APLIC standards to reduce the potential for electrocution.
- Clear Creek will implement a wildlife incident report form to document injuries and/or fatalities (Appendix A).
- Clear Creek will conduct annual on-site training for operation and maintenance staff on eagle species identification and wildlife incident report form protocol.
- Tenaska will implement a Livestock Carcass Management Plan (see the ECP).

8.0 POST-CONSTRUCTION MONITORING, ADAPTIVE MANAGEMENT, AND ADDITIONAL CONSERVATION MEASURES

To monitor and evaluate the Project's impacts on birds and bats, Clear Creek staff will be responsible for overseeing the Wildlife Incident Reporting System, coordinating with third-party consultants in the completion of post-construction fatality surveys, and will be the primary contact for discussions with regulatory agencies as needed. Utilizing the results of the post-construction monitoring, Clear Creek staff will facilitate decisions regarding any necessary additional surveys, adjustments to facility operation and management, and/or off-site enhancement options as appropriate using the adaptive management process. Recommendations for adaptive management will be based on best available science and standardized and accepted methods.

8.1 MORTALITY STUDIES

Following the commencement of Project operations, post-construction mortality studies will be completed to evaluate the impacts of the Project on birds and bats. Pre-construction surveys and agency coordination (USFWS-designated Tier 3 actions) indicate the Project poses a collision risk to bird and bat species (see Section 5.0 and 6.0). In accordance with the recommendations for Tier 4 studies in the WEG, the post-construction mortality study will be conducted for one year at the Project and the study will be robust enough to assess the validity of the risk predictions. The study will include standardized carcass searches and bias correction trials (i.e., searcher efficiency and carcass persistence trials).

Standardized carcass searches will be conducted at 100% of the turbines on roads and pads once per month November – March and August for all bird species. In addition, searches will occur once per week for six weeks in the spring (April 15 – May 31), six weeks in the summer (June15 -July 31) and six weeks in the fall (September 15– October 30) for both birds and bats for a total of 24 searches. A trained biologist in bird and bat carcass identification will scan for carcasses while walking along the roads and pads within 80 m of each turbine base. In addition to the searches on roads and pads, the searcher will also scan the entire area within 240 m of the turbine base for large bird carcasses.

During each search, the observer will record the start/finish time, turbine identification, weather data, and observed carcass information. Each bird or bat carcass found during the survey will be documented on a datasheet. Carcass-specific data will include species, sex, age (when possible), estimated time since death, condition of carcass (e.g., entire, partial, scavenged), type of injury (if possible), and azimuth and distance from turbine. All observed carcasses will be photo-documented and all carcasses that cannot be identified will be recorded as an unidentified bat or bird. If the carcass of a federally listed T/E species is discovered during the mortality study, Clear Creek and/or their contractors will report the incident to the USFWS as soon as possible, but within three business days of the discovery.

A fatality estimator (e.g., Huso et al. 2012) will be used to calculate the adjusted seasonal and annual mortality rates for each of the carcass classes by incorporating the results of the standardized searches, bias correction trials, and DWP values. For the estimator, the searchable area of each turbine will be

mapped. Results of the carcass distributions identified during the standardized searches, will be used to calculate a Density Weighted Proportion (DWP) for each turbine. The DWP will be incorporated into the fatality estimator to increase the accuracy of the estimate by accounting for areas beneath the turbines that were not searched.

As part of the mortality study, a searcher efficiency rate (i.e., the ability of a surveyor to detect a carcass) and carcass persistence rate (i.e., the amount of time a carcass persists before it is no longer detectable) will be determined for birds (small and large size classes) and bats. Searcher efficiency and carcass persistence trials will be conducted during each of the four seasons to ensure temporal differences in searcher efficiency and removal rates are adequately assessed. The results of the trials will be used to adjust the raw fatality data to provide a refined and more accurate mortality estimate.

Results of the bird and bat mortality study will be presented to the USFWS and the MDC following the completion of the one-year study. If additional fatality surveys are determined to be warranted, then the results of the additional surveys will be provided to the USFWS and the MDC upon completion of those surveys.

8.2 ADAPTIVE MANAGEMENT

This BBCS represents a process through which Clear Creek plans to reduce impacts on birds, bats, and other wildlife and habitats while maintaining optimal operation and generating renewable, emissions-free electricity. Clear Creek sited the Project and incorporated measures to avoid and minimize impacts on birds and bats, including sensitive and listed species (based on consultations with the USFWS and the MDC). Adaptive management, if necessary, is a process that will allow Clear Creek to adjust avoidance measures outlined in this BBCS to reflect new information or changing conditions to prevent substantial impacts on all bird and bat species and optimize operation. Changes to the avoidance and minimization plan may be triggered by:

- Discovery of mass bird or bat mortality events (> 50 individuals in one day);
- Take of an ESA-listed species;
- Take of a Bald Eagle or Golden Eagle;
- New ESA listings of bird or bat species known to occur or with the potential to occur in the Project vicinity.

Additional adaptive management measures will be designed to resolve any issues that arise on a case-by-case basis. Some examples of adaptive management include:

- Modification of wind turbine operations; and
- Additional training of Project staff.

Clear Creek will coordinate with the USFWS and the MDC prior to implementing adaptive management changes. The adaptive management plan will apply throughout the life of the Project; on-going evaluation and adaptation of the BBCS will provide effective measures for avoiding and reducing impacts on bird and bat species, as well as other sensitive species and habitats.

This BBCS will be active immediately and will be followed though decommissioning of the Project.

8.3 ADDITIONAL CONSERVATION MEASURES

In accordance with requests from the USFWS and MDC, Clear Creek has committed to conducting post-construction fatality surveys for Bald Eagles per the ECP.

9.0 WILDLIFE INCIDENT REPORTING

Clear Creek will implement a wildlife incident reporting protocol to standardize the actions taken by the Project staff or its subcontractors in response to any bird or bat fatalities or injuries detected within the Project boundary. The protocols will apply to the operational phase of the Project and will be used for incidental discoveries of dead or injured birds or bats as well as for those found during scheduled post-construction surveys (e.g., fatality studies).

9.1 BIRD OR BAT MORTALITY REPORTING PROTOCOL

If a bird or bat carcass is discovered and determined to be a federally or state-listed T/E species or eagle by the Site Supervisor or an on-call biologist, then Clear Creek will contact the USFWS. The need for alterations in Project activities will be evaluated within an adaptive management framework.

9.2 BIRD OR BAT INJURY PROTOCOL

If an injured bird or bat is discovered, the observer will immediately report the incident to the Project Supervisor, who will immediately contact the USFWS or the MDC, as well as the pre-determined and approved rehabilitation facility/facilities. Injured animals will not be moved by any individual who does not have proper qualifications and appropriate permits obtained through the MDC and the USFWS. If an injured bird or bat is determined to be a federally or state-listed T/E or eagle species, Clear Creek or staff will contact the USFWS and/or the MDC following a reporting protocol developed by Clear Creek.

9.3 INCIDENT REPORT

Incident reports completed by the Project Supervisor or a biologist will include, at minimum, the following information: date, time, weather, observer, location (turbine number, specific location of carcass, distance of carcass from turbine), photographic documentation (including scale), and description of the carcass (e.g., condition, physical description). An example Wildlife Incident Reporting Form is provided in Appendix H. Incident reports will be completed for all fatalities or injuries for all bird and bat species. Incident reports will be entered into a spreadsheet or searchable database that also contains fatality monitoring data. The spreadsheet or database will be housed and maintained by Clear Creek. Incident reports will be entered into the database as soon as possible. All incident reports will be reviewed periodically for quality assurance/quality control issues by Clear Creek environmental management.

9.4 EMPLOYEE TRAINING

Training personnel during the operation and maintenance phase of the Project facilitates compliance with all regulations and requirements of the USFWS or MDC. Clear Creek will provide on-site training to employees in the identification of special status species and in the wildlife incident report protocol. Clear Creek will conduct a periodic refresher training to educate employees about wildlife laws, reporting requirements, and permit requirements with specific emphasis on special status species that may occur in

the Project. Employees, contractors, and site visitors will be instructed to avoid harassing or disturbing wildlife, particularly during reproductive seasons.

10.0 QUALITY ASSURANCE AND CONTROL

Compliance with this BBCS will be reviewed by Clear Creek periodically, and information gathered during the assessment of existing practices will be used to improve the effectiveness of the BBCS. Any noted deficiencies will be addressed with recommendations for specific corrective plans which will be implemented in a timely manner. Quality assurance and control for the BBCS will be evaluated by assessing:

- Efficiency and quality of mortality reporting procedures and documentation;
- Quality and accuracy of avian and bat mortality reporting;
- Compliance with company procedures; and
- Compliance with Clear Creek's environmental permits, as applicable.

11.0 KEY RESOURCES

USFWS
USFWS Midwest Region: Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Ohio, and Wisconsin)
U.S. Fish and Wildlife Service Migratory Bird Permit Office
5600 American Blvd. West (Suite 990), Bloomington, Minnesota 55437-1458
Tel: 612-713-5436 Fax: 612-713-5393
Email: permitsR3MB@fws.gov

Missouri Ecological Services Field Office
Jane Ledwin Biologist
101 Park DeVille Drive, Suite A, Columbia, MO 65203-0057
Tel: 573-234-2181 Fax: 573-234-2181
Email: jane_ledwin@fws.gov

USFWS Office of Law Enforcement
National Headquarters:
Office of Law Enforcement
U. S. Fish and Wildlife Service
4401 North Fairfax Drive, MS-LE-3000
Arlington, Virginia, USA 22203
Tel: 703-358-1949 Fax: 703-358-2271

USFWS Midwest Region: Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Ohio, and Wisconsin)
U.S. Fish and Wildlife Service Office of Law Enforcement
5600 American Blvd. West (Suite 990), Bloomington, Minnesota 55437-1458
Tel: 612-713-5320 Fax: 612-713-5283

Missouri Department of Conservation
Jennifer Campbell, Policy Coordinator Environmental Compliance Supervisor
2901 W Truman Blvd, Jefferson City, MO 65102
Phone: (573) 751-4115 Tel: 620-672-0788
Email: Jennifer.campbell@mdc.mo.gov

Wildlife Rehabilitation Resources
National Wildlife Rehabilitators Association
http://www.nwrawildlife.org/?page=Find_A_Rehabilitator

International Wildlife Rehabilitation Council (IWRC)
https://theiwrc.org/resources/emergency

The Wildlife Rehabilitation Information Directory
http://wildliferehabinfo.org/

Endnotes

[1] A complete list of birds protected under the MBTA can be found here: https://www.fws.gov/birds/management/managed-species/migratory-bird-treaty-act-protected-species.php.

[2] The USFWS defines these as “an eagle nest, foraging area, or communal roost site that eagles rely on for breeding, sheltering, or feeding, and the landscape features surrounding such nest, foraging area, or roost. site that are essential for the continued viability of the site for breeding, feeding, or sheltering eagles” (50 Code of Federal Regulations 22.3).

[3] Denotes incomplete design, will be updated prior to operations.

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Appendix A PHOTOGRAPHS



Photo 1: Cropland habitat in the Project region. Photographed during an aerial nest survey March 29, 2017.



Photo 2: Hay/herbaceous grassland habitat within the Project. Photographed during a habitat mapping survey September 5, 2017.



Photo 3: Deciduous forest/hay habitat within the Project. Photographed during an avian/eagle survey on May 24, 2017.



Photo 4: Deciduous forest habitat within the Project. Photographed during an avian/eagle survey on August 13, 2018.



Photo 5: Cedar Waxwing, a year-round resident within the Project. Photographed during an avian/eagle survey on December 14, 2017.



Photo 6: Flock of Snow Geese, a migrant waterbird observed in the Project. Photographed during an avian/eagle survey on May 8, 2018.



Photo 7: Common Yellowthroat, a summer resident observed in the Project. Photographed during an avian/eagle survey on June 19, 2018.



Photo 8: Rough-legged Hawk, a winter resident observed within the Project. Photographed during an avian/eagle survey on February 9, 2018.



Photo 9: Adult Bald Eagle flying within the Project at eagle observation point 05. Photographed during an avian/eagle survey on February 9, 2018.



Photo 10: Northern Harrier, a state-listed endangered species observed within the Project boundary. Photographed during an avian/eagle survey on April 4, 2018.



Photo 11: Adult Bald Eagle and chick observed on nest during the 2017 aerial nest survey. Photographed during an eagle survey on April 12, 2017.



Photo 12: Great-horned Owlets observed during the 2017 aerial nest survey. Photographed March 28, 2017.

Appendix B AGENCY CONSULTATION

Stantec Consulting Services Inc.
6800 College Boulevard, Suite 750, Overland Park KS 66211-1855

February 3, 2017

Jane Ledwin
U.S. Fish and Wildlife Service
Columbia Missouri Field Office
101 Park DeVille Drive, Suite A
Columbia, Missouri 65203

Reference: Clear Creek Wind Project in Nodaway County, Missouri

Dear Ms. Ledwin,

Tenaska, Inc. (Tenaska) is in the process of developing the Clear Creek wind project (Project) in Nodaway County, Missouri. Tenaska has contracted Stantec Consulting Service Inc. (Stantec) to evaluate the environmental aspects of the Project, including potential impacts to sensitive species or habitats.

The Project is in northern Nodaway County and covers approximately 30,000 acres. A map depicting the general proposed Project location is provided as Attachment 1. The layout of the Project, including the locations of turbines and Project infrastructure, has not been finalized.

Tenaska intends to incorporate the U.S. Fish and Wildlife Service (USFWS) Land-based Wind Energy Guidelines and the USFWS Eagle Conservation Plan Guidance into Project development.

As part of Tenaska's environmental permitting due diligence, Tenaska is requesting information on the presence of sensitive species and habitats and any other potential environmental concerns with regards to the development, construction, and operation of the Project. In addition, Stantec and Tenaska would like to schedule a meeting to further discuss the Project, any environmental concerns you are aware of, and upcoming pre-construction surveys planned for the Project. We are proposing a joint meeting between Missouri Department of Conservation (MDC) and the USFWS Missouri Field Office at an agreed upon location. In the event we cannot meet jointly, we can coordinate a separate meeting to best fit your schedule.

Thank you for your consideration of this matter, and we look forward to working with you in the future. If you have any questions or concerns, please feel free to contact me via phone or email.

Sincerely,

David Bender

David Bender
Wildlife Biologist/Project Manager
Phone: (913) 202-6881
Fax: (913) 229-2599
David.Bender@stantec.com

Attachment: Figure 1 – General Project Location

Design with community in mind

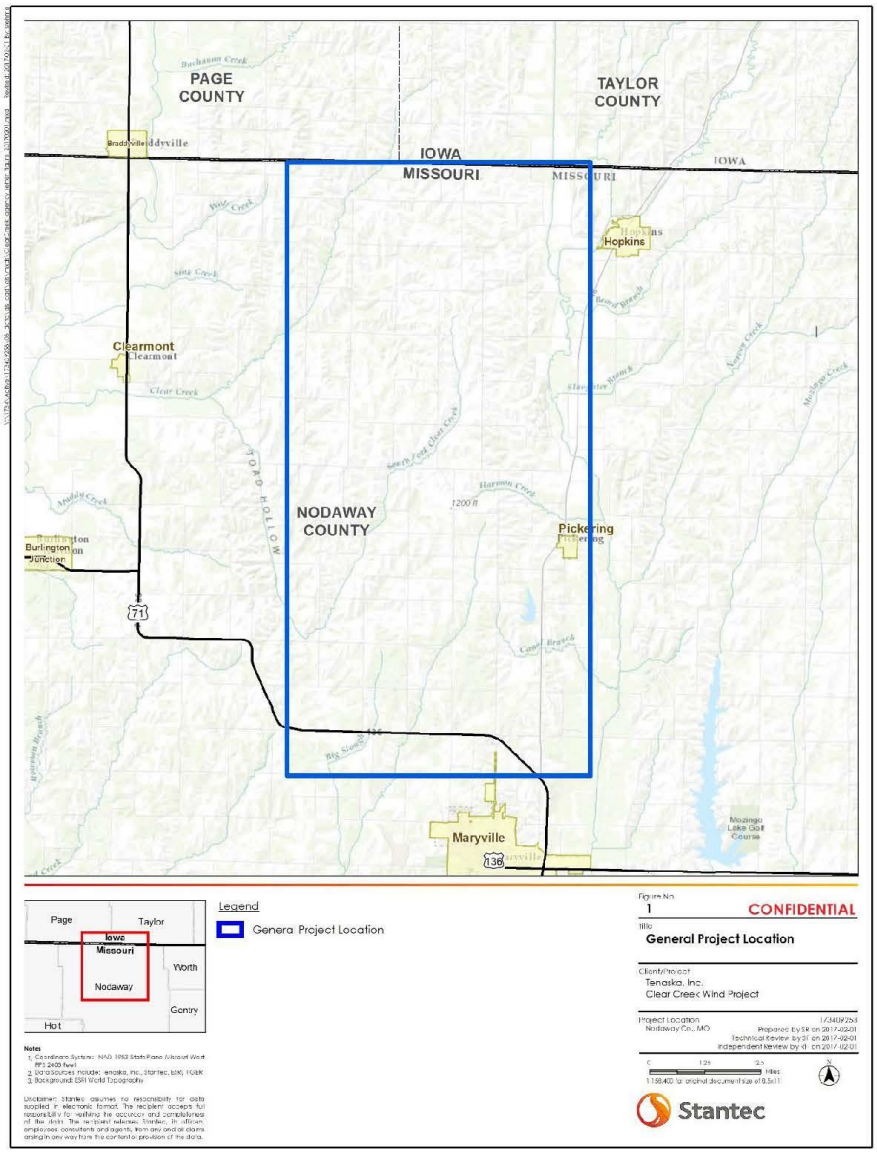


Reference: Clear Creek Wind Project in Nodaway County, Missouri

c.c. Jennifer Campbell, Missouri Department of Conservation
Anthony Elliot, Missouri Department of Conservation
Fred Strauss, Tenaska Inc.
Shauna Marquardt, US Fish and Wildlife Service
Ryan Hrabe, Stantec Consulting Services Inc.

February 3, 2017
Page 3 of 3

Reference: Clear Creek Wind Project in Nodaway County, Missouri



Design with community in mind

Stantec Consulting Services Inc.
6800 College Boulevard, Suite 750, Overland Park KS 66211-1855

February 3, 2017

Jennifer Campbell
Missouri Department of Conservation
2901 W. Truman Blvd.
Jefferson City, MO 65109

Reference: Clear Creek Wind Project in Nodaway County, Missouri

Dear Ms. Sternberg,

Tenaska, Inc. (Tenaska) is in the process of developing the Clear Creek wind project (Project) in Nodaway County, Missouri. Tenaska has contracted Stantec Consulting Service Inc. (Stantec) to evaluate the environmental aspects of the Project, including potential impacts to sensitive species or habitats.

The Project is in northern Nodaway County and covers approximately 30,000 acres. A map depicting the general proposed Project location is provided as Attachment 1. The layout of the Project, including the locations of turbines and Project infrastructure, has not yet been finalized.

Tenaska intends to incorporate the U.S. Fish and Wildlife Service (USFWS) Land-based Wind Energy Guidelines and the USFWS Eagle Conservation Plan Guidance into Project development.

As part of Tenaska's environmental permitting due diligence, Tenaska is requesting information on the presence of sensitive species and habitats and any other potential environmental concerns with regards to the development, construction, and operation of the Project. In addition, Stantec and Tenaska would like to schedule a meeting to further discuss the Project, any environmental concerns you are aware of, and upcoming pre-construction surveys planned for the Project. We are proposing a joint meeting between Missouri Department of Conservation (MDC) and the USFWS Missouri Field Office at an agreed upon location. In the event we cannot meet jointly we can coordinate a separate date to best fit your schedule.

Thank you for your consideration of this matter, and we look forward to working with you in the future. If you have any questions or concerns, please feel free to contact me via phone or email.

Sincerely,

David Bender

David Bender
Wildlife Biologist/Project Manager
Phone: (913) 202-6881
Fax: (913) 229-2599
David.Bender@stantec.com

Attachment: Figure 1 – General Project Location

Design with community in mind

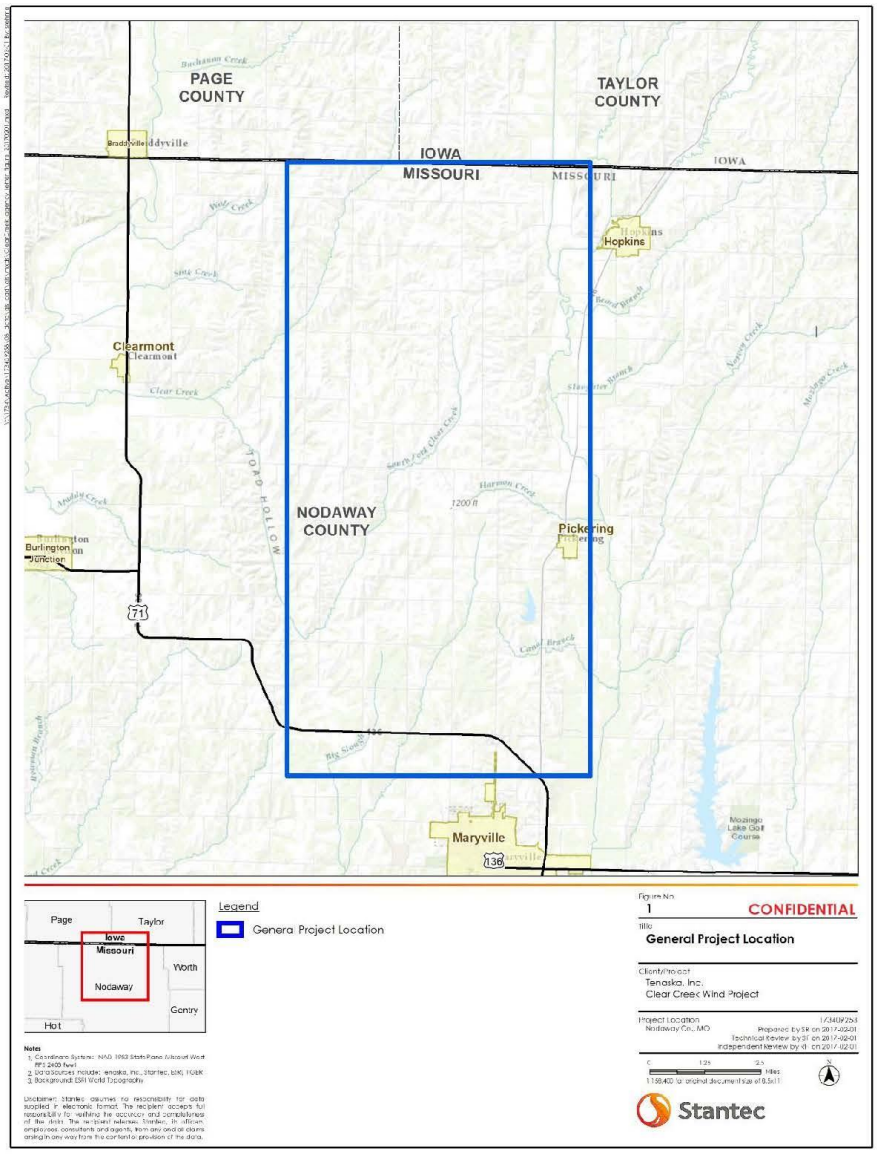


Reference: Clear Creek Wind Project in Nodaway County, Missouri

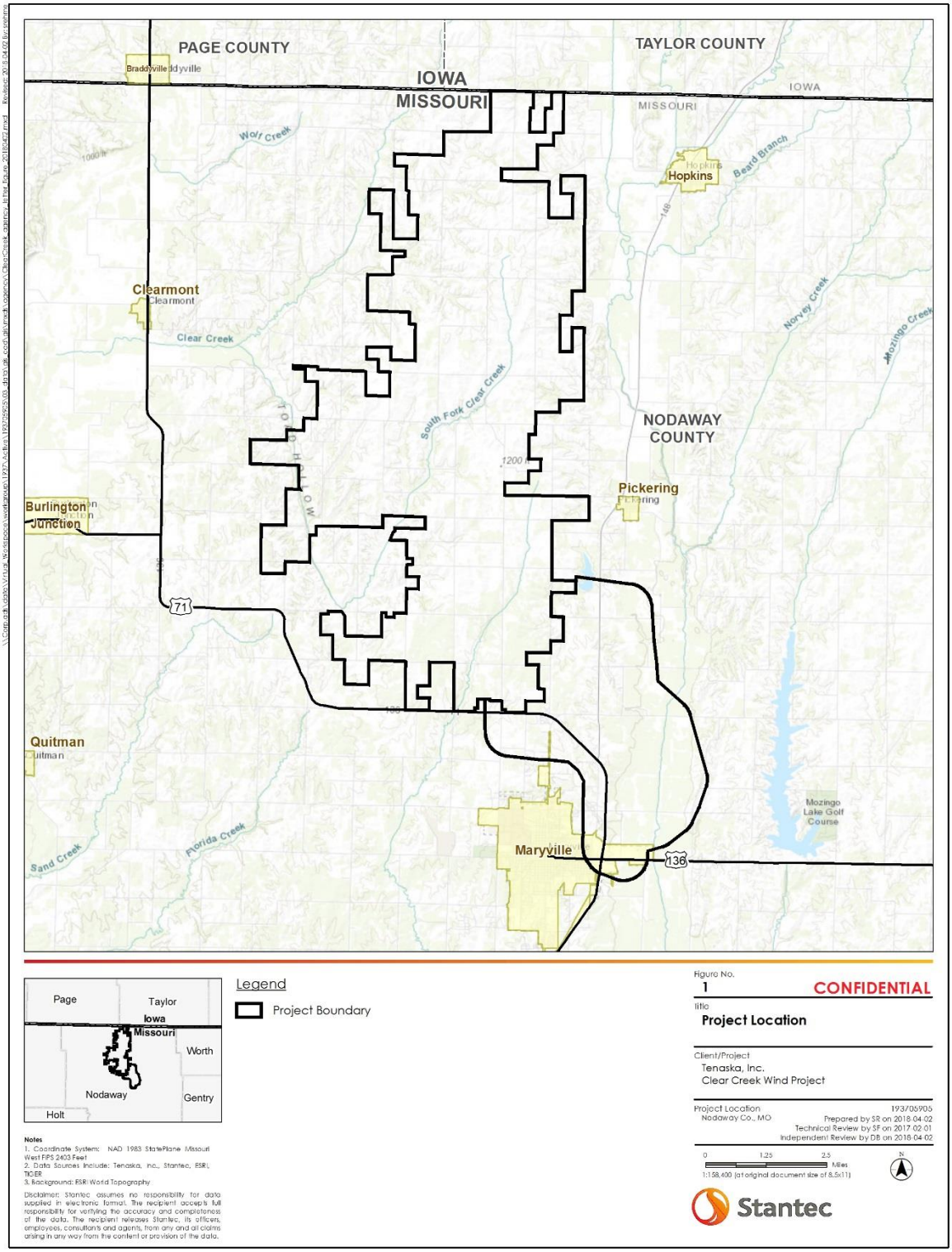
c.c. Jane Ledwin, US Fish and Wildlife Service
Shauna Marquardt, US Fish and Wildlife Service
Anthony Elliot, Missouri Department of Conservation
Fred Strauss, Tenaska Inc.
Ryan Hrabe, Stantec Consulting Services Inc.

February 3, 2017
Page 3 of 3

Reference: Clear Creek Wind Project in Nodaway County, Missouri



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PAGE COUNTY
TAYLOR COUNTY
IOWA
MISSOURI
Braddyville
Wolf Creek
Hopkins
Beard Branch
Clearmont
Clear Creek
Norvey Creek
Mozingo Creek
South Fork Clear Creek
NODAWAY COUNTY
Pickering
Burlington Junction
71
Quitman
Florida Creek
Sand Creek
Maryville
136
Mozingo Lake Golf Course
Page
Taylor
Iowa
Missouri
Worth
Nodaway
Gentry
Holt
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Project Boundary
Figure No.
1
CONFIDENTIAL
Title
Project Location
Client/Project
Tenaska, Inc.
Clear Creek Wind Project
Project Location
Nodaway Co., MO
193/05905
Prepared by SR on 2018-04-02
Technical Review by SF on 2017-02-01
Independent Review by DB on 2018-04-02
0 1.25 2.5 Miles
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Stantec
Notes
1. Coordinate System: NAD 1983 StatePlane Missouri West FIPS 2403 Feet
2. Data Sources Include: Tenaska, Inc., Stantec, ESRI, TIGER
3. Background: ESRI World Topography
Disclaimer: Stantec assumes no responsibility for data supplied in electronic format. The recipient accepts full responsibility for verifying the accuracy and completeness of the data. The recipient releases Stantec, its officers, employees, consultants and agents, from any and all claims arising in any way from the content or provision of the data.

Stantec

Memo

TO:	Fred Strauss Tenaska, Inc.	From:	David Bender Stantec Consulting Services Inc.
File:	Site Characterization Study Addendum Memo	Date:	August 22, 2017

Reference: **Addendum to the Site Characterization Study: Iowa Department of Natural Resources Response to the Clear Creek Wind Project.**

Stantec Consulting Services Inc. (Stantec) submitted a request to Iowa Department of Natural Resources (IDNR) on June 12, 2017 to evaluate the Clear Creek Wind Project (Project) in Nodaway County, Missouri on behalf of Tenaska, Inc. (Tenaska). The response from IDNR summarized in this memo is intended to be included as an addendum to the Site Characterization Study for Clear Creek (Stantec 2017).

Clear Creek is near two protected natural resource areas in Iowa, including Ross Park/Ross Bros Wildlife Area and Siam Tract. IDNR requests a minimum of one mile avoidance buffer.

There are no Bald Eagle nests identified within in the boundary in Iowa.

Iowa recommends preconstruction and post construction bird and bat surveys.

Attachments included in this addendum include the Environmental Review for Natural Resources request for review as attachment 1. The Iowa Department of Natural Reosurces Response to the Environmental Review as Attachment 2. Wind Energy and Wildlife Resources Management in Iowa: Avoiding Potential Conflicts as attachment 3. Finally a map of Wind areas of concern as attachment 4. Stantec did not include an additional master's thesis about bird and bat behavior and mortality at a northern Iowa windfarm.

David Bender
Project Manager/Wildlife Biologist
Phone: 913-202-6881
David.bender@stantec.com

Attachment: Attachment 1: Environmental Review for Natural Resources: Potential Wind Energy Facility – Clear Creek Wind Energy Project.
Attachment 2: Iowa Department of natural Resources Response to the Environmental Review
Attachment 3: Wind Energy and Wildlife Resources Management in Iowa: Avoiding Potential Conflicts.
Attachment 4: Wind Areas of Concern map.

c. C.C.Ryan Hrabe, Monte Ten Clay

Reviewed by:

Design with community in mind

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Stantec

August 22, 2017
Fred StraussTenaska, Inc.
Page 2 of 19

Reference: Addendum to the Site Characterization Study: Iowa Department of Natural Resources Response to the Clear Creek Wind Project.

Dan Schepis, Wildlife Biologist

Reviewed by:

Ryan Hrabe, Senior Associate

Design with community in mind

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Stantec

August 22, 2017
Fred StraussTenaska, Inc.
Page 3 of 19

Reference: Addendum to the Site Characterization Study: Iowa Department of Natural Resources Response to the Clear Creek Wind Project.

ATTACHMENT 1: ENVIRONMENTAL REVIEW FOR NATURAL RESOURCES REQUEST LETTER

Stantec

August 22, 2017
Fred StraussTenaska, Inc.
Page 4 of 19

Reference: Addendum to the Site Characterization Study: Iowa Department of Natural Resources Response to the Clear Creek Wind Project.

Bender, David

From:	Otten, Josh
Sent:	Monday, June 12, 2017 8:48 PM
To:	SLER@dnr.iowa.gov
Cc:	Bender, David
Subject:	Environmental Review for Natural Resources: Potential Wind Energy Facility - Clear Creek Wind Energy Project
Attachments:	CC_boundary_20170302_10mi_buffer_IA_clip.zip

Dear Mr. Moore,

Stantec Consulting Services Inc., on behalf of Tenaska, Inc., is requesting a heritage review of the proposed Clear Creek Wind Energy Project in Nodaway County, Missouri. The actual footprint is outside of Iowa; however, we are attempting to identify environmental resources within 10 miles of the Project footprint. Specifically, we are interested in whether there are any state and or federally listed species occurrences/habitats within 10 miles of the Project, which extends into Iowa, see the attached shapefile. Any information that you can provide will be helpful.

If you have any questions, please contact me at 319-334-3755.

Thank you,

Josh Otten
Environmental Specialist
Stantec
2300 Swan Lake Boulevard Suite 102, Independence IA 50644-9708
Phone: (319) 334-3755
Fax: (319) 334-3780
Josh.Otten@stantec.com

Stantec

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Please consider the environment before printing this email.

1

Stantec

August 22, 2017
Fred StraussTenaska, Inc.
Page 5 of 19

Reference: Addendum to the Site Characterization Study: Iowa Department of Natural Resources Response to the Clear Creek Wind Project.

ATTACHMENT 2: ENVIRONMENTAL REVIEW FOR NATURAL RESOURCES RESPONSE

Stantec

August 22, 2017
Fred StraussTenaska, Inc.
Page 6 of 19

Reference: Addendum to the Site Characterization Study: Iowa Department of Natural Resources Response to the Clear Creek Wind Project.

DEPARTMENT OF NATURAL RESOURCES

GOVERNOR KIM REYNOLDS
LT. GOVERNOR ADAM GREGG
DIRECTOR CHUCK GIPP

July 20, 2017

STANTEC
ATTN: JOSH OTTEN
2300 SWAN LAKE BOULEVARD SUITE 102
INDEPENDENCE, IA 50644

RE: Environmental Review for Natural Resources
Potential Wind Energy Facility Project: Clear Creek
Nodaway County, Missouri

Dear Mr. Otten:

Thank you for inviting the Department's comments on the impact of this project. The Department has searched records for state- and federal-listed endangered or threatened species, rare natural communities, sensitive habitat, and state lands and waters in a proposed project area. Recommendations based on the Department's review of records and data available at the time of this request follow.

The Proposed Wind Energy Project (Project) is in close proximity to protected natural resource areas, including Ross Park/Ross Bros Wildlife Area and the Siam Tract. These and other natural areas are within the proposed project boundary. The Department strongly recommends that turbines are sited a minimum of one mile from these and other state and county-owned areas or complexes. Statewide GIS information about public conservation lands and Bird Conservation Areas is available on the Department's website at https://programs.iowadnr.gov/nrgislibx/ under Administrative and Political Boundaries and Biologic and Ecologic headings, respectively.

The Department has searched Natural Areas Inventory records for the project area and found no site-specific records of rare species or significant natural communities that could be impacted by this project. However, Department data are not the result of thorough field surveys. These species are associated with several habitats, including wooded river and stream corridors, prairie remnants, and wetlands. If listed species or rare communities are found during the planning or construction phases, additional studies and/or mitigation may be required.

We are not aware of any bald eagle nests within the wind farm boundary, but that does not mean that there are none. If a nest is found a 5 mile buffer to that nest site would be suggested.

502 EAST 9th STREET / DES MOINES, IOWA 50319-0034
PHONE 515-725-8200 FAX 515-725-8201 www.iowadnr.gov

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Reference: Addendum to the Site Characterization Study: Iowa Department of Natural Resources Response to the Clear Creek Wind Project.

It is in the Project developer's interest to avoid potential conflict with federal and state-listed threatened and endangered animal species; allow a one mile buffer from natural areas as described above would minimize interaction between threatened and endangered species and the proposed wind energy Project. Although turbine locations are currently unknown, locations might exceed the minimum recommended buffer of one mile. The Department strongly urges the developer to consider sites for these turbines beyond the one mile buffer.

Although the Department does not regulate wind farms, there are concerns regarding potential adverse impacts to bird and bat populations associated with wind farms beyond mortality associated with turbine collisions. Given the possibility of habitat avoidance, the Department strongly recommends a one mile buffer between turbines and natural resource areas, including riparian corridors.

The Department also recommends bird and bat use and interactions with wind turbines and supporting facilities are monitored for an adequate period. The Department recommends one season of pre-construction surveys to assess bird and bat use (including spring and fall migration times) of the Project area. Presence of bat habitats should also be noted and an evaluation made of bat foraging activity in and around the proposed site. Pre-construction survey methodology was developed by Natural Resource Consulting, Incorporated, and accepted by the Department in May, 2008. The methodology is included here as an attachment.

The Department recommends completion of at least two years of post-construction surveys using accepted standard methods. The post-construction monitoring should evaluate collisions and mortality that occur to determine whether the facility can be modified to prevent future collisions, or if mitigation is needed. Wildlife avoidance and other behavioral changes should also be evaluated. An adaptive management approach to planning, design, construction and operations is highly recommended. Additional information titled *Wind Energy and Wildlife Resource Management in Iowa: Avoiding Potential Conflicts* is available here as an attachment and from the Department website at http://www.iowadnr.gov/Environment/WildlifeStewardship/NonGameWildlife/Conservation/WindandWildlife.aspx.

This letter is a record of review for protected species, rare natural communities, state lands and waters in the project area, including review by personnel representing state parks, preserves, recreation areas, fisheries and wildlife but does not include comment from the Environmental Services Division of this Department. This letter does not constitute a permit. Other permits may be required from the Department or other state or federal agencies before work begins on this project.

Please reference the following DNR Environmental Review/Sovereign Land Program tracking number assigned to this project in all future correspondence related to this project: 14459.

If you have questions about this letter or require further information, please contact me at (515) 725-8464.

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Reference: Addendum to the Site Characterization Study: Iowa Department of Natural Resources Response to the Clear Creek Wind Project.

Sincerely,

Seth Moore
Environmental Specialist
Conservation and Recreation Division

FILE COPY: Seth Moore
Tracking Number: 18459

Enclosures

Suggested References

Anderson, R., M. Morrison, K. Sinclair, D. Strickland, H. Davis, and W. Kendall. 1999. Studying wind energy/bird interactions: a guidance document. Metrics and methods for determining or monitoring potential impacts on birds at existing and proposed wind energy sites. Avian Subcommittee, National Wind Coordinating Committee, Washington, DC. 87 pp.

Jain, A.A. 2005. Bird and bat behavior and mortality at a northern Iowa windfarm. M.S. Thesis, Iowa State Univ., Ames. 108pp.

Kerns, J., W. P. Erickson, and E. B. Arnett. 2005. Bat and bird fatality at wind energy facilities in Pennsylvania and West Virginia. Pages 24–95 in E. B. Arnett, editor. Relationships between bats and wind turbines in Pennsylvania and West Virginia: an assessment of bat fatality search protocols, patterns of fatality, and behavioral interactions with wind turbines. A final report submitted to the Bats and Wind Energy Cooperative. Bat Conservation International, Austin, Texas, USA.

CC: Monica Thelan, Wildlife Bureau, Iowa DNR
Amber Schrog, U.S. Fish and Wildlife Service, Rock Island Field Office

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Reference: Addendum to the Site Characterization Study: Iowa Department of Natural Resources Response to the Clear Creek Wind Project.

Natural Resources Consulting, Inc. Pre-Construction Avian Survey Methods for Wind Projects, May 2008

Pre-construction bird surveys consist of one year of standardized pre-construction roadside point count surveys conducted within the project area. Four surveys are conducted during each of four seasons (16 total surveys), including fall migration, winter, spring migration, and the breeding season. These surveys are considered screening level bird surveys and the optimal survey period within each of the four seasons
is targeted.

Point count stations are selected using a random sampling design stratified by dominant landcover types within the project area. Station locations are then adjusted for road locations, traffic volume, and residence locations.

Individual point count periods are five minutes long, and all birds detected by sight or sound (singing/calling) are identified to species and tallied on standardized data forms at each point count station. Because the landscape is open at most wind projects, bird detections are recorded relative to a point count radius of 100 meters (i.e. bird within 100 m and birds beyond 100 m are recorded separately at each point count station). Notes on general habitat types within each 100 m radius point count station
are recorded.

Surveys begin around sunrise and continue until all point count stations within the project area are covered. The survey order of point count stations (i.e. beginning and ending points) is alternated on each
visit so that all points are surveyed during the most optimal time of day (i.e. early morning). Weather conditions (e.g., temperature, cloud cover, wind) are recorded at the beginning and end of the survey route for each survey day. Surveys are not completed when it is raining or when winds are more than a Category 3 on Beaufort Wind Scale (> 12 mph).

Additional behavioral observations of special status species (i.e., endangered, threatened, or species of special concern), waterbirds (i.e., waterfowl, grebes, cormorants, cranes, herons, egrets, rails, plovers, shorebirds, and gulls) and raptors (i.e. hawks, owls, eagles) are recorded. These species tend to be at a higher risk of collision with wind turbine blades; therefore, behavior (e.g., flying, perching, hunting, displaying, vocalizing) of these species are observed and recorded. When individuals from these bird groups are observed flying, an estimate of flight height is recorded in relation to proposed wind turbine design (i.e. below, within, or above the rotor swept area).

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Reference: Addendum to the Site Characterization Study: Iowa Department of Natural Resources Response to the Clear Creek Wind Project.

Natural Resources Consulting, Inc. Pre-Construction Bat Survey Methods for Wind Projects, May 2008

Pre-construction bat surveys incorporate stationary and mobile *Anabat* echolocation detectors, which have been proven to be acceptable methodology for bat/wind farm screening. The use and orientation of these detectors depend on the stationary and mobile locations selected. Stationary detectors are mounted upon one (1) meteorological (MET) tower.

Three detectors are deployed on the tower, at varying heights (50 m MET = 6.5 ft, 72 ft (tree canopy), and ~160 ft (within the turbine rotor-swept area); 80 m MET = 6.5 ft, 72 ft (tree canopy), and ~262 ft (within the turbine rotor-swept area)), in a vertical transect to capture information about bat species flying at higher altitudes. These will be deployed and active sun-down to sun-up from April through October (~214 days). Data are downloaded weekly from the detectors.

Surveys with mobile hand-held *Anabat* detectors are used to supplement stationary surveys. Mobile surveys will be conducted; specified transects are walked or driven by surveyors, while holding the mobile bat call detector or mounting it on the vehicle.

Mobile units are accompanied by a geographic positioning system (GPS) that records geographic location each time a bat call is detected. Although the limited range of the hand-held units only detects bats in the lower altitudes of the project area, it allows the presence of species in other portions of the project area
(not captured by detectors on MET towers) to be surveyed. Hand-held surveys are conducted five times per season (spring, summer, fall), resulting in a total of 15 surveys.

Iowa Department of Natural Resources Post Construction Bat and Bird Mortality Survey Methods, September 2010

The Department recommends post construction mortality surveys be conducted at 20% of the turbines selected randomly and at 5% of randomly selected turbines located nearest forest or riparian habitats. If there are no forest or riparian habits within 3 miles of the Project area the survey should be done on 25% of randomly selected turbines.

The surveys will be conducted daily for two week periods in spring, summer, and fall for a total of six weeks. Survey periods are as follows:

- Spring – between April 5 and 25
- Summer – between June 5 and 30
- Fall – between August 20 and September 15

Searcher efficiency will be quantified to adjust the estimate of total fatalities for observer detection bias according to methods described by Kerns et al. (2006).

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Reference: Addendum to the Site Characterization Study: Iowa Department of Natural Resources Response to the Clear Creek Wind Project.

ATTACHMENT 3: WIND ENERGY AND WILDLIFE RESOURCE MANAGEMENT IN IOWA: AVOIDING POTENTIAL CONFLICTS

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Reference: Addendum to the Site Characterization Study: Iowa Department of Natural Resources Response to the Clear Creek Wind Project.

Wind Energy and Wildlife Resource Management in Iowa: Avoiding Potential Conflicts

Introduction

Iowa is on its way to ranking among the world's leading producers of wind-generated electrical energy. In our efforts to become less dependent upon fossil fuels, nuclear power, hydropower and other sources with frequent environmental concerns, the possibility of this "green" energy has caused much excitement. Many Iowans eagerly await expansion of this low-cost (after initial infrastructure investments) source of electricity as one step towards energy independence.

The Governor, General Assembly, and Department of Natural Resources all consider wind energy development in Iowa a high priority. With much open farmland upon which wind generators might be placed, and in a region of nation realizing relatively high average wind velocities, Iowa seems destined to be a national focal point for wind energy development. Many state and national conservation organizations also support increasing wind energy production.

No energy source has yet been found to be without some degree of environmental costs, however, and wind energy is no exception. It has been demonstrated that if proper siting of wind turbines is not carefully planned, certain locations may result in collisions with, and death of, both wild birds and bats. In one or two noteworthy instances, excessive mortality of hawks, eagles and other birds of prey has resulted in major modifications to both design and placement of wind turbines, or even periodic shut-downs of large facilities. Additional costs involved with such measures can reduce cost-effectiveness of energy production.

Iowa currently exercises minimal regulation on locating wind farms. Nevertheless, some energy companies recognize the benefits of consulting with wildlife resource managers before final decisions are made on siting of new facilities. Such actions will result in greater trust and cooperation between energy producers and those charged with protecting our wildlife resources.

This can lead to an orderly and beneficial development of Iowa's wind energy. An ad hoc Iowa wind energy and wildlife discussion group has met infrequently to review current developments regarding wind energy and wildlife interactions. The group consists of representatives from Iowa DNR's Wildlife Bureau and Energy Section, US Fish & Wildlife Service, several non-governmental conservation organizations, energy companies, the Iowa Renewable Energy Association and other interested parties. The group has no rule-making or regulatory authority; rather it simply works cooperatively to discuss mutual concerns and to learn of the latest developments. A map of sensitive natural resource areas was cooperatively created by the group and is available from Iowa DNR and some other represented organizations, in hopes that it might serve as a helpful reference for wind energy development. The latest version of this map may be viewed at: http://www.iowadnr.com/energy/wind/windwildlife.html .

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Reference: Addendum to the Site Characterization Study: Iowa Department of Natural Resources Response to the Clear Creek Wind Project.

Wildlife Concerns

Just what are the problems wind turbines might pose to our wildlife and other natural resources? The most obvious is direct collisions of birds and bats with rotating blades. Fortunately for birds, the annual mortality rate at most Midwestern wind farms appears to remain relatively low and probably insignificant. An exception occurs when turbines are placed in or very near major migration corridors and pathways, such as large river valleys and ridgetops or bluffs. Because birds tend to follow or congregate along these natural landscape features during their semiannual migrations, wind turbines placed near these features have potential for causing significant bird kills in spring and fall. A few examples of such landscapes in Iowa include the Des Moines River, Little Sioux River, Wapsipinicon River, Loess Hills, and Mississippi River blufflands. Still, with Iowa's mostly open landscape, birds generally are widely dispersed throughout much of the year and chance of interaction with turbines is small.

Bats present an entirely different situation. For reasons still mostly unknown, bat collisions and mortality is much higher than for birds at many wind farms. Early efforts are underway to attempt a better understanding of the problem, but little is known at this time. However, bats usually are associated with trees or wooded areas and wetlands, where the insects on which they feed are abundant. Wind turbines placed near woodlands and wetlands thus might reasonably be expected to result in more bat deaths than turbines situated in open farmlands.

An emerging concern for birds is wind turbines placed within or very near large expanses of grassland. In some western states, ground-nesting lesser prairie-chickens have been found to abandon their nesting grounds when wind turbines were erected and operated nearby. It is quite likely that Iowa's greater prairie-chickens, a state endangered species requiring large expanses of unbroken habitat, would exhibit similar behavior. Many other ground-nesting grassland birds have yet to be studied, but some of these species already are in steep decline nationwide and cannot risk another factor that might potentially threaten their survival. A leading cause of much bird decline is related to fragmentation, or "parcelization", of their remaining habitat, breaking it into parcels too small to meet certain birds' survival or reproductive needs. It has been suggested that wind turbines placed in the middle of a large grassland may similarly fragment habitat and greatly reduce its value. This is a question in need of much additional research.

In summary, adverse effects of wind turbines on birds and bats have been documented in some locations, but much remains to be learned. A few energy companies or developers have collaborated with wildlife researchers to conduct some desperately needed studies. They are to be recognized for their commitment to better conservation of all our natural resources. Nevertheless, much more research is needed, especially in comparing "before and after" effects upon wildlife where wind farms are constructed. Information garnered would be invaluable in helping with future wind farm siting decisions.

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Reference: Addendum to the Site Characterization Study: Iowa Department of Natural Resources Response to the Clear Creek Wind Project.

Wind Turbine Siting Recommendations and Guidelines

Until we more fully understand how wildlife interacts with wind turbines, interim guidelines have been prepared to help wind energy developers and producers do a better job of designing and siting their wind farms. The list of recommendations below will serve as a starting point for things that should be considered when planning wind energy developments. These have been collected from a variety of sources, chief among them the US Fish & Wildlife Service Interim Guidelines for siting and construction of wind energy facilities, and recommendations from the National Wind Coordinating Committee. Keep in mind that this list is a work in progress, subject to change as new information is gained.

Siting Recommendations:

- Avoid placing turbines at locations where any species of fish, wildlife or plants protected under the federal Endangered Species Act have been documented. Information may be obtained by contacting the Iowa Department of Natural Resources Endangered Species Coordinator or Wildlife Bureau staff. Any action resulting in losses to federally-listed species could result in substantial fines or other penalties.
- Avoid placing turbines in or near recognized bird concentration areas or migration pathways, including lakes, wetlands, forests, river valleys, ridge tops or bluff tops, large grasslands, known bird roosting areas, public wildlife areas, parks, and areas with frequent incidence of fog mist or low clouds. While there is no firm information on the amount of buffer zone needed between turbines and these habitats, a separation distance of at least one mile might be considered an absolute minimum (more for prairie chickens—see below).
- Avoid placement of turbines in or near areas where highly "area-sensitive" wildlife species, such as prairie-chickens, are known. Area-sensitive species require expansive, unfragmented habitat. For prairie-chickens in particular, a separation distance of at least 5 miles from all known leks (breeding grounds) is strongly recommended.
- Avoid placing turbines near documented bat hibernation, breeding or nursery colonies and in migration corridors (see bird recommendation above) or between known colonies and feeding areas.
- Avoid placement of multiple turbines in close proximity to one another or perpendicular to known migration pathways (typically north-south). Widely spaced turbines, in arrays parallel to normal bird migration routes, can reduce collisions.
- Reduce or eliminate availability of carrion within wind farms, to reduce chances of attracting eagles, vultures and other raptors colliding with turbine blades. Neither dead livestock nor wildlife should be left within or near wind farm boundaries.
- Place wind turbines in areas already fully developed for agriculture, especially row-crop farming, where there is minimal extant wildlife habitat—Iowa is especially rich in such lands, and it has been estimated that as much as 80% of Iowa's landscape might be considered suitable for wind energy development with few adverse effects upon wildlife.

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Reference: Addendum to the Site Characterization Study: Iowa Department of Natural Resources Response to the Clear Creek Wind Project.

If wildlife habitat losses or fragmentation must be mitigated, develop a plan to create or restore habitat away from the wind farm site. This will serve to attract birds, bats and other wildlife away from the development and reduce collisions. Wherever possible, coordinate habitat mitigation sites with other public or private wildlife lands, to connect, enlarge or enhance those areas.

Certain landscapes, such as the Loess Hills in western Iowa and the "Iowa Great Lakes Region" in northwest Iowa, are known for their beauty, rarity and for extensive wildlife breeding and migrating activities. Such landscapes should be avoided entirely both for biological and aesthetic reasons.

Consider possible cumulative regional effects of multiple wind energy projects. While one project alone may result in few concerns for wildlife, multiple projects across one landscape could significantly multiply adverse effects.

A map of Iowa, denoting areas of particular concern for possible adverse effects by wind turbines upon wildlife and habitat, has been developed and is updated periodically. Wind energy developers and planners are encouraged to refer to this map when considering new sites. Construction within these areas may not necessarily result in wildlife conflicts, and consultation with DNR wildlife biologists can assist developers in finding suitable sites within these potentially sensitive landscapes, or in suggesting plan modifications to minimize adverse effects.

Turbine Design and Operation Recommendations:

Tubular support towers with pointed tops, rather than lattice supports, greatly reduce opportunities for birds to perch or nest upon the structures. Avoiding placement of permanent external ladders or platforms on tubular towers also reduces nesting and perching.

Avoid use of guy wires for turbine or meteorological tower supports. Any existing guy wires should be marked with recommended bird deterrent devices (Avian Power Line Interaction Committee 1994).

Taller turbines, having a top-of-rotor sweep exceeding 199 ft., may require lights for aviation safety. The minimum amount of pilot warning and avoidance lighting necessary should be used, and unless otherwise required by the Federal Aviation Administration, only white strobe lights should be used at night. These should be minimized in number, intensity, and number of flashes per minute. Solid red or pulsating red lights should not be used, as they appear to attract more night-migrating birds than do white strobes.

Electric power lines should be placed underground wherever possible, or should utilize insulated, shielded wire when placed above ground, in order to reduce bird perching and electrocution.

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Reference: Addendum to the Site Characterization Study: Iowa Department of Natural Resources Response to the Clear Creek Wind Project.

Where the height of rotor-sweep area produces high wildlife collision risks, tower heights should be adjusted to lower risks.

If wind turbine facilities absolutely must be located in areas known for high seasonal concentration of birds, it is essential that a bird monitoring program be established, with at least three years of data collected to determine peak use periods. Data may be collected by direct observation, radar, infrared or acoustic methods. When birds are highly concentrated in or near the site, turbines should be shut down until birds have dispersed.

When older facilities must be upgraded or retrofitted, the guidelines above should be employed as closely as possible. Ideally, a site study plan and description of turbine structural and lighting design should be submitted to Iowa DNR well in advance of final siting decisions, for review by staff wildlife experts and advisements on acceptability or suggestions for modifications and/or monitoring.

Hiring a reputable environmental consultant with a strong background in bat and bird ecology is strongly recommended. A baseline inventory of wildlife and evaluation of habitat should be considered for every site under serious consideration for windfarm development. Use of National Wind Coordinating Committee study guidelines will allow for comparison with other studies. Special attention should be paid to Spring and Fall migration seasons, reviewing migrational use of the proposed site by raptors, waterfowl, shorebirds, gulls, songbirds and bats. Upon completion and startup of wind energy generation, monitoring wildlife populations and migrations should be conducted for at least 2-3 years.

Related Links

The following websites of other agencies and organizations may be useful in further understanding of potential wind energy and wildlife conflicts, and how to reduce or mitigate threats to wildlife:

http://www.fws.gov/habitatconservation/wind.pdf

https://nationalwind.org/research/publications/

http://www.aplic.org

http://www.fws.gov/midwest/endangered/mammals/inba/WindEnergyGuidance.html

http://www.fws.gov/windenergy/

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Reference: Addendum to the Site Characterization Study: Iowa Department of Natural Resources Response to the Clear Creek Wind Project.

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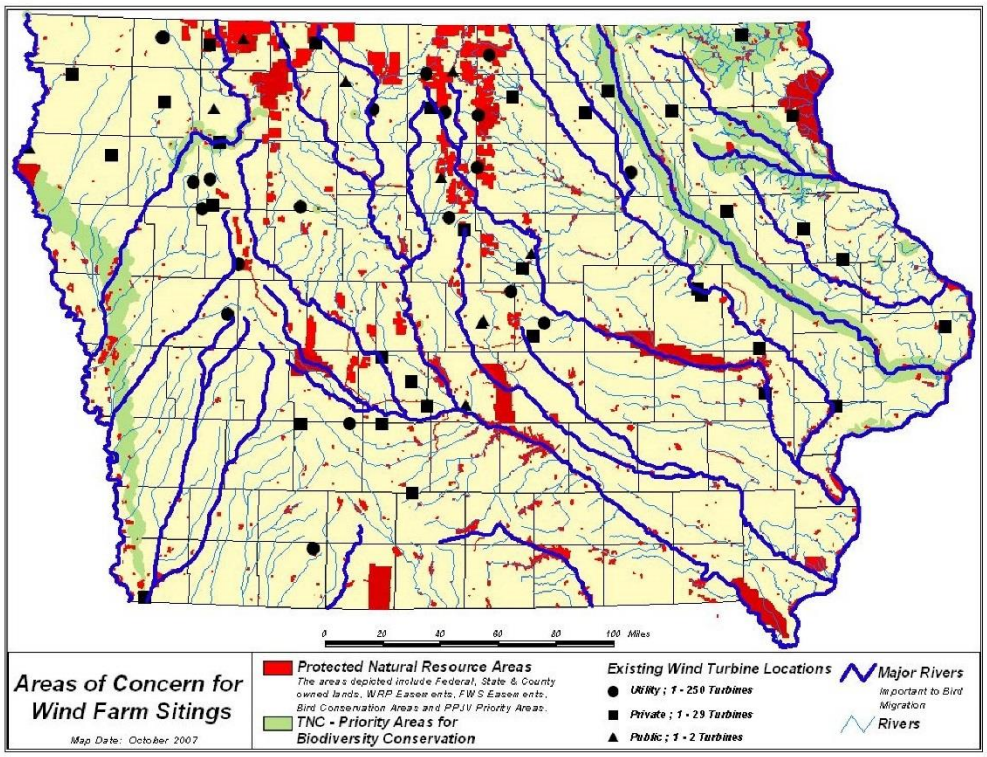
Reference: Addendum to the Site Characterization Study: Iowa Department of Natural Resources Response to the Clear Creek Wind Project.

ATTACHMENT 4: WIND AREAS OF CONCERN FOR WIND FARM SITINGS

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Reference: Addendum to the Site Characterization Study: Iowa Department of Natural Resources Response to the Clear Creek Wind Project.



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Stantec Consulting Services Inc.
6800 College Boulevard, Suite 750, Overland Park KS 66211-1855

April 3, 2018

Matthew Sailor
U.S. Army Corps of Engineers
Kansas City District Office
601 East 12th Street, Room 402
Kansas City, Missouri 64106

Reference: Request for Pre-application Meeting
Clear Creek Wind Project, Nodaway County, Missouri

Dear Mr. Sailor,

Tenaska, Inc. (Tenaska) is in the process of developing the Clear Creek Wind Project (Project) in Nodaway County, Missouri. Tenaska has contracted Stantec Consulting Services Inc. to evaluate environmental aspects of the Project and support the permitting efforts, including those pertaining to jurisdictional waters.

The Project is located in northern Nodaway County and covers approximately 30,000 acres. A map depicting the Project location is provided as Attachment 1. The layout of the Project, including the locations of turbines and other infrastructure, has not yet been finalized.

As part of the Project's permitting requirements, Tenaska is requesting a pre-application meeting with the Corps of Engineers to discuss field activities and preparation of documents necessary for the Project to be in compliance with the Clean Water Act Sections 404 and 401. Such a meeting in your office at your soonest convenience would be appreciated.

Thank you for your consideration in this matter and we look forward to working with you and your staff on this important renewable energy project. If you have any questions or require additional information, please feel free to contact me via phone or email.

Sincerely,

David Bender
Wildlife Biologist/Project Manager
Phone: (913) 202-6881
Fax: (913) 229-2599
David.Bender@stantec.com

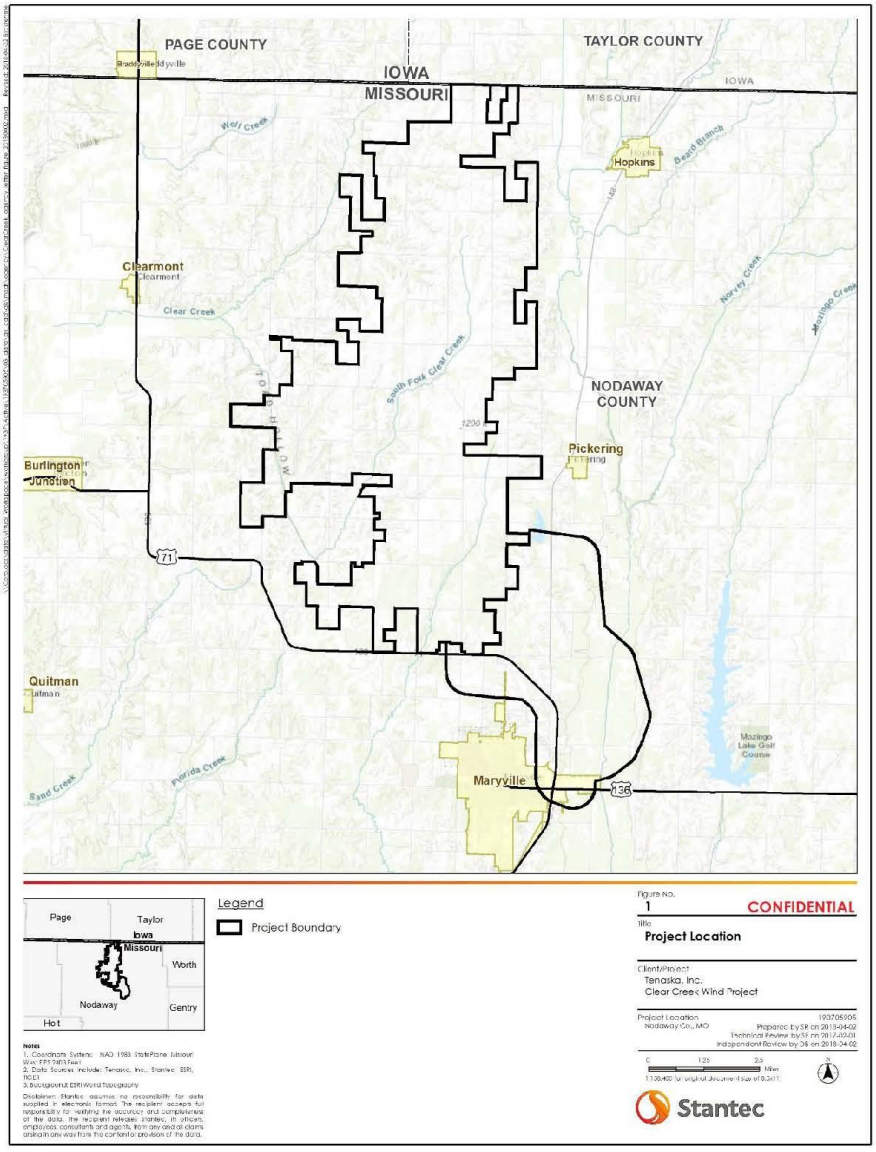
Attachment: Figure 1 – General Project Location

cc: M. Fred Strauss, P.G., Tenaska, Inc.

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April 3, 2018
Page 2 of 2

Reference: Request for Pre-application Meeting
Clear Creek Wind Project, Nodaway County, Missouri



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Meeting Notes

Tenaska Inc., Agency Meeting for Clear Creek Wind Project in Nodaway County, Missouri

Date:	March 1, 2017
Time:	1:00 pm
Place:	U.S. Fish and Wildlife Service, Columbia Missouri Field Office 101 Park DeVille Drive Columbia, Missouri 65203
Next Meeting:	Unscheduled/ 2017
Attendees:	Agencies
	Jane Ledwin– U.S. Fish and Wildlife Service–in person
	Ryan Anthony-U.S. Fish and Wildlife Service–via conference call
	Tony Elliott – Missouri Department of Conservation–in person
	Jennifer Campbell – Missouri Department of Conservation–via conference call
	Janet Haslerig – Missouri Department of Conservation–via conference call
	Steve Buback – Missouri Department of Conservation–via conference call
	Kelly Rezac – Missouri Department of Conservation–via conference call
	Sarah Kendrick – Missouri Department of Conservation–via conference call
	Project Representatives
	Fred Strauss – Tenaska Inc. –in person
	Monte Ten Kley – Tenaska Inc. –in person
	David Bender – Stantec Consulting Services Inc. –in person
	JT Layne – Stantec Consulting Services Inc. –in person

Introductions

Everyone introduced themselves and their roles with the Clear Creek Wind Project (Project). A conference call dial-in was provided by the U.S. Fish and Wildlife Service (USFWS) and several Missouri Department of Conservation (MDC) and USFWS employees attended via conference call.

Clear Creek Project Description

David Bender introduced the Project, which was formerly named the Northwest Energy Center under development by a different wind company. Stantec presented maps of the Project area which included the boundary on an aerial photo and National Land Cover Database background. David described the Project land cover as 35% row-crop agriculture, 46% Pasture/Hay, 12% Woodland, 1% native grassland/herbaceous, and smaller percentages of

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Meeting Notes

wetlands, developed, and other coverages. The row crop is located mainly in the southern portion of the Project. Shapefiles had previously been provided to the USFWS and MDC. Monte Ten Kley added that the Project encompasses approximately 29,000-35,000 acres, and is intended to produce 200 megawatts with approximately 100 turbines. Turbine designs have not been chosen, but multiple manufacturers are being evaluated. The estimated commercial operation date is 2020 with construction beginning end of 2019 or early 2020. The Project boundary and layout have not been finalized. The interconnect logistics have not been completed, but Tenaska plans to interconnect at the Maryville substation (northeast of Maryville).

General Discussion

Stantec informed the group that surveys had not been conducted to date. Desktop assessments following the USFWS Land-based Wind Energy Guidelines and the Eagle Conservation Plan Guidance (ECPG) will be developed, including an Eagle Risk Assessment (Phase 1 of the ECPG*). Prior to any field surveys taking place at the Project, Tenaska is seeking to obtain information on local environmental resources as part of their due diligence.

David asked if MDC identified species of interest or sensitive habitats in the Project area. Jennifer Campbell stated that a natural heritage review had not been conducted by MDC. Stantec plans to submit a request for the heritage review to MDC. In addition, a Memorandum of Understanding (MOU) could be developed to maintain the confidentiality of the natural heritage data shared between Tenaska and MDC.

MDC identified several species of concern for the Project, including: the Indiana Bat, Northern Long-eared Bat, Franklin's Ground Squirrel, Least Weasel, Badger, Greater Prairie-Chicken, Little Brown Bat, Silver-haired Bat, and Tricolored Bat. Tricolored Bats have declined and are currently being evaluated by the MDC to include as Species of Conservation Concern (SCC). Steve Buback mentioned that Greater Prairie-Chickens could occur in that area, although there is a low likelihood due to numerous trees and lack of habitat (native tallgrass prairie) in the northern portion of the Project. Steve noted that Greater Prairie-Chickens will nest in non-native grasslands (smooth brome), and frequently lek in burned areas.

MDC also mentioned a recently identified eagle nest from the area that had not been entered into the natural heritage database. If requested, MDC could provide the general location for all known eagle nests in the Project vicinity, but the exact location would not be provided. Bald Eagle presence in the Project region is greatest in winter. Golden Eagle records are sporadic from northern Missouri; therefore, risk to this species due to Project construction and operation is low. David requested inter-nest distance for known eagle nests to reduce the nest survey area from the recommended 10-miles buffer around the Project. Ryan Anthony needed the shapefile of the Project area in order to identify nests from the USFWS database, which was provided by Jane. Jennifer mentioned that there were inconsistent methods identifying nests in Missouri and most of the nests were recorded by incidental observations; therefore, more detailed surveys would be necessary to locate nests. David asked if the agencies were aware of Bald Eagle communal roosts, but there were no data available from MDC or USFWS.

MDC also mentioned that Nexrad could assist in determining the activity of mass migrations of birds. Jennifer, Steve, and Tony all mentioned Best Management Practices during development such as clustering infrastructure (turbines) to the extent practicable, which could potentially lower the risk to birds and bats as opposed to linear turbine layout. MDC noted that state scientific collection permits would be required for individuals conducting surveys that physically handle protected species and all surveyors would be required to apply for their own individual permit.

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Meeting Notes

MDC has performed acoustic bat surveys in northern Missouri, but they have no data from within the Project. The USFWS Indiana Bat Summer Survey Guidelines (published 2016) are current as of the date of the meeting and no unique protocol are required for Missouri SCC bats aside from the USFWS recommended guidelines.

MDC manages Nodaway County Community Lake (adjacent to the Project) and Mozingo Lake (< 5 miles from the Project), and both areas may provide valuable environmental resources including potential Bald Eagle nests. MDC frequently conducts prescribed burning at these Lakes, which could create arching from transmission lines. As a result, MDC recommended a 1-5 mile buffer around the areas. In addition, Jennifer requested a view-shed study for public use at Nodaway County Community Lake and Mozingo Lake to evaluate impacts from the Project and public users.

Jennifer mentioned that Tenaska should consider talking to the local county agencies and landowners about the Project. She recommended that Tenaska remain transparent with local stake holders throughout the development of the Project. For different wind projects, county agencies, and Non-Governmental Organizations (NGOs) have been frustrated with the lack of transparency in regards to wind development. MDC's role is to help mitigate and minimize impacts to natural resource and the public; therefore, they try to get the public informed early in the process.

Ryan mentioned that since Tenaska is consulting early, 2 years prior to construction, this will allow plenty of opportunity for preconstruction surveys, per the 2016 revision of the Bald and Golden Eagle Rule. An eagle take permit can be acquired since a Programmatic Environmental Impact Statement* (PEIS) for the Eagle Permits rule revision (50 CFR Parts 13 and 22, December, 2016) addressed the requirements in the National Environmental Policy Act (NEPA*). The Eagle Rule revision allows a 30-year permit and management measures following an approved Eagle Conservation Plan. However, Bald Eagles may also receive coverage by completion of a Habitat Conservation Plan (HCP), and receiving an ITP under the Endangered Species Act (ESA) which would also cover other federally protected species.

A significant discussion included take permits for eagles and bats via BGEPA or under the ESA. The primary points are summarized below:

- The timeline and process for applying for an eagle take permit under BGEPA was estimated at 6 months.
    - Two years of preconstruction data (Eagle Use and Eagle Nests*) are recommended per the 2016 rule revisions and the Eagle Conservation Plan Guidelines.
- Pursuing an ITP is voluntary.
- Coverage for listed species (endangered and threatened) and eagles can occur under the ESA and through the development of an HCP, but the timeline will be multiple years.
- Application fees are different depending upon the permits pursued.
- NEPA will not be necessary for an eagle take permit as the process has been completed under the PEIS in the revised rule; however, eagle take must be <5% of the Local Area Population. This statement was further clarified by the USFWS in subsequent communication between Tenaska and the USFWS on March 14th, which described a

tiered NEPA process would still be required for eagle take permits, including preparation of an Environmental Assessment that would NOT be publicly noticed*.

- The NEPA process has uncertain outcome and development of a HCP can be lengthy and the timeline for approval from USFWS will vary. Jennifer mentioned it would be good to allow the public to comment on the NEPA document for an ESA ITP, if Tenaska chooses to address other species of concern (e.g. Little Brown Bat, which might become a listed species).
- A single HCP can cover multiple species including eagles, state-listed species, SCC species. The advantage of doing so streamlines coverage under one permit. However, species can be addressed individually as necessary and under any process needed (ITP under ESA or ITP under BGEPA).
- Any ESA species that could be impacted by the Project needs to be addressed in an HCP.
    - The Midwest HCP also provides coverage for other species, that might not be affected by the Project, those will not need to be addressed. The Midwest HCP can provide coverage for Indiana Bat, Northern Long-eared Bat, and Bald Eagles and ITP can be issued under the ESA.
    - Jane stated that if the Project enrolls in the Midwest HCP, it can be tailored and can include conservation measures only for the species requiring coverage. However, there is no carve-out provision in the Midwest HCP for an individual species such that an applicant seeking coverage for one species is required to fulfill the obligations for all species in the HCP. Since the Project is within the range for Northern Long-eared Bat, Indiana Bat, and Bald Eagle, site-specific surveys would be necessary to understand the level of take expected for each species.
- Any unauthorized eagle take that occurs during operations is a case for potential prosecution. But if the Project is coordinating with USFWS and a permit application has been submitted, prosecutorial discretion would be up to law enforcement, but would potentially not be enforced.
- If mitigation is proposed for eagles above those identified by the revised eagle rule, a full NEPA review might be necessary, but the USFWS is still discussing that process.

Jane Ledwin stated that tree clearing could impact bat species. Indiana Bat is the main federally-listed species of concern for the USFWS and MDC. The Northern Long-eared Bats are federally-threatened species, but are exempted from incidental take by the 4(d) rule. Jane recommended that Northern Long-eared Bats be radio-tagged and tracked during mist-netting surveys, if possible. Lastly, she informed the group that there was limited information from the Project area on bat activity, but east of the Project there are more capture records of Indiana Bat and Northern Long-eared Bat. David asked if Stantec conducts acoustic surveys and the automated software identifies target bat species (i.e., Indiana Bat / Northern Long-eared Bat*), but Stantec determines the calls are not target species through visual assessment, would USFWS accept Stantec's identifications? Jane responded that any results could be discussed with the USFWS and they would collaborate with their experts.

Fred asked if Indiana Bats are not identified during surveys, but might still pass through the Project during migration, what is the process for permits? USFWS would evaluate post-construction data, and recommend curtailment and management practices such as timing of curtailment only in the spring and fall. If acoustic detectors on met towers did not detect the species, the USFWS will

Stantec

Meeting Notes

assume they are not present during migration. Indiana Bats could occur during migration, and the USFWS and MDC have evidence of Indiana Bats migrating relatively long distances.

Fred asked if the Project pursues an HCP for the Indiana Bat, but the permits have not been issued prior to the beginning of operations how would USFWS handle the situation? USFWS responded that if operation begins prior to the permit being issued, the USFWS would recommend curtailment by implementing cut-in speeds such as, 6.9 m/s in the fall and spring as an avoidance measure for bats. The turbine manufacturer and the size of the turbines would determine appropriate cut-in speeds for minimizing impacts to bat species, which would be information to be included into an HCP.

USFWS prefers two full years of pre-construction surveys. If BMPs and curtailment were implemented before completion of surveys, the data from pre-construction monitoring and post-construction monitoring can be used to adjust cut-in speeds and timing e.g. implement during fall migration. Jane requested any plans for preconstruction surveys for bats be reviewed by USFWS to discuss the amount of effort that would be necessary in advance.

Action Items:

Meeting Notes will be provided to the agencies.

David to request heritage Inventory review via email with the Project boundary and eagle nest data from Jennifer Campbell and the Natural Heritage Program. CC Ryan Anthony.

Agencies will provide an initial response to inquiry letters and heritage review when requested.

The meeting adjourned at 2:45

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David.bender@stantec.com

c.
Jane Ledwin, USFWS
Ryan Anthony, USFWS
Jennifer Campbell, MDC
Tony Elliott, MDC
Fred Strauss, Tenaska
Monte Ten Kley, Tenaska

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Meeting Notes

Tenaska, Inc. Clear Creek Wind Project, Nodaway County Missouri

Date/Time:	October 13, 2017 / 3:00 PM
Place:	U.S. Fish and Wildlife Service Office Columbia, MO
Next Meeting:	Early 2018
Attendees:	Jane Ledwin – U.S. Fish and Wildlife Service Kathryn Womack – Missouri Department of Conservation (via phone) Jennifer Campbell – Missouri Department of Conservation (via phone) Janet Haslerig – Missouri Department of Conservation (via phone) Fred Strauss – Tenaska, Inc. David Bender - Stantec Consulting Services Inc. Josh Flinn – Stantec Consulting Services Inc.

Project Description and Discussion

Everyone introduced themselves and their role with the Clear Creek Wind Project (Project).

David Bender provided a PowerPoint presentation to the attendees prior to the meeting, which was shown during the meeting. David stated that the Project is expected to utilize approximately 100 turbines to produce 200 - 250 megawatts (MW) of energy. Fred Strauss explained the turbine selection is not yet final, but would likely be on the order of 2MW or greater. Currently the Project is located on 57,000 acres in Nodaway County, MO, but the final build will likely be closer to 30,000 acres. The transmission line will interconnect with the Maryville, MO substation.

David explained the Project is following the 2012 U.S. Fish and Wildlife Service (USFWS) *Land-based Wind Energy Guidelines* (USFWS 2012) and the Eagle Conservation Plan Guidance (USFWS 2013). A heritage review was provided by Missouri Department of Conservation (MDC) on May 15, 2017 to identify species of potential concern.

Surveys for Bald Eagles are underway and the Project has completed a Stage 1 Eagle Risk Assessment (ERA). The ERA determined the site is a Category II for eagle risk due to the location of an eagle nest on the 102 River. Golden Eagles are thought to be rare for the area, but site biologists will report any sightings. There are no eagle-use minutes recorded to date for Bald or Golden Eagles.

Jennifer Campbell asked if there were any data from grassland bird surveys or breeding bird survey routes in the Project. David responded there are none to date.

David said avian surveys are scheduled for every month and began in May 2017 and will continue for 2 years. Raptor surveys will also occur every month concurrently with the eagle-use surveys and will also occur for 2 years. To date, only 3 raptor species have been recorded. It was noted that Northern Harriers had not been observed. David responded that since fall migration activity was just starting to pick up, more species were anticipated in the coming weeks.

Eagle nest surveys were completed via helicopter in spring 2017 within 10 miles of the Project using 1-mile transects for Bald Eagles and using 0.5 mile transects for raptors within the Project. There were 8 eagle nests and 92 raptor nests (mostly Red-tailed Hawks) documented during the surveys.

Acoustic bat detectors were installed on 3 Project meteorological (met) towers with microphones mounted at 3 and 45 meters. Activity during fall migration has been recorded. Species

Project Description and Discussion

composition and relative abundance levels will be analyzed after detectors are taken down later this fall. Kathryn asked about the spacing of the met towers and David explained they were arranged to cover a broad area of the Project ranging from north to south. Kathryn agreed spacing the detectors in this way was a good approach.

David explained the habitat mapping efforts to date, which were conducted from public roadways. The effort was designed to document presence of MDC sensitive species habitat(s).

Regarding eagle point-count surveys and survey locations, Janet asked why 40% coverage instead of 30%. David explained that the Project boundary could change and the added coverage is there to accommodate those changes.

Jennifer asked Fred if Tenaska had purchased any data from previous surveys. Fred explained they did receive some desktop reports and other information from the northern half of the Project and were aware of surveys that had been conducted in the southern half, but the southern half data were not provided to Tenaska. Jane added that Lynn Robbins had some bat capture data from 2010 including 8 northern long-eared bats within the Project boundary. In addition, MDC had records from recent studies conducted by JT Layne, (Stantec biologist, formerly with MDC) and additional records were being uploaded into the MDC Heritage database. Both agencies suggested that they could share those data with Tenaska and Stantec to help focus bat survey efforts to areas where previous captures occurred. Additionally, Little Brown Bats, Hoary Bats, and Tri-colored Bats in the Project should be considered due to potential changes to their listing status. Josh Flinn discussed the planned bat surveys scheduled for 2018 and emphasized the goal to determine presence/absence using acoustic surveys as an initial approach and then following up with netting in areas where focal species are recorded. He explained the issue with automated species identification programs producing false-positives and confirmed that for any sites where a focal species was recorded, the files will be visually reviewed by acoustic bat experts with extensive experience with bat echolocation call identification in northern Missouri. Jane requested that we share any data collected and collaborate with Kathryn and the USFWS office on final determinations for species identification. All agreed that presence could not be confirmed based on acoustics alone, but that presence determinations would require capture records from mist-netting efforts. The acoustic survey will be used as a preliminary effort to determine the extent of the netting effort. Survey sites where acoustic results do not indicate presence will not require further netting survey efforts.

Jane requested that presence/absence surveys be conducted June and July even though guidance allows May 15 – August 15. The rationale was that captures of reproductive females and juveniles are more likely during this period. Josh requested that we start the acoustic surveys as early as May 15 so that there is time to process the data and determine which sites will need to be netted during June and July. Kathryn and Jane approved of this timeline and agreed this was acceptable as long as the netting effort occurs in June/July.

Josh asked if changes to the USFWS's Range-wide Indiana Bat Summer Survey Guidelines were planned and Jane informed the group that Shauna Marquardt (USFWS) has indicated that the effort will likely be the same for 2018 as it was for 2017, but may change in 2019. She advised that if any applicable changes were approved for 2018, they would be released around April 2018. Jane requested that we prepare a work plan outlining the approach for bat surveys as soon as possible to avoid delays in USFWS approval. The survey efforts will be outlined in the work plan,

Project Description and Discussion

and a Project specific survey approach will be outlined following the 2017 guidelines, which include a site per 123 acres of suitable bat habitat within the Project. If the Project area is further refined, the number of sites will be adjusted accordingly. Radio-tracking and emergence roost counts will be conducted on focal bat species captured during the netting effort.

Janet discussed the importance of 2 years of eagle surveys and asked if a 2nd year of nest surveys would occur in spring 2018. David confirmed that plan. Janet suggested coordination with her as the surveys approach since MDC will also be flying nest surveys in that area.

David requested guidance on how state listed T/E species should be treated and Jennifer responded that bat species will be the primary concern. She recommended we coordinate with her on minimization and mitigation strategies. Kathryn added that MDC will be listing Tri-colored Bats as a species of conservation concern in 2018 and reviewing status changes for Hoary Bat and Little Brown Bat.

The meeting adjourned at 4:10

A conference call between Fred Strauss, David Bender, and Ryan Anthony (USFWS) occurred on 10/27/2017. The PowerPoint presentation provided on October 13, 2017 was shown and an overview of the discussions among the previous meeting's participants was summarized. Following the presentation and summary, Ryan discussed USFWS input on Bald Eagle surveys for the Project.

Ryan asked if 24 months of eagle-use surveys were planned. Fred acknowledged that the current schedule includes two years of eagle-use surveys. Recently, 19 eagle-use minutes were recorded during the October survey at the Project, which are the first minutes documented since surveys began in May.[1] Ryan mentioned the nearby 102 River and Nodaway River might provide suitable habitats for eagles and recommended to continue surveying to collect information on eagle use. He also mentioned that there is evidence that projects with low eagle-use may still have some eagle risk during the life of the project and a permit would provide coverage for incidental take.

Ryan suggested that if the Project continues to collect data according to the ECPG recommendations, which include 2 years of pre-construction data and a waiver is not necessary, that the permit process could occur quickly (potentially 6 months) and a streamlined Environmental Assessment (EA) tiering-off the Programmatic Environmental Impact Statement (PEIS) (USFWS 2016) would be a possible avenue for obtaining an Incidental Take Permit (ITP) per the requirements of the Bald and Golden Eagle Protection Act (BGEPA).

Ryan further described the possible avenues for achieving coverage for incidental take of Bald Eagles by the proposed Project.

1. ITP under BGEPA
    a. Eagle Conservation Plan (ECP) would be required.

[1] * Indicates information that was not originally discussed in the meeting, or was provided in ancillary discussions and not in the PowerPoint Presentation.

b. The EA can forego public comment period and tier-off of the PEIS. However, some Projects are including a public comment period to coordinate with the public.

c. The permit could be issued as quickly as 6 months.

d. The ECP and permit conditions will follow the recommendations and require pre-construction surveys per the revision of the Bald Eagle Rule.

2. ITP under Endangered Species Act (ESA)

a. A Habitat Conservation Plan to address Indiana Bat can include other federal species including the Bald Eagle.

b. An EIS will be necessary, which will include a public comment period.

c. The timeline to get a permit could be longer.

d. The requirements to address eagles may be different than what is recommended in the 2016 rule revision for Bald Eagles and as a result there may be some flexibility in the requirements for pre- or post-construction surveys. However, the avoidance and minimization strategies can be similar in either option, thus the development of an ECP is valuable in either option.

Ryan discussed that there are a few eagle permits that are currently being evaluated, which should not affect the 6 month schedule for receiving a permit for the Project, provided the ECP and EA are developed. The first permits issued by the USFWS might be unique in the conditions and level of effort included in them and some projects are needing waivers; however, by the time the Project receives a permit, the conditions in each permit and ECP will likely become more consistent. To date, no permits have been issued.

For each alternative, conservation of eagles will include both avoidance and minimization including:

- Placement of turbines to avoid high use areas.
- Curtailment during active seasons.
- Compensatory mitigation for Bald Eagles is voluntary and the only currently approved process is retrofitting powerpoles. However, the USFWS is open to exploring alternative options. Mitigation is only required if the take is "high" and would affect >5% of the Local Area Population. USFWS explores the take associated with each project on a case-by-case basis and the estimated take for a project is added to or included within the overall unauthorized take estimated for the LAP by the USFWS.

Potential Bald Eagle take would be estimated from the original take estimate calculated prior to permit issuance and during the first 5-year review (per the PEIS) during which, the post-construction monitoring would be included to update the take model. The USFWS is considering using the take estimated from the first 5-year review as the only take number calculated for the entire life of a project. In addition, the USFWS is considering a reduction of the qualifications of surveyors during post-construction monitoring during years 6-30 such that trained maintenance

Stantec

October 13, 2017

staff can conduct refined surveys with less effort than originally recommended in the 2016 rule revision.

Ryan mentioned that the Eagle Conservation Plan Guidelines might be revised, but efforts to update them remain preliminary.

Methods for including nests in the ECP are currently qualitative and the USFWS is still addressing eagle nests on a case-by-case basis. Overall, the ECP process can begin before the two years of pre-construction data are completed and the take model incorporated into the ECP at any time.

If requested, a technical assistance letter could be issued for the Project.

Tenaska agreed to provide a summary of both discussions back to the group. A meeting in early 2018 is planned.

The foregoing is considered to be a true and accurate record of all items discussed. If any discrepancies or inconsistencies are noted, please contact the writer immediately.

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Meeting Notes

Tenaska, Inc. Clear Creek Wind Project, Nodaway County Missouri

Date/Time:	March 2, 2018 / 9:00 AM
Place:	U.S. Fish and Wildlife Service Office -- Columbia, MO
Next Meeting:	June 1, 2018
Attendees:	Jane Ledwin – U.S. Fish and Wildlife Service Kathryn Womack – Missouri Department of Conservation (via phone) Jennifer Campbell – Missouri Department of Conservation (via phone) Fred Strauss – Tenaska, Inc. David Bender - Stantec Consulting Services Inc. Josh Flinn – Stantec Consulting Services Inc.

Project Description and Discussion

Approval of the Bat Survey Work Plan for the upcoming 2018 bat surveys for the Clear Creek Wind Project (Project) was requested which was previously submitted on February 9, 2018.

David Bender briefly reviewed the history of the 250 megawatts (MW) Project. The Project is still in development and leases continue to be acquired. The Project COD is currently forecasted for 2019. The Bat Survey Work Plan, which was based on the U.S. Fish and Wildlife Service 2017 Range-wide Indiana Bat Survey Summary Guidelines, was submitted for the Project to develop presence/presumed absence determinations for the Project.

The following items were discussed during the meeting:

- Both the USFWS and the MDC requested updated GIS shapefiles of the Project boundary.
- Jane noted several Northern Long-eared Bat (NLEB) occurrence locations from within and west of the current Project boundary. Jane committed to providing the occurrence data to Stantec and Tenaska.
- USFWS described the 4(d) rule for Northern Long-eared bats (NLEB) and its relevance to the Project.
    - The 4(d) rule for NLEB exempts incidental take from wind Projects, provided the conditions identified in the rule are followed:
        - restricted tree clearing from June 1 through July 31.
    - The rule is currently under litigation, which could affect the listing status in the future.
    - The NLEB is continuing to decline across the US and their hibernacula counts have gone from ~1,000 bats to 5. NLEB might only rear a single pup at any one time, making it difficult to rebound from population declines. At least 27 were captured in Missouri this year according to MDC records.
    - If the NLEB listing is upgraded to Endangered after construction, then curtailment for avoidance might be a strategy that would allow the Project to avoid impacts

Project Description and Discussion

until a Habitat Conservation Plan (HCP) can be developed and an Incidental Take Permit (ITP) received.

- In addition, the Tri-colored Bat has been petitioned, which might add an additional species to the discussion.
- There is no paperwork to file for coverage under the 4(d) rule.
- Stantec mentioned that the Project is still determining how to address the NLEB. If the Project determines that trees would be removed during the summer for construction, then the NLEB will be surveyed alongside the Indiana Bat to identify maternity roost trees. The current version of the Bat Survey Work Plan includes both species; however, the Project will determine what species will be surveyed prior to May 15. The USFWS noted winter tree removal is strongly recommended to avoid effects to bats and and migratory birds. Including avoidance conservation measures into a Bird and Bat Conservation Strategy is recommended.

- Survey strategies identified in the Bat Survey Work Plan
  - Stantec mentioned that the intent is to use acoustic surveys to refine the number of survey sites necessary to determine potential presence of Indiana Bat and NLEB. The locations for the 63 acoustic sites were determined as a result of the 2017 habitat survey.
  - USFWS mentioned that the survey sites could be moved to larger more connected areas. In addition, the number of sites required for the survey may be reduced if the process for removing sites could be worked out. Sites located along the transmission line might also be able to be moved to more suitable habitat within the Project.
  - Jane recommended considering forest block size and connectivity into the determination for number of survey sites. Her preference was to focus surveys on the larger, more connected forested areas rather than the smaller disjunct forested areas. Netting was appropriate within 2.5 miles of suitable habitat.
  - The proposal to net up to 25 sites as a follow-up to the acoustic survey seemed reasonable. USFWS is willing to work with Stantec to refine and agree on a suitable survey approach to adequately characterize bat presence at the site.
  - Questionable bat echolocation call files identified by Stantec bat biologists could be verified by Kathryn Womack, who agreed to qualitatively analyze a subset of calls with Stantec prior to netting. A doodle poll will be provided in advance to secure everyone's schedule to meet and discuss the calls.
  - USFWS expressed interest in moving survey sites to suitable habitat that were not previously surveyed within the Project boundary.

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March 2, 2018

Project Description and Discussion

- Stantec mentioned that land access was a challenge and that there were no leases within the woodland areas Jane identified.
- USFWS requested sampling the areas following NABat protocols to include acoustic surveys from the roadways.
- USFWS stated that any recorded acoustic bat calls identified as Indiana Bat would be considered positive and the USFWS would assume presence of the species, unless through manual vetting, the call was determined to be something else.
- In addition, if roost locations for areas where Indiana Bat presence was determined based on acoustic data, habitat within 2.5 miles of the recorded location would be considered occupied.

- If the Indiana Bat is assumed present on the survey site either through acoustics or netting, then the USFWS recommends that an HCP be developed and Tenaska apply for an ITP. If Indiana Bat is present at the Project, then tree clearing should occur from November 1 through March 31 as per the U.S. Fish and Wildlife Service 2017 Range-wide Indiana Bat Survey Summary Guidelines.
- USFWS mentioned that Region 3 was developing a low-effect HCP option for Indiana Bat and NLEB. The low-effect HCP, currently in draft form has the following concepts:
    - allow for 6 bats that could be taken in a six-year time frame;
    - include an increased level of post-construction mortality monitoring that would evaluate the Project-specific take using USFWS evidence of absence models. Up-front mitigation in the form of operational cut-in speed would be 5 m/s as a conservation measure would be required;
    - As currently envisioned, the short term LE HCP may qualify as a categorical exclusion. At the end of six years, the USFWS would have site-specific information to determine whether an individual, template or no HCP is needed for the project.
    - Enable the USFWS to issue a technical assistance letter that clears the Project if at the end of the 6 years the Project is determined to have a low-effect on the species.
- Stantec inquired about banding any bats captured during the surveys and Jane mentioned that she would look into it.
- Changes to the survey plan would be provided to the USFWS in a timely manner.
- The proposal to radio-track up to 15 bats with preference for females and volant juveniles seemed an appropriate level of effort for the Project.

Project Description and Discussion

The meeting adjourned at 11:00

Action Items:

Stantec

1. Will provide an updated Project boundary to the agencies.
2. Update the Bat Survey Work Plan including analyzing the point locations in a timely manner and re-submit to the USFWS.
3. Schedule a meeting between Stantec and USFWS/MDC bat biologists in June to verify Project bat acoustic calls suspected to be Indiana Bat.

USFWS

1. Research Indiana Bat occurrence data from the Project area.
2. Identify the level of effort required to discount a positive acoustic detection.

These meeting notes are considered to be a true and accurate record of items discussed. If any discrepancies, inconsistencies, or omissions are noted, please contact the David Bender at david.bender@stantec.com immediately.

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c. Jane Ledwin, USFWS
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Kathryn Womack, MDC
Fred Strauss, Tenaska

Stantec

Meeting Notes

Tenaska, Inc. Clear Creek Wind Project, Nodaway County Missouri

Date/Time:	April 10, 2018 / 9:00 AM
Place:	U.S. Fish and Wildlife Service Office -- Moline, IL
Next Meeting:	TBD
Attendees:	Ryan Anthony – U.S. Fish and Wildlife Service Kristin Lundh – U.S. Fish and Wildlife Service Jane Ledwin – U.S. Fish and Wildlife Service (via phone) Janet Haselrig – Missouri Department of Conservation (Via Phone) Fred Strauss – Tenaska, Inc. David Bender - Stantec Consulting Services Inc. Sarah Rehme – Stantec Consulting Services Inc. (Via Phone)

Project Description and Discussion

David Bender showed a powerpoint presentation that summarized the Clear Creek Wind Project (Project) background, recent avian studies including: Eagle Risk Assessments, Aerial Nest Surveys, Avian Surveys, Large Birds, and Eagle-use surveys, and begin the discussion of the Eagle Conservation Plan.

Fred Strauss briefly reviewed the history of the 200-250 megawatts (MW) Project. The Project is still in development and active leasing is nearly complete. The Project COD is currently forecasted for 2019. Tenaska, Inc. (Tenaska) is intending to develop an Eagle Conservation Plan (ECP) and pursue an Eagle Incidental Take Permit (ETP).

The following items were discussed during the meeting:

- Recommendations for reducing the surveys to reflect the current boundary were solicited and the recommendations from Ryan Anthony and Kristin Lundh included maintaining an accurate representation of the landscape. All of the points that are currently located outside of the Project Boundary can be eliminated. Stantec will follow-up with a rationale to remove the extra points and seek approval from the U.S. Fish and Wildlife Service (USFWS).
- Ryan recommended including a discussion of the evolution of the Project Boundary in the ECP.
- The schedule to complete the ECP by May 2019 might be achievable, but it depends on the context of the Permit.
    - Tenaska has the option of choosing to include a public comment period during the National Environmental Policy Act process. USFWS recommends including public comments to reduce the time the public can weigh into a Project. If the process proceeds without public comment, then litigation could occur at anytime because the public would have a case that they were not consulted.
    - The project still qualifies for the Tiered Environmental Assessment if all of the conditions continue to be met.

Project Description and Discussion

- USFWS could provide a technical assistance letter if desired by Tenaska to satisfy the Project's lenders.

- The Local Area Population (LAP) includes both the Central Flyway and the Mississippi Flyway Eagle Management Units (EMUs)
  - There is one Project within the LAP pursuing an ETP and their permit is about to be issued.
  - The LAP is calculated by looking at the density of eagles in the EMU. Within the Mississippi EMU, 5% may not be exceeded, but it is possible that the Central EMU might be because of the current Permit being considered by a competing company. USFWS can provide the actual population estimates within the LAP so we can accurately estimate the 5% threshold that the LAP can sustain..

- Golden Eagles
  - Coverage of GOEA was not planned in the proposed ECP.
    - No GOEA have been observed by Stantec during 12 months of avian/eagle-use surveys. MDC did not report any GOEA from Nodaway County during Mid-winter bird counts.
  - GOEA have been seen in the area and the USFWS recently got there first report of a GOEA fatality in Region 3.
  - If a GOEA fatality occurs, it may void the Eagle Take Permit that only includes BAEA.
  - It may or may not be possible to issue a BAEA-only permit with this recent fatality. A USFWS internal discussion will take place to decide this outcome and Ryan committed to providing the information to Tenaska. * in a follow up email on 4/13/2018; USFWS tentatively stated that a BAEA-only permit still might be issued, but that decision was awaiting the solicitor's review.
  - Any GOEA take being sought would require compensatory mitigation and the permitting timeline may be increased because the mitigation would have to be delivered in advance of permit issuance.
    - Mitigation options include In-lieu fee program (ILF)(which does not exist), mitigation banks (which does not exist), powerpole retrofits, or an Resource Equivalency Analysis. Possibly rehabbing might be an option.
    - Take is calculated with 0 eagle minutes for GOEA. The model has built-in a base-line risk, but it may only be one GOEA every 3-4 years, but the mitigation may be difficult.
    - Mitigation will occur within the EMU that the take occurs.

Stantec

April 10, 2018

Project Description and Discussion

- BAEA
    - BAEA take might be exceeded in the Central Flyway. Mitigation might be required.
    - There is a possibility that a case can be made to consider the Central Flyway not impacted, based on the placement of the Project wholly within the Mississippi flyway and only a portion of the LAP occurs in the central flyway.
- A permit might not be issued because of a GOEA permit, but that could be absolved by including them in the permit.
- Section 7 and 404 Permitting
    - Clarifying the USFWS consultation for section 7 and the recent decision for the interdependent or interrelated activity and the scope of the permits between the two agencies will need to be discussed. An HCP would provide better discussions of federal species; however, there will need to be some discussion on the issue. A Nationwide permit would likely go through a no-effect analysis for eagles.
- Stantec will provide USFWS with a rationale for removing or eliminating points from the eagle-use surveys moving forward to be more reflective of the current Project boundary.

* Indicates information that was not specifically discussed in the meeting.

The meeting adjourned at 10:35

Action Items:

Stantec

1. Will provide an updated Project boundary and survey rationale to the agencies.
2. A summary of meeting notes will be provided to the agencies.

USFWS

1. USFWS will respond with the outcome of the GOEA discussions.

These meeting notes are considered to be a true and accurate record of items discussed. If any discrepancies, inconsistencies, or omissions are noted, please contact the David Bender at david.bender@stantec.com immediately.

Stantec

April 10, 2018

David Bender
Project Manager
Phone: (913) 202-6881
David.Bender@stantec.com

c. Jane Ledwin, USFWS
Jennifer Campbell, MDC
Janet Haselrig, MDC
Ryan Anthony, USFWS
Kristin Lundh, USFWS
Fred Strauss, Tenaska

Stantec

Meeting Notes

Clear Creek Wind Project

U.S. Army Corps of Engineers Agency Meeting

Date/Time:	April 24, 2018 / 2:00 PM
Place:	U.S. Army Corps of Engineers Kansas City District Office
Next Meeting:	TBD
Attendees:	Fred Strauss, Tenaska Kailey Jones, USACOE David Bender, Stantec Ryan Hrabe, Stantec Dan Schepis, Stantec

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The meeting opened with an overview of the project provided by Stantec and Tenaska. Details included background on project specifics including size and desired Commercial Operations Date (COD) by end of 2019. In addition, the environmental surveys, including federally Threatened and/or Endangered (T/E) bat surveys are scheduled in June 2018. Wetland field work anticipated for July 2018 and a pre-construction notification to the U.S. Army Corps of Engineers (USACOE) in September.

General Discussion:

- Kailey Jones indicated that based on the area and project, likely areas of impact include road crossings where project infrastructure crosses jurisdictional waters.
    - Attempts to minimize impacts with design are recommended
    - Turbine locations are unlikely to have an impact to waters of the U.S. as they are typically placed in uplands
    - Each impacted crossing would be a "single and complete" project which lends to Nationwide Permits (NWPs) 12 and 14, opposed to 51; NWP 33 is an option for temporary construction activities and impacts
    - A preliminary jurisdictional determination (PJD) would be fine, simply consider all waters jurisdictional and move forward with the permitting.
    - It is likely that no mitigation required for temporary work unless the impact is to forested wetlands
    - The transmission line corridor could be considered with the rest of the project permits or separately due to construction time lines; if the overall impact to waters of the U.S. are greater than ½ acre, USACOE recommends using multiple NWPs rather than applying for an Individual Permit

Stantec

April 24, 2018

Clear Creek **Wind Project**

U.S. Army Corps of Engineers Agency Meeting
Page 2 of 3

  - Potentially Section 7 could be limited to within 50 ft from the impact area, which would apply to both Section 106 of the National Historic Preservation Act and Endangered Species Act

- 401 permitting provided through the Missouri Department of Natural Resources would be required for NWP 51; section 404 permits can be issued prior to section 401 issuance, but would be contingent on the 401 requirements before work starts
- "Small Federal Handle" discussion
  - The U.S. Fish and Wildlife Service (USFWS) has approved the T/E bat presence absence plan; field work to start summer 2018
  - Kailey discussed the topic with Jane Ledwin, USFWS prior to the meeting
    - Habitat Conservation Plan may be required under section 10 consultation, but not under section 7
    - Section 10 consultation may have to be complete before issuing section 404 permits
  - The Small Federal Handle likely will not include the entire project boundary, but the areas of impact are dependent on distance from T/E presence locations if any occur
    - It is unclear what the limits from USFWS might look like. Neither USFWS nor the USACOE know how this will proceed
  - There is no guidance regarding the number or locations of culverts/areas of impact that would trigger section 7 consultation and the Small Federal Handle, should it apply
  - If Tenaska does not apply for an incidental take permit, USFWS may insert specific conditions to the permits as part of section 7 consultation;
    - likely would only apply to T/E impacts within jurisdictional action areas (e.g., crossings) and not uplands
- Wetland Mitigation
  - Permanent impacts over and above the thresholds in NWP's could require an individual permit and mitigation may be required. Mitigation would follow the mitigation rule and first go through a mitigation bank or in-lieu fee, if released credits are available
  - NWP 33 would require a restoration plan, if impacting waters of the U.S., with how restoration will be completed – this can be a few paragraphs
- Permit schedules are usually issued within 45-60 days from Preconstruction Notification (PCN) though the State Historical Preservation Office (SHPO) and USFWS consultation can delay that;
  - Coordinating with USFWS and SHPO early is recommended
- Next Steps

Stantec

April 24, 2018

Clear Creek **Wind Project**

U.S. Army Corps of Engineers Agency Meeting

- T/E bat surveys are planned for June 2018 and Tenaska will proceed from there with consultations based on the T/E survey findings
- A meeting between Tenaska, Stantec, USFWS, and USACOE would be helpful to make sure that the Section 7 consultation and the scope of the assessment are well understood.

The meeting adjourned at 3:30 pm

The foregoing is considered to be a true and accurate record of all items discussed. If any discrepancies or inconsistencies are noted, please contact the writer immediately.

Stantec Consulting Services Inc.

David Bender
Project Manager/ Wildlife Biologist

Phone: (913) 202-6881
David.Bender@stantec.com

c. Fred Strauss, Tenaska

Stantec

Meeting Notes

Tenaska Clear Creek Energy Center, Nodaway County Missouri

Date/Time:	August 16, 2018 / 9:00 AM
Place:	U.S. Fish and Wildlife Service Office -- Columbia, MO
Next Meeting:	TBD
Attendees:	Jane Ledwin – U.S. Fish and Wildlife Service (USFWS) Karen Herrington - USFWS Kathryn Womack – Missouri Department of Conservation (MDC) Jennifer Campbell – MDC (via phone) Fred Strauss – Tenaska, Inc. David Bender - Stantec Consulting Services Inc. (Stantec) JT Layne – Stantec Dan Schepis – Stantec (via phone) Kailey Jones – U.S. Army Corps of Engineers (via phone)

Project Description and Discussion

The goal of the meeting was to discuss the results from the 2018 bat surveys for the Tenaska Clear Creek Energy Center (Project) (formerly the Clear Creek Wind Project), which was submitted to the agencies on July 27, 2018, and to discuss next steps, scheduling, and continued consultation with the U.S. Fish and Wildlife Service (USFWS) and the U.S. Army Corps of Engineers (COE).

Fred Strauss briefly reviewed the history of the ~250 megawatts (MW) Project, that will consist of 109-111 turbines. The Project is still in development, but active leasing has been discontinued. The final layout is still in flux, and the wetland delineations are being finalized, which will influence the final designs. The Project COD is currently forecasted for financial closing in December 2018 with construction to begin Q1 2019 with COD in Q4 2019. At this time, the Project's goal is to complete all discretionary permitting by November 1, 2018.

The Bat Survey Report, which was based on the USFWS 2018 Range-wide Indiana Bat Survey Summary Guidelines, was submitted to demonstrate presence/presumed absence determinations for the Project. The surveys followed the Bat Work Plan previously approved by USFWS and Missouri Department of Conservation (MDC)

The following items were discussed during the meeting:

- Acoustic data collection on three meteorological towers began in the fall of 2017. Because construction is scheduled for spring 2019, two years of data collection may not occur. However, two fall migrations will be documented. Presence/absence mist-netting surveys were conducted throughout the Project in 2018. Therefore, the Project understands the bat behavior for the region.
- The Bat Survey Report was reviewed by Stantec.
    - Several survey points were shifted during the survey, but remained in the same forest block within 1 mile of the initially proposed locations identified and in the Bat Work Plan if possible.

Project Description and Discussion

- USFWS acknowledged the effort for both species as adequate under the recommended survey guidelines.
  - Based on the results, Indiana Bats are presumed absent
  - Northern Long-eared Bats (NLEB) were the only federally-listed species that was captured.
  - Maternity roosts of NLEB were identified. All roosts with a single female bat overnight meet the definition of an occupied maternity roost.
- The NLEBs captured on the east side of the Project were never found due to no access outside of the Project boundary, few public roadways along the One hundred and Two River, or possible transmitter failure.

- The NLEB litigation and pending court decision were briefly discussed. The hearing is scheduled for September 12, 2018.
  - To be prepared in the event the rule is vacated, Tenaska is planning to continue development of a Habitat Conservation Plan (HCP).
  - A technical assistance letter (TAL) from USFWS was mentioned by Tenaska to assist in financing. The TAL may be needed by November 1, 2018, and Tenaska committed to providing USFWS a follow-up request in writing to outline the content of the TAL it may seek.
    - Tenaska may request that TAL include the following concepts:
      - acknowledging that the Project is following the recommendations in the 4(d) rule,
      - an HCP will be pursued in coordination with the USFWS, and
      - if the 4(d) rule is vacated before tree clearing has been complete, that the project can continue to clear trees during the summer.
      - If the 4(d) rule is vacated the Project will operate under 6.9 m/s cut-in speeds.
    - USFWS and MDC pointed out that clearing trees in the winter (November 1 – March 31) is preferred in order to reduce impacts on all tree-roosting bats.
    - A TAL may provide coverage on additional species.
- USFWS inquired about the Project voluntarily lowering cut-in speeds and post-construction monitoring (PCM) to observe the levels of take in order to better inform an HCP if it is needed.
  - Currently, one year of PCM would likely occur per the Wind Energy Guidelines.

Project Description and Discussion

- USFWS suggested Evidence of Absence (EOA) level PCM to evaluate the levels of fatalities across the Project
  - EOA allows the Project to more accurately predict take in future HCPs and validate the TAL
  - EOA can be written into the Bird and Bat Conservation Strategy (BBCS) if necessary to cover the description outlined in the TAL
  - USFWS mentioned that a TAL is typically not sent without working on drafts of an Eagle Conservation Plan or the HCP.
    - David Bender pointed out that the plan was to keep the ECP and the HCP separate discussions on different timelines and it won't be complete because surveys are ongoing through the spring of 2019.
    - Jennifer Campbell requested that Janet Haslerig participate in the Eagle discussions when they occur.
  - As part of the TAL commitment, the Project would plan on implementing avoidance curtailment of 6.9 m/s seasonally and above 50 degrees Fahrenheit until HCP is complete and an Incidental Take Permit (ITP) has been issued.
- The BBCS is intended to be complete by November 1, 2018.
- USFWS mentioned that a current research project in Iowa has indicated that NLEB may be overwintering on talus slopes.
  - MDC mentioned that telemetry studies to locate hibernacula and additional mitigation opportunities may be appropriate.

- MDC commented on Hoary Bat acoustic data and if analysis was in sufficient detail to address that species.
- A brief description of the different HCP options was described as follows:
  - Short Term HCP
    - Take is covered to allow time to determine long-term management
    - Allow for PCM activities to inform the long-term HCP
    - Offers a bridge to a long-term HCP
    - May only be an Environmental Assessment
    - Allows coverage for additional species
    - May allow for curtailment under different operating speeds than 6.9m/s.

Project Description and Discussion

- Low Effect HCP
  - Take is covered to allow time to determine long-term HCP
  - Required 6.9 m/s curtailment
  - Categorically excluded for NEPA
- Technical Assistance Letter and Pilot Study
  - Allows operator to curtail and implement robust monitoring (EOA) of different mitigation scenarios to inform take numbers for life of the Project
  - Offers a bridge to a short-term HCP to cover take.
  - It states what the Project is doing to reduce impacts to listed species. The Pilot study allows for a much better take estimate for a long-term HCP.
- The TAL allows for coverage if the 4(d) rule is vacated and an ITP is not yet issued.
- An HCP and ITP will only be necessary if the provisions for the NLEB change. If an Indiana Bat is found during monitoring, an ITP would be sought.

- Karen Herrington requested guidelines for the TAL be sent to the USFWS to assist them in their determination.
- 404 permitting for the Project was addressed with Kailey Jones.
- The intent is to file the 404 permit on September 1st to the Kansas City District.
- Kailey specified that if there are few anticipated impacts for the Project, then each individual crossing would be considered a separate complete action area. The entire windfarm would not be covered for the permit areas.
- Kailey stated that a review can take up to 60 days, but with USFWS consultation already occurring, concurrence can potentially be shorter and a final determination may occur within 30 days.
  - There have not been many wind projects in Missouri that just cover NLEB, but if the provisions are followed per the USFWS, that should speed up the process.

The meeting adjourned at 3:00

Action Items:

Stantec/Tenaska

Stantec

August 16, 2018

1. Will provide an outline of requests for the TAL if one is pursued.

These meeting notes are considered to be a true and accurate record of items discussed. If any discrepancies, inconsistencies, or omissions are noted, please contact the David Bender at david.bender@stantec.com.

David Bender
Project Manager
Phone: (913) 202-6881
David.Bender@stantec.com

c. Jane Ledwin, USFWS
Karen Herrington, USDFWS
Jennifer Campbell, MDC
Kathryn Womack, MDC
Kailey Jones, US Army Corps of Engineers
Fred Strauss, Tenaska

Missouri Department of Conservation

Natural Heritage Review Report

May 12, 2017 -- Page 1 of 3

Resource Science Division
P. O. Box 180
Jefferson City, MO 65102
Prepared by: Brittnie Brauner
Brittnie.Brauner@mdc.mo.gov
(573) 522 – 4115 ext. 3182

JENNIFER CAMPBELL
POLICY COORDINATION
MISSOURI DEPARTMENT OF CONSERVATION
JENNIFER.CAMPBELL@MDC.MO.GOV

Project type:	WIND FARM
Location/Scope:	SHAPEFILE PROVIDED
County:	NODAWAY
Query reference:	CLEAR CREEK
Query received:	3/7/2017

This NATURAL HERITAGE REVIEW is not a site clearance letter. Rather, it identifies public lands and sensitive resources known to have been located close to and/or potentially affected by the proposed project. *On-site verification is the responsibility of the project. Natural Heritage records were identified at some date and location. This report considers records near but not necessarily at the project site. Animals move and, over time, so do plant communities. To say "there is a record" does not mean the species/habitat is still there. To say that "there is no record" does not mean a protected species will not be encountered. These records only provide one reference and other information (e.g. wetland or soils maps, on-site inspections or surveys) should be considered. Look for additional information about the biological and habitat needs of records listed in order to avoid or minimize impacts. More information is at http://mdc.mo.gov/discover-nature/places-go/natural-areas and mdc4.mdc.mo.gov/applications/mofwis/mofwis_search1.aspx.*

Level 3 issues: Records of federal-listed (these are also state-listed) species or critical habitats near the project site:

Natural Heritage records identify the following species within 10 miles of the project area:

Scientific Name	Common Name	Status	TRS
Myotis sodalis	Indiana Myotis	Federally Endangered	T65NR34WS30
Myotis sodalis	Indiana Myotis	Federally Endangered	T64NR35WS15
Myotis septentrionalis	Northern Long-eared Myotis	Federally Threatened	T66NR34WS32

FEDERAL LIST species/habitats are protected under the Federal Endangered Species Act. ***Contact the U.S. Fish and Wildlife Service*** *(101 Park Deville Drive Suite A, Columbia, Missouri 65203-0007; 573-234-2132) for Endangered Species Act coordination and concurrence information.*

Level 2 issues: Records of state-listed (not federal-listed) endangered species AND / OR state-ranked (not state-listed endangered) species and natural communities of conservation concern. The Department tracks these species and natural communities due to population declines and/or apparent vulnerability.

Natural Heritage records identify the following concerns within 10 miles of the project area:

Scientific Name	Common Name	Status	TRS	Habitat
Taxidea taxus	American Badger	S3	T65NR36WS09	Grassland matrix, Savanna pature/orchard, Row/close grown crops
Taxidea taxus	American Badger	S3	T66NR34WS04	Grassland matrix, Savanna pature/orchard, Row/close grown crops
Taxidea taxus	American Badger	S3	T66NR36WS11	Grassland matrix, Savanna pature/orchard, Row/close grown crops
Taxidea taxus	American Badger	S3	T65NR35WS33	Grassland matrix, Savanna pature/orchard, Row/close grown crops
Agalinis auriculata	Auriculate False Foxglove	S3	T65NR35WS20	Grassland matrix
Carex buxbaumii	Brown Bog Sedge	S2	T66NR35WS35	Grassland matrix, Fen/seep, Forest bottomland

Quercus prinoides	Dwarf Chinquapin Oak	S3?	T64NR35WS11	Grassland native prairie, Savanna
Ambystoma tigrinum	Eastern Tiger Salamander	S3	T64NR35WS20	Savanna/Shrub/Woodland matrix, Grassland matrix, Wetland matrix
Poliocitellus franklinii	Franklin's Ground Squirrel	S2S3	T64NR36WS21	Grassland matrix, Roadside/railroad
Poliocitellus franklinii	Franklin's Ground Squirrel	S2S3	T64NR35WS21	Grassland matrix, Roadside/railroad
Poliocitellus franklinii	Franklin's Ground Squirrel	S2S3	T64NR35WS14	Grassland matrix, Roadside/railroad
Poliocitellus franklinii	Franklin's Ground Squirrel	S2S3	T64NR36WS35	Grassland matrix, Roadside/railroad
Poliocitellus franklinii	Franklin's Ground Squirrel	S2S3	T66NR35WS03	Grassland matrix, Roadside/railroad
Mustela nivalis	Least Weasel	S3	T64NR35WS19	Grassland matrix, Savanna/Shrub/Woodland matrix, Marsh, Wet praire/meadow
Mustela nivalis	Least Weasel	S3	T65NR35WS30	Grassland matrix, Savanna/Shrub/Woodland matrix, Marsh, Wet praire/meadow
Mustela nivalis	Least Weasel	S3	T65NR36WS12	Grassland matrix, Savanna/Shrub/Woodland matrix, Marsh, Wet praire/meadow
Mustela nivalis	Least Weasel	S3	T65NR35WS16	Grassland matrix, Savanna/Shrub/Woodland matrix, Marsh, Wet praire/meadow
Mustela nivalis	Least Weasel	S3	T64NR36WS13	Grassland matrix, Savanna/Shrub/Woodland matrix, Marsh, Wet praire/meadow
Mustela nivalis	Least Weasel	S3	T64NR35WS30	Grassland matrix, Savanna/Shrub/Woodland matrix, Marsh, Wet praire/meadow
Mustela nivalis	Least Weasel	S3	T64NR35WS19	Grassland matrix, Savanna/Shrub/Woodland matrix, Marsh, Wet praire/meadow
Mustela nivalis	Least Weasel	S3	T64NR35WS29	Grassland matrix, Savanna/Shrub/Woodland matrix, Marsh, Wet praire/meadow
Mustela frenata	Long-tailed Weasel	S3	T66NR36WS06	Habitat generalist, Savanna/Shrub/Woodland matrix, Forest matrix, Grassland matrix
Carex sartwellii	Sartwell's Sedge	S1	T66NR35WS35	Grassland native prairie
Lasionycteris noctivagans	Silver-haired Bat	S3	T65NR34WS30	Forest matrix
Ictidomys tridecemlineatus	Thirteen-lined Ground Squirrel	S2	T64NR35WS20	Grassland matrix, Urban low density vegetated, Roadside/railroad

Symphoricarpos occidentalis	Wolfberry	S1	T64NR36WS13	Forest upland, Grassland matrix
Dry-mesic loess/glacial till prairie	Dry-mesic loess/glacial till prairie	S1	T65NR36WS09	Grassland native prairie

Nodaway County Community Lake boarders the project area. This community lake is owned by Missouri Department of Conservation. If project activities will impact the lake, please contact Craig Crisler, 816-271-3100.

Mozingo Lake (Maryville) occurs 3.67 miles from the project area. This lake is owned by the City of Maryville. If project activities will impact the lake, please contact the city at, 660-562-2089.

See https://nature.mdc.mo.gov/sites/default/files/downloads/2017-SOCC.pdf for a complete list of species and communities of conservation concern.

STATE ENDANGERED species are listed in and protected under the Wildlife Code of Missouri (3CSR10-4.111).

General recommendations related to this project or site, or based on information about the historic range of species (unrelated to any specific Natural Heritage records):

- Indiana bats *(Myotis sodalis*, federal and state-listed endangered) and Northern long-eared bats (*Myotis septentrionalis,* federal-listed threatened) hibernate during winter months in caves and mines. During the summer months, they roost and raise young under the bark of trees in riparian forests and upland forests near perennial streams. During project activities, avoid degrading stream quality and where possible leave snags standing and preserve mature forest canopy. Do not enter caves known to harbor Indiana bats or Northern long-eared bats, especially from September to April. **If any trees need to be removed by your project, please contact the U.S. Fish and Wildlife Service (Ecological Services, 101 Park Deville Drive, Suite A, Columbia, Missouri 65203-0007; Phone 573-234-2132 Ext. 100 for Ecological Services) for further coordination under the Endangered Species Act.**

- Construction should be managed to minimize erosion and sedimentation/runoff to nearby streams and lakes, including adherence to any "Clean Water Permit" conditions. Project design should include stormwater management elements that assure storm discharge rates to streams for heavy rain events will not increase from present levels. Revegetate disturbed areas to minimize erosion using native plant species compatible with the local landscape and wildlife needs. Annual ryegrass may be combined with native perennials for quicker green-up. Avoid aggressive exotic perennials such as crownvetch and sericea lespedeza.

- Invasive exotic species are a significant issue for fish, wildlife and agriculture in Missouri. Seeds, eggs, and larvae may be moved to new sites on boats or construction equipment, so inspect and clean equipment thoroughly before moving between project sites.
  - Remove any mud, soil, trash, plants or animals from equipment before leaving any water body or work area.
  - Drain water from boats and machinery that have operated in water, checking motor cavities, live-well, bilge and transom wells, tracks, buckets, and any other water reservoirs.
  - When possible, wash and rinse equipment thoroughly with hard spray or HOT water (≧140° F, typically available at do-it-yourself carwash sites), and dry in the hot sun before using again.

These recommendations are ones project managers might prudently consider based on a general understanding of species needs and landscape conditions. Natural Heritage records largely reflect sites visited by specialists in the last 30 years. Many privately owned tracts have not been surveyed and could host remnants of species once but no longer common.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Missouri Ecological Services Field Office
101 Park DeVille Drive, Suite A
Columbia, Missouri 65203-0057
Phone: (573) 234-2132 Fax: (573) 234-2181

November 7, 2018

Mr. Fred Strauss, P.G.
Tenaska Clear Creek Wind, LLC
14302 FNB Parkway
Omaha, Nebraska 68154

Dear Mr. Strauss:

The U.S. Fish and Wildlife Service (Service) has been coordinating with Tenaska Clear Creek Wind, LLC (Tenaska) regarding their development of the Clear Creek Energy Center (CCEC), an approximately 250 MW wind energy facility in Nodaway County, Missouri. Tenaska has requested the Service provide them with a technical assistance letter (TAL) documenting their compliance with the Endangered Species Act of 1973 (as amended). Tenaska will use the TAL to assist in securing financial support for the proposed facility.

Pre-construction surveys of the project area conducted according to the Service's 2018 Indiana bat guidelines indicated no summer presence of Indiana bats. Because the project site is at the extreme western edge of the range, we do not anticipate Indiana bats migrating through the project site in the fall. Thus, take of Indiana bats is unlikely at this location.

The surveys also indicated summer presence of the Northern long-eared bat and telemetry indicated 11 roost locations, including live and dead trees and human structures. The site supported a relatively large concentration of Northern long-eared bats given the recent dramatic decline in their numbers in Missouri. Thus, we anticipate potential risk to Northern long-eared bats during both the summer maternity season and migration.

The Northern long-eared bat is listed as threatened and has a 4(d) rule that specifies actions that may result in take but are exempted from section 9 prohibitions. Among those exemptions are tree clearing outside the pup season (June- July) and take associated with wind energy turbine operations. Thus, the anticipated take of Northern long-eared bats by construction and operation of the CCEC are exempted under the 4(d) rule. Nonetheless, Tenaska has expressed interest in developing a Habitat Conservation Plan (HCP) to cover take of the Northern long-eared bats in the event the 4(d) rule is vacated or the status of the Northern long-eared bat otherwise changes such that any potential take from this project would be prohibited.

To address that potential, Tenaska agrees to the following as they develop an HCP for their CCEC project.

1. Tenaska will prepare and implement a voluntary Bird and Bat Conservation Strategy plan pursuant to the USFWS's Wind Energy Guidelines that describes: (a) risks to wildlife associated with the CCEC, (ii) avoidance and minimization techniques incorporated into the design and operation of the CCEC, and (iii) post-construction mortality monitoring and reporting. That plan, including post-construction monitoring, will be in place at the start of operations.

2. To conserve all bat species in the area, Tenaska will limit tree felling (but not necessarily removal) to between November 1, 2018 and March 31, 2019, with the possible exception of supplemental tree-clearing necessary to accommodate any final layout design changes. Supplemental tree-clearing would adhere to the restrictions of the 4(d) rule (i.e., no tree clearing June 1 through July 31 within 150 feet of identified female roost tree, or within 5 miles of a female netting site that could not be tracked to a roost).

3. Develop an HCP covering the Northern long-eared bat with USFWS in the event the Northern long-eared bat 4(d) rule is vacated.

4. Should the Northern long-eared bat 4(d) rule be vacated or the status of the Northern long-eared bat otherwise changes such that any potential take would be prohibited, Tenaska will implement avoidance feathering protocol consisting of 6.9 m/s cut-in speed from April 1 to October 30, sunset to sunrise, > 50°F until an HCP for Northern long-eared bat has been finalized and an ITP is issued.

5. Should the CCEC incur a fatality of an endangered bat species other than Northern long-eared bat, Tenaska will immediately contact the USFWS and curtail turbine operations to 6.9 m/s, sunset to sunrise, > 50°F, during the applicable risk season(s) to avoid additional take while they confer with the Service to modify the HCP accordingly until an ITP is issued.

6. The measures outlined in this TAL will be superseded by the avoidance, minimization, and mitigation measures established in the HCP and the subsequent issuance of the ITP.

This office is not authorized to provide guidance in regards to the USFWS Office of Law Enforcement (OLE) investigative priorities involving federally listed species. However, we understand that OLE carries out its mission to protect ESA-listed species through investigation and enforcement, as well as by fostering relationships with individuals, companies, and industries that have taken effective steps to avoid take of listed species; and by encouraging others to implement measures to avoid take of listed species. It is not possible to absolve individuals or companies from liability for unpermitted take of listed species, even if such take

occurs despite the implementation of appropriate take avoidance measures. However, the OLE focuses its enforcement resources on individuals and companies that take listed species without identifying and implementing all reasonable, prudent and effective measures to avoid such take. This office concludes that, if Tenaska follows the measures above, CCEC is unlikely to result in prohibited take of ESA listed species.

Thank you for your continuing coordination on project development. Should you have questions regarding this TAL, please contact Jane Ledwin, 573/234-2132, x 109, of my office.

Sincerely,

Karen Herrington
Field Supervisor

cc: MDC, Jefferson City, MO (J. Campbell)

Appendix C SURVEY POINT HABITATS AND LOCATIONS

Table C-1 Migratory Bird Survey Locations and Habitats

Survey Point[1]	Survey Point Habitats[2]	Latitude[3]	Longitude[3]
CC-01	Pasture-Hay, Cultivated Crops, Deciduous Forest, Developed-Open Space, Scrub-Shrub, Grassland-Herbaceous, Developed-Low Intensity, Open Water, Evergreen Forest	40.56271	-94.92109
CC-02	Pasture-Hay, Deciduous Forest, Cultivated Crops, Developed-Open Space, Scrub-Shrub, Open Water, Developed-Low Intensity, Grassland-Herbaceous, Woody Wetlands, Emergent Herbaceous Wetlands	40.56247	-94.89302
CC-03	Pasture-Hay, Cultivated Crops, Deciduous Forest, Developed-Open Space, Scrub-Shrub, Open Water, Woody Wetlands, Developed-Low Intensity	40.53690	-94.87242
CC-04	Pasture-Hay, Deciduous Forest, Cultivated Crops, Developed-Open Space, Scrub-Shrub, Woody Wetlands, Grassland-Herbaceous, Open Water, Developed-Low Intensity	40.53357	-94.90491
CC-05	Pasture-Hay, Cultivated Crops, Deciduous Forest, Developed-Open Space, Scrub-Shrub, Grassland-Herbaceous, Open Water, Developed-Low Intensity, Woody Wetlands, Evergreen Forest	40.55144	-94.93466
CC-06	Pasture-Hay, Cultivated Crops, Deciduous Forest, Grassland-Herbaceous, Developed-Open Space, Scrub-Shrub, Woody Wetlands, Open Water, Developed-Low Intensity	40.53463	-94.95720
CC-07	Cultivated Crops, Pasture-Hay, Deciduous Forest, Developed-Open Space, Scrub-Shrub, Grassland-Herbaceous, Woody Wetlands, Developed-Low Intensity, Open Water, Emergent Herbaceous Wetlands	40.49859	-94.97359
CC-08	Pasture-Hay, Deciduous Forest, Cultivated Crops, Developed-Open Space, Scrub-Shrub, Grassland-Herbaceous, Developed-Low Intensity, Open Water, Woody Wetlands, Evergreen Forest	40.50535	-94.94813
CC-09	Pasture-Hay, Deciduous Forest, Cultivated Crops, Grassland-Herbaceous, Scrub-Shrub, Developed-Open Space, Developed-Low Intensity, Open Water, Woody Wetlands	40.51929	-94.92074
CC-10	Pasture-Hay, Cultivated Crops, Deciduous Forest, Scrub-Shrub, Developed-Open Space, Grassland-Herbaceous, Woody Wetlands, Developed-Low Intensity	40.50451	-94.90346
CC-11	Pasture-Hay, Cultivated Crops, Deciduous Forest, Scrub-Shrub, Developed-Open Space, Woody Wetlands, Open Water, Developed-Low Intensity, Grassland-Herbaceous	40.50352	-94.87874
CC-12	Cultivated Crops, Pasture-Hay, Deciduous Forest, Grassland-Herbaceous, Developed-Open Space, Scrub-Shrub, Developed-Low Intensity, Open Water, Mixed Forest, Woody Wetlands, Evergreen Forest	40.47543	-94.87862
CC-13	Pasture-Hay, Cultivated Crops, Deciduous Forest, Developed-Open Space, Scrub-Shrub, Developed-Low Intensity, Grassland-Herbaceous, Open Water, Woody Wetlands	40.48384	-94.91674
CC-14	Pasture-Hay, Cultivated Crops, Deciduous Forest, Developed-Open Space, Scrub-Shrub, Grassland-Herbaceous, Developed-Low Intensity, Emergent Herbaceous Wetlands, Woody Wetlands, Open Water	40.47653	-94.95859
CC-15	Pasture-Hay, Cultivated Crops, Deciduous Forest, Developed-Open Space, Scrub-Shrub, Developed-Low Intensity, Grassland-Herbaceous, Emergent Herbaceous Wetlands, Open Water, Woody Wetlands	40.46260	-94.97087
CC-16	Pasture-Hay, Cultivated Crops, Deciduous Forest, Developed-Open Space, Scrub-Shrub, Grassland-Herbaceous, Developed-Low Intensity, Emergent Herbaceous Wetlands	40.46105	-94.93801
CC-17	Pasture-Hay, Cultivated Crops, Deciduous Forest, Scrub-Shrub, Developed-Open Space, Developed-Low Intensity, Grassland-Herbaceous, Woody Wetlands, Open Water	40.48910	-94.89765
CC-18	Cultivated Crops, Pasture-Hay, Deciduous Forest, Developed-Open Space, Grassland-Herbaceous, Open Water, Developed-Low Intensity, Scrub-Shrub, Woody Wetlands	40.44978	-94.91000

Survey Point[1]	Survey Point Habitats[2]	Latitude[3]	Longitude[3]
CC-19	Cultivated Crops, Pasture-Hay, Deciduous Forest, Developed-Open Space, Grassland-Herbaceous, Developed-Low Intensity, Scrub-Shrub, Open Water, Evergreen Forest	40.45402	-94.88788
CC-20	Cultivated Crops, Pasture-Hay, Developed-Open Space, Deciduous Forest, Open Water, Developed-Low Intensity, Evergreen Forest	40.43448	-94.89088
CC-21	Cultivated Crops, Pasture-Hay, Deciduous Forest, Open Water, Developed-Open Space, Grassland-Herbaceous, Barren Land, Woody Wetlands, Developed-Low Intensity, Scrub-Shrub	40.42786	-94.87211
CC-22	Cultivated Crops, Pasture-Hay, Deciduous Forest, Open Water, Developed-Low Intensity, Developed-Open Space, Grassland-Herbaceous, Barren Land, Scrub-Shrub, Woody Wetlands, Emergent Herbaceous Wetlands, Evergreen Forest	40.41754	-94.85859
CC-23	Cultivated Crops, Pasture-Hay, Developed-Open Space, Open Water, Developed-Low Intensity, Deciduous Forest, Developed-Medium Intensity, Developed-High Intensity, Evergreen Forest, Grassland-Herbaceous	40.40330	-94.87523
CC-24	Cultivated Crops, Pasture-Hay, Developed-Open Space, Deciduous Forest, Open Water, Woody Wetlands, Developed-Low Intensity	40.41598	-94.89107
CC-25	Cultivated Crops, Pasture-Hay, Deciduous Forest, Developed-Open Space, Open Water, Woody Wetlands, Developed-Medium Intensity, Developed-Low Intensity	40.41455	-94.91010
CC-26	Cultivated Crops, Pasture-Hay, Developed-Open Space, Deciduous Forest, Developed-Low Intensity, Open Water, Developed-Medium Intensity	40.40400	-94.92340
CC-27	Cultivated Crops, Pasture-Hay, Deciduous Forest, Developed-Open Space, Scrub-Shrub, Grassland-Herbaceous, Developed-Low Intensity, Open Water, Woody Wetlands, Evergreen Forest	40.40953	-94.94807
CC-28	Pasture-Hay, Cultivated Crops, Deciduous Forest, Developed-Open Space, Grassland-Herbaceous, Developed-Low Intensity, Scrub-Shrub, Open Water, Woody Wetlands	40.42559	-94.97644
CC-29	Pasture-Hay, Cultivated Crops, Deciduous Forest, Grassland-Herbaceous, Developed-Open Space, Scrub-Shrub, Open Water, Developed-Low Intensity, Woody Wetlands, Emergent Herbaceous Wetlands, Mixed Forest	40.44446	-94.97050
CC-30	Pasture-Hay, Cultivated Crops, Deciduous Forest, Developed-Open Space, Grassland-Herbaceous, Scrub-Shrub, Developed-Low Intensity, Woody Wetlands, Open Water	40.43340	-94.94708
CC-31	Pasture-Hay, Cultivated Crops, Deciduous Forest, Developed-Open Space, Scrub-Shrub, Woody Wetlands, Developed-Low Intensity, Open Water, Grassland-Herbaceous, Emergent Herbaceous Wetlands	40.56224	-94.86662
CC-32	Pasture-Hay, Deciduous Forest, Cultivated Crops, Scrub-Shrub, Developed-Open Space, Woody Wetlands, Open Water, Grassland-Herbaceous, Developed-Low Intensity	40.54803	-94.90765
CC-33	Pasture-Hay, Cultivated Crops, Deciduous Forest, Developed-Open Space, Grassland-Herbaceous, Scrub-Shrub, Woody Wetlands, Developed-Low Intensity, Open Water	40.51979	-94.94333
CC-34	Pasture-Hay, Cultivated Crops, Deciduous Forest, Developed-Open Space, Grassland-Herbaceous, Scrub-Shrub, Woody Wetlands, Open Water	40.52028	-94.96403
CC-35	Pasture-Hay, Cultivated Crops, Deciduous Forest, Developed-Open Space, Scrub-Shrub, Woody Wetlands, Developed-Low Intensity, Open Water, Grassland-Herbaceous, Emergent Herbaceous Wetlands, Developed-Medium Intensity	40.47703	-94.98389
CC-36	Pasture-Hay, Cultivated Crops, Deciduous Forest, Developed-Open Space, Scrub-Shrub, Developed-Low Intensity, Open Water, Woody Wetlands, Grassland-Herbaceous	40.51884	-94.88572

Survey Point[1]	Survey Point Habitats[2]	Latitude[3]	Longitude[3]
CC-37	Pasture-Hay, Cultivated Crops, Deciduous Forest, Developed-Open Space, Grassland-Herbaceous, Woody Wetlands, Scrub-Shrub, Open Water, Developed-Low Intensity	40.53660	-94.93480
CC-38	Pasture-Hay, Cultivated Crops, Deciduous Forest, Developed-Open Space, Open Water, Scrub-Shrub, Emergent Herbaceous Wetlands, Developed-Low Intensity	40.42997	-94.91022
CC-39	Pasture-Hay, Cultivated Crops, Deciduous Forest, Developed-Open Space, Scrub-Shrub, Developed-Low Intensity, Woody Wetlands, Open Water, Grassland-Herbaceous, Emergent Herbaceous Wetlands, Developed-Medium Intensity, Evergreen Forest	40.42115	-94.92896
CC-40	Pasture-Hay, Cultivated Crops, Deciduous Forest, Developed-Open Space, Scrub-Shrub, Grassland-Herbaceous, Developed-Low Intensity, Open Water, Woody Wetlands, Evergreen Forest	40.49083	-94.93953

Source: Homer et al. 2015
Notes:
[1] Habitats are listed largest to smallest area within 1 mile of the survey point
[2] SPN NAD83 US Feet

Appendix D AVIAN SURVEY RESULTS

Table D-1 Avian Point Count Survey Data by Point

Species	Survey Point																			
	CC-01	***CC-02***	***CC-03***	***CC-04***	***CC-05***	***CC-06***	***CC-07***	***CC-08***	***CC-09***	***CC-10***	***CC-11***	***CC-12***	***CC-13***	***CC-14***	***CC-15***	***CC-16***	***CC-17***	***CC-18***	***CC-19***	***CC-20***
Greater White-fronted Goose (*Anser albifrons*)																				
Snow Goose (*Chen caerulescens*)																				
Canada Goose (*Branta canadensis*)	5	1	40														2		2	1
Gadwall (*Anas strepera*)																				
American Wigeon (*Anas americana*)																				
Mallard (*Anas platyrhynchos*)			8																	
Blue-winged Teal (*Anas discors*)																				
Northern Shoveler (*Anas clypeata*)																				
Green-winged Teal (*Anas crecca*)																				
Ring-necked Duck (*Aythya collaris*)																				
Bufflehead (*Bucephala albeola*)													2							15
Hooded Merganser (*Lophodytes cucullatus*)																				2
Northern Bobwhite (*Colinus virginianus*)	5	3		3		2	5	1	4	7	6		9	4	4	7	4	3	5	4
Ring-necked Pheasant (*Phasianus colchicus*)	1		2				1		1	4	2		1	1			1		1	3
Wild Turkey (*Meleagris gallopavo*)				1					2											1
Pied-billed Grebe (*Podilymbus podiceps*)			1																	
Great Blue Heron (*Ardea herodias*)															1		1			
Green Heron (*Butorides virescens*)																				
Turkey Vulture (*Cathartes aura*)	6	13	16	20	3	4	2	2	21	12		1	10	1	20	10	5	2	7	4
Bald Eagle (*Haliaeetus leucocephalus*)	1	1	1					1		3				1	1					
Northern Harrier (*Circus cyaneus*)			1					1		2	1		2							
Cooper's Hawk (*Accipiter cooperii*)																				

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Species	Survey Point																			
	CC-01	***CC-02***	***CC-03***	***CC-04***	***CC-05***	***CC-06***	***CC-07***	***CC-08***	***CC-09***	***CC-10***	***CC-11***	***CC-12***	***CC-13***	***CC-14***	***CC-15***	***CC-16***	***CC-17***	***CC-18***	***CC-19***	***CC-20***
Red-tailed Hawk (*Buteo jamaicensis*)	4	1	1	4	3	3			1		1	2		5	3	2	6		4	2
Rough-legged Hawk (*Buteo lagopus*)					2															
American Kestrel (*Falco sparverius*)	1					1											5			1
Merlin (*Falco columbarius*)																				
American Coot (*Fulica americana*)									3											
Killdeer (*Charadrius vociferus*)			5			7	8	1		2	2			11	1	1		1	2	1
Upland Sandpiper (*Bartramia longicauda*)																				
Wilson's Snipe (*Gallinago delicata*)																				1
Mourning Dove (*Zenaida macroura*)	2	5	4	2	4		2	2	4	6	14	2	2	11	3	1	3	7	4	1
Great Horned Owl (*Bubo virginianus*)																				
Barred Owl (*Strix varia*)								1												
Short-eared Owl (*Asio flammeus*)																				
Common Nighthawk (*Chordeiles minor*)																1				
Chimney Swift (*Chaetura pelagica*)																	4			
Belted Kingfisher (*Megaceryle alcyon*)																				
Red-headed Woodpecker (*Melanerpes erythrocephalus*)	1		6	1	2	1			1	4	4					1		1	1	1
Red-bellied Woodpecker (*Melanerpes carolinus*)	2	1	1	2	6	2	1	4	10	3	5	1		4	6	1	1			
Downy Woodpecker (*Picoides pubescens*)		1	1	3	2				1	1	2				1		1			
Hairy Woodpecker (*Picoides villosus*)			1												1					
Northern Flicker (*Colaptes auratus*)	4	1	3	3	6		1	1	4	8	1	2		2	2	1	14	2		
Eastern Wood-Pewee (*Contopus virens*)										1				1	1		1			
Willow Flycatcher (*Empidonax traillii*)																	1			

Species	Survey Point																			
	CC-01	***CC-02***	***CC-03***	***CC-04***	***CC-05***	***CC-06***	***CC-07***	***CC-08***	***CC-09***	***CC-10***	***CC-11***	***CC-12***	***CC-13***	***CC-14***	***CC-15***	***CC-16***	***CC-17***	***CC-18***	***CC-19***	***CC-20***
Eastern Phoebe (*Sayornis phoebe*)		1			1			1	3		1			1	1		2	1		
Great Crested Flycatcher (*Myiarchus crinitus*)																				
Eastern Kingbird (*Tyrannus tyrannus*)		3	5	3	4	3	3		4	5	6	1	3			2	3		2	
Loggerhead Shrike (*Lanius ludovicianus*)										1	1			3					1	
Northern Shrike (*Lanius excubitor*)																2				
Bell's Vireo (*Vireo bellii*)							2			1		1			1	3		2	1	4
Warbling Vireo (*Vireo gilvus*)					2						1									
Blue Jay (*Cyanocitta cristata*)	2	11	5	16	12	3	5	7	15	14	7	9	1	4	9	1	7		4	2
American Crow (*Corvus brachyrhynchos*)	6	10	18	17	8	8	8	12	17	9	12	1	5	29	12	2		5	1	1
Horned Lark (*Eremophila alpestris*)		1	2	1	4	12	2			2	2		66					4	2	4
Purple Martin (*Progne subis*)																	12			
Tree Swallow (*Tachycineta bicolor*)	2	46	11	17		3				7	8		4							
Northern Rough-winged Swallow (*Stelgidopteryx serripennis*)																				
Bank Swallow (*Riparia riparia*)														1						
Cliff Swallow (*Petrochelidon pyrrhonota*)			2												3	1		1		
Barn Swallow (*Hirundo rustica*)	12	29	12	3	4	1	1	1	2	2			3	1	3		9	1		
Black-capped Chickadee (*Poecile atricapillus*)	1				9	3			6					2	2	1		1		
Tufted Titmouse (*Baeolophus bicolor*)				1					1											
White-breasted Nuthatch (*Sitta carolinensis*)	1			1	7			1	5	2	2						1			
Brown Creeper (*Certhia americana*)																1				
Carolina Wren (*Thryothorus ludovicianus*)														1						
House Wren (*Troglodytes aedon*)	1	2	2		4		2	2	1	2	2	1					3			
Blue-gray Gnatcatcher (*Polioptila caerulea*)		2					1									2				

Species	Survey Point																			
	CC-01	***CC-02***	***CC-03***	***CC-04***	***CC-05***	***CC-06***	***CC-07***	***CC-08***	***CC-09***	***CC-10***	***CC-11***	***CC-12***	***CC-13***	***CC-14***	***CC-15***	***CC-16***	***CC-17***	***CC-18***	***CC-19***	***CC-20***
Eastern Bluebird (*Sialia sialis*)			8	2	7	4	1		2	2	1	6		4			2		3	1
Wood Thrush (*Hylocichla mustelina*)																				
American Robin (*Turdus migratorius*)	2	3	4	1		4	2	5	5	9	21	5	2		11	2	38	6	5	5
Gray Catbird (*Dumetella carolinensis*)		1		1	2		1	2		2		1				5	3	5		1
Northern Mockingbird (*Mimus polyglottos*)		3		1				2		3	1	1		3	1	2	1	2		
Brown Thrasher (*Toxostoma rufum*)		3	2	1	1	1	1	1	1	2	1					2		1	2	1
Cedar Waxwing (*Bombycilla cedrorum*)															40					
Yellow Warbler (*Dendroica petechia*)				1							1				1					
Yellow-rumped Warbler (*Dendroica coronata*)										1	1									
Common Yellowthroat (*Geothlypis trichas*)	1	4	2		3	1	3		8	3	4	2	6	7	7	8	8	3	3	4
Yellow-breasted Chat (*Icteria virens*)					1															
Eastern Towhee (*Pipilo erythrophthalmus*)					1					1										1
American Tree Sparrow (*Spizella arborea*)	7	4		2			5			22						24	24	2	4	3
Chipping Sparrow (*Spizella passerina*)			1	2		2												1		
Field Sparrow (*Spizella pusilla*)	1	2	21	6	4		3		4	11	3	2	2	5	10	1	3	4		4
Lark Sparrow (*Chondestes grammacus*)									2									1		
Savannah Sparrow (*Passerculus sandwichensis*)						1					11									
Grasshopper Sparrow (*Ammodramus savannarum*)	4	6	5	12			2	1		1			3	1		1	2	1		
Fox Sparrow (*Passerella iliaca*)																				
Song Sparrow (*Melospiza melodia*)		1		1					3		2	4	4	2			1	14	1	14

Species	Survey Point																			
	CC-01	***CC-02***	***CC-03***	***CC-04***	***CC-05***	***CC-06***	***CC-07***	***CC-08***	***CC-09***	***CC-10***	***CC-11***	***CC-12***	***CC-13***	***CC-14***	***CC-15***	***CC-16***	***CC-17***	***CC-18***	***CC-19***	***CC-20***
Harris's Sparrow (*Zonotrichia querula*)										3										5
White-crowned Sparrow (*Zonotrichia leucophrys*)							1	1		1										
Dark-eyed Junco (*Junco hyemalis*)	17	12	16				3	2	1	18	2	2		1		24		6	4	
Northern Cardinal (*Cardinalis cardinalis*)	1	4		2	2		1	1	3	3		5		2	5	5	1		4	
Rose-breasted Grosbeak (*Pheucticus ludovicianus*)					3															
Blue Grosbeak (*Passerina caerulea*)								1	2	2										
Indigo Bunting (*Passerina cyanea*)				2					3		1		1	1	5		1	2		
Dickcissel (*Spiza americana*)	11	14	18	13	3	12	8	3	3	4	22	9	25	18	16	20	10	10	16	19
Bobolink (*Dolichonyx oryzivorus*)	5	6	6	8		2		2		3	2	2	3			2	1	1		
Red-winged Blackbird (*Agelaius phoeniceus*)	7	87	13	13	1	21	33	5	7	109	16	17	6	55	2	16	9	96	26	83
Eastern Meadowlark (*Sturnella magna*)	4	8	30	6		2	7	1		14	7	3	3	4	1	4	3	2	6	
Western Meadowlark (*Sturnella neglecta*)						1											1			13
Common Grackle (*Quiscalus quiscula*)		1	1			1					1									1
Brown-headed Cowbird (*Molothrus ater*)	12	1	2		13	6	1				4			2	2	5		1		
Orchard Oriole (*Icterus spurius*)											1									
Baltimore Oriole (*Icterus galbula*)				1	1					1	3	1					3			
American Goldfinch (*Spinus tristis*)	7	9	10	3	13	8	4	3	12	15	6	6	7	7	6	10	18	4	4	14
Unknowns																				
Blackbird spp.			36			50	3				2							31	1	1
Flycatcher spp.								1												
Hawk spp.		1		1					3											
Sparrow spp.		2	2	1	1		1	3		1	8	3	3	3	5			22	1	1
Woodpecker spp.								1						1	2					

Species	Survey Point																			
	CC-01	***CC-02***	***CC-03***	***CC-04***	***CC-05***	***CC-06***	***CC-07***	***CC-08***	***CC-09***	***CC-10***	***CC-11***	***CC-12***	***CC-13***	***CC-14***	***CC-15***	***CC-16***	***CC-17***	***CC-18***	***CC-19***	***CC-20***
Meadowlark spp.			2						1				37							1
Total Birds	***0***	***6***	***2***	***2***	***3***	***3***	***1***	***1***	***24***	***18***	***4***	***7***	***16***	***3***	***54***	***7***	***11***	***38***	***4***	***20***
Species Richness*	**31**	**36**	**38**	**36**	**32**	**28**	**31**	**29**	**34**	**44**	**41**	**25**	**23**	**32**	**32**	**34**	**39**	**32**	**26**	**32**
Total Unknowns	**136**	**304**	**327**	**178**	**139**	**169**	**124**	**73**	**166**	**329**	**201**	**90**	**210**	**199**	**189**	**171**	**215**	**246**	**117**	**220**

*Species richness does not include unidentified birds.

Table D-1 Avian Point Count Survey Data by Point, Cont.

Species	Survey Point																				
	CC-21	***CC-22***	***CC-23***	***CC-24***	***CC-25***	***CC-26***	***CC - 27***	***CC-28***	***CC-29***	***CC-30***	***CC - 31***	***CC - 32***	***CC - 33***	***CC - 34***	***CC - 35***	***CC - 36***	***CC - 37***	***CC-38***	***CC -39***	***CC -40***	**Total**
Greater White-fronted Goose (*Anser albifrons*)					100										3	500					603
Snow Goose (*Chen caerulescens*)	20	3			220			70							12	1000					1325
Canada Goose (*Branta canadensis*)		1	2	3				1	17		3	1									79
Gadwall (*Anas strepera*)		2																			2
American Wigeon (*Anas americana*)			2																		2
Mallard (*Anas platyrhynchos*)																					8
Blue-winged Teal (*Anas discors*)									2						2			2			6
Northern Shoveler (*Anas clypeata*)	7	12																			19
Green-winged Teal (*Anas crecca*)	13							3													16
Ring-necked Duck (*Aythya collaris*)	16	3	8						5										1		33
Bufflehead (Buc*ephala albeola*)			2																		19
Hooded Merganser (*Lophodytes cucullatus*)																					2
Northern Bobwhite (*Colinus virginianus*)	1		5	2	4	4	9	6	3	7		2	1	1	2	5	1	3		5	137
Ring-necked Pheasant (*Phasianus colchicus*)								1		1											20
Wild Turkey (*Meleagris gallopavo*)																					4
Pied-billed Grebe (*Podilymbus podiceps*)																					1
Great Blue Heron (*Ardea herodias*)																	3				5
Green Heron (*Butorides virescens*)	1																				1

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Species	Survey Point																				
	CC-21	***CC-22***	***CC-23***	***CC-24***	***CC-25***	***CC-26***	***CC - 27***	***CC-28***	***CC-29***	***CC-30***	***CC - 31***	***CC - 32***	***CC - 33***	***CC - 34***	***CC - 35***	***CC - 36***	***CC - 37***	***CC-38***	***CC -39***	***CC -40***	**Total**
Turkey Vulture (*Cathartes aura*)	1	11		8	10	3	4	2	3	2	13	7	1	13	6	6	5	3	7	3	267
Bald Eagle (*Haliaeetus leucocephalus*)														1	1						11
Northern Harrier (*Circus cyaneus*)										1							1		1	1	11
Cooper's Hawk (*Accipiter cooperii*)													1								1
Red-tailed Hawk (*Buteo jamaicensis*)	1	1	2	3	3	2	7	2	5			4	1	1	2	1	1	3	3		84
Rough-legged Hawk (*Buteo lagopus*)					1							1	1								5
American Kestrel (*Falco sparverius*)	1			1		1		3	2			1				1				1	19
Merlin (*Falco columbarius*)	1									1							1				3
American Coot (*Fulica americana*)																					3
Killdeer (*Charadrius vociferus*)	6	7	6	3	4		1	1	4						1	1		2			78
Upland Sandpiper (*Bartramia longicauda*)			1	1		2															4
Wilson's Snipe (*Gallinago delicata*)																					1
Mourning Dove (*Zenaida macroura*)	1	4	21	1	3	3	3		9	3	2	2	1	9	1	4	3	8			157
Great Horned Owl (*Bubo virginianus*)		1																			1
Barred Owl (*Strix varia*)															2						3
Short-eared Owl (*Asio flammeus*)						1															1
Common Nighthawk (*Chordeiles minor*)																					1
Chimney Swift (*Chaetura pelagica*)		1																			5
Belted Kingfisher (*Megaceryle alcyon*)							3		1												4

Species	Survey Point																				
	CC-21	***CC-22***	***CC-23***	***CC-24***	***CC-25***	***CC-26***	***CC - 27***	***CC-28***	***CC-29***	***CC-30***	***CC - 31***	***CC - 32***	***CC - 33***	***CC - 34***	***CC - 35***	***CC - 36***	***CC - 37***	***CC-38***	***CC -39***	***CC -40***	**Total**
Red-headed Woodpecker (*Melanerpes erythrocephalus*)	2			1	2		1	1	7	2		2				1	1				44
Red-bellied Woodpecker (*Melanerpes carolinus*)		1	1				3	1	9	2	1	2	5		1		1				77
Downy Woodpecker (*Picoides pubescens*)							1		2				3								19
Hairy Woodpecker (*Picoides villosus*)					1		1		1			1									6
Northern Flicker (*Colaptes auratus*)	1						6		6			2	2		3		4				79
Eastern Wood-Pewee (*Contopus virens*)							1		1			1									7
Willow Flycatcher (*Empidonax traillii*)																1					2
Eastern Phoebe (*Sayornis phoebe*)							1		2					1	1						17
Great Crested Flycatcher (*Myiarchus crinitus*)			2				2		1												5
Eastern Kingbird (*Tyrannus tyrannus*)		1		1			7		1			1	1	1	1	1	1			1	64
Loggerhead Shrike (*Lanius ludovicianus*)					1		1			2						1					11
Northern Shrike (*Lanius excubitor*)																					2
Bell's Vireo (*Vireo bellii*)	2			1														1		1	20
Warbling Vireo (*Vireo gilvus*)																					3
Blue Jay (*Cyanocitta cristata*)		4	3		5		12	14	22	7	9	7	3	3	5		6	1	1	3	239
American Crow (*Corvus brachyrhynchos*)	1	7			3		11	18	7	2	13	14	6	8	9	12	11	3		5	311
Horned Lark (*Eremophila alpestris*)	2		56	1	6	3	4	3							1	4			13		195

Species	Survey Point																				
	CC-21	***CC-22***	***CC-23***	***CC-24***	***CC-25***	***CC-26***	***CC - 27***	***CC-28***	***CC-29***	***CC-30***	***CC - 31***	***CC - 32***	***CC - 33***	***CC - 34***	***CC - 35***	***CC - 36***	***CC - 37***	***CC-38***	***CC -39***	***CC -40***	**Total**
Purple Martin (*Progne subis*)																					12
Tree Swallow (*Tachycineta bicolor*)	2						4	2	24		91					83	25	8		92	429
Northern Rough-winged Swallow (*Stelgidopteryx serripennis*)		1																			1
Bank Swallow (*Riparia riparia*)					4				2												7
Cliff Swallow (*Petrochelidon pyrrhonota*)		35			20		13		6			2									83
Barn Swallow (*Hirundo rustica*)	6	26	14		5	5	3	2	5			18	1	7		10	2	18	11	6	223
Black-capped Chickadee (*Poecile atricapillus*)						1			1			2		1			2				32
Tufted Titmouse (*Baeolophus bicolor*)																					2
White-breasted Nuthatch (*Sitta carolinensis*)							2														22
Brown Creeper (*Certhia americana*)																					1
Carolina Wren (*Thryothorus ludovicianus*)							3					1	1								6
House Wren (*Troglodytes aedon*)									2			2						1			27
Blue-gray Gnatcatcher (*Polioptila caerulea*)									1			1									7
Eastern Bluebird (*Sialia sialis*)		2						6	26	6	1	2	1	2					5	3	97
Wood Thrush (*Hylocichla mustelina*)	1												1								2
American Robin (*Turdus migratorius*)	12	9	2	9	3	3	3	2	10	3	1		7	2	3		6	4	6	21	236

Species	Survey Point																			
	CC-21	***CC-22***	***CC-23***	***CC-24***	***CC-25***	***CC-26***	***CC - 27***	***CC-28***	***CC-29***	***CC-30***	***CC - 31***	***CC - 32***	***CC - 33***	***CC - 34***	***CC - 35***	***CC - 36***	***CC - 37***	***CC-38***	***CC -39***	***CC -40***	**Total**
Gray Catbird (*Dumetella carolinensis*)	4						3		2			2	1	1	1	1		1			40
Northern Mockingbird (*Mimus polyglottos*)		1			1		1		2	1					1	1	1			1	30
Brown Thrasher (*Toxostoma rufum*)	1					1	1	1	1							1					26
Cedar Waxwing (*Bombycilla cedrorum*)																					40
Yellow Warbler (*Dendroica petechia*)	1	1				1	3		2												11
Yellow-rumped Warbler (*Dendroica coronata*)																					2
Common Yellowthroat (*Geothlypis trichas*)	4	1		2	2	2	8	3	6	3	1	4	1	1		3		2	1	1	122
Yellow-breasted Chat (*Icteria virens*)																					1
Eastern Towhee (*Pipilo erythrophthalmus*)																					3
American Tree Sparrow (*Spizella arborea*)				34		2	60			65	1				3	21		15			298
Chipping Sparrow (*Spizella passerina*)												2									8
Field Sparrow (*Spizella pusilla*)				1			7		1	1	1	5	5	1	2		3	2		1	116
Lark Sparrow (*Chondestes grammacus*)																					3
Savannah Sparrow (*Passerculus sandwichensis*)								1	1							1				6	21
Grasshopper Sparrow (*Ammodramus savannarum*)	2	6		1	1	1	4	4	3	1	1	2			1		1	1	1		69
Fox Sparrow (*Passerella iliaca*)										1											1
Song Sparrow (*Melospiza melodia*)	2	2	2		3	3	10		6				2			1					78

Species	Survey Point																				
	CC-21	***CC-22***	***CC-23***	***CC-24***	***CC-25***	***CC-26***	***CC - 27***	***CC-28***	***CC-29***	***CC-30***	***CC - 31***	***CC - 32***	***CC - 33***	***CC - 34***	***CC - 35***	***CC - 36***	***CC - 37***	***CC-38***	***CC -39***	***CC -40***	**Total**
Harris's Sparrow (*Zonotrichia querula*)										1					1						10
White-crowned Sparrow (*Zonotrichia leucophrys*)																					3
Dark-eyed Junco (*Junco hyemalis*)	2			5			5		15	27			5	23	11	25	22	36	8	2	294
Northern Cardinal (*Cardinalis cardinalis*)					1		4	1	2	1	2	2	3	8	3		3	1	1		71
Rose-breasted Grosbeak (*Pheucticus ludovicianus*)							1					1									5
Blue Grosbeak (*Passerina caerulea*)					1																6
Indigo Bunting (*Passerina cyanea*)	2						2		2			1				2					25
Dickcissel (*Spiza americana*)	14	29	18	13	14	24	9	5	15	9	3	14		3	1	17		10	3	5	460
Bobolink (*Dolichonyx oryzivorus*)	2	1				4	4	1	1	2						4		2			64
Red-winged Blackbird (*Agelaius phoeniceus*)	72	30	13	32	52	38	24	5	11	10	10	6	268	3	36	28	39	19	24	11	1353
Eastern Meadowlark (*Sturnella magna*)	1	12	3	3	4	4	1	4	10	9	3	2	1	1		4	1	10	13	2	193
Western Meadowlark (*Sturnella neglecta*)	3	7	18	15	9	14		1			6					1	2	4	1	2	98
Common Grackle (*Quiscalus quiscula*)	1			4				1		8	30				40			2	15		106
Brown-headed Cowbird (*Molothrus ater*)	2				2	1			1	1									14		70
Orchard Oriole (*Icterus spurius*)							1														2
Baltimore Oriole (*Icterus galbula*)						1															11
American Goldfinch (*Spinus tristis*)	4	3	1	5	9	4	5	4	3	5	3	6	3	10	13	4	6	6	3	12	275
Unknowns																					
Blackbird spp.	6	15	80			1		12	50							30			200		518

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	Survey Point																				
Species	***CC-21***	***CC-22***	***CC-23***	***CC-24***	***CC-25***	***CC-26***	***CC - 27***	***CC-28***	***CC-29***	***CC-30***	***CC - 31***	***CC - 32***	***CC - 33***	***CC - 34***	***CC - 35***	***CC - 36***	***CC - 37***	***CC-38***	***CC -39***	***CC -40***	**Total**
Flycatcher spp.																					1
Hawk spp.				1			2				1					1	1				11
Sparrow spp.	12	3	1	3	3	5	5	7	3	1		1	3	3		5	2	7	4	1	126
Woodpecker spp.	1																	1			6
Meadowlark spp.	10	5	5	2		10		1					15			1		17	1		108
Total Birds	***1***	***5***	***8***	***3***	***9***	***6***	***1***	***19***	***1***	***7***	***100***	***2***	***2***	***56***	***1***	***0***	***1***	***0***	***3***	***6***	***455***
Species Richness*	**37**	**31**	**21**	**24**	**30**	**25**	**44**	**30**	**48**	**29**	**20**	**34**	**26**	**22**	**30**	**31**	**26**	**27**	**20**	**22**	**104**
Total Unknowns	**244**	**248**	**268**	**156**	**497**	**144**	**266**	**189**	**324**	**185**	**196**	**124**	**344**	**104**	**169**	**1782**	**155**	**193**	**337**	**186**	**9914**

*Species richness does not include unidentified birds.

Table D-2 Large Bird Point Count Survey Data by Point

Species	Survey Point																			
	CC-01	***CC - 02***	***CC - 03***	***CC - 04***	***CC - 05***	***CC - 06***	***CC - 07***	***CC - 08***	***CC - 09***	***CC - 10***	***CC - 11***	***CC - 12***	***CC - 13***	***CC - 14***	***CC - 15***	***CC - 16***	***CC - 17***	***CC - 18***	***CC - 19***	***CC - 20***
Greater White-fronted Goose (*Anser albifrons*)		30						80			15	480		65	1500			15		
Snow Goose (*Chen caerulescens*)		100						180			35	388		160	1500			55	550	
Canada Goose (*Branta canadensis*)	2	10	18			2	1		16		57		66		32		13	5	45	1
Gadwall (*Anas strepera*)				2		3	8							4						
American Wigeon (*Anas americana*)																				12
Mallard (*Anas platyrhynchos*)			10											2						
Blue-winged Teal (*Anas discors*)																				
Northern Shoveler (*Anas clypeata*)																				
Green-winged Teal (*Anas crecca*)	9										5									
Ring-necked Duck (*Aythya collaris*)		3																		
Surf Scoter (*Melanitta perspicillata*)																				
Bufflehead (*Bucephala albeola*)													4							15
Hooded Merganser (*Lophodytes cucullatus*)																				2
Ring-necked Pheasant (*Phasianus colchicus*)	2	1	1				1		1	1	4		4			2				1
Wild Turkey (*Meleagris gallopavo*)			1	1					3	3										1
Pied-billed Grebe (*Podilymbus podiceps*)			1																	

Species	Survey Point																			
	CC-01	***CC - 02***	***CC - 03***	***CC - 04***	***CC - 05***	***CC - 06***	***CC - 07***	***CC - 08***	***CC - 09***	***CC - 10***	***CC - 11***	***CC - 12***	***CC - 13***	***CC - 14***	***CC - 15***	***CC - 16***	***CC - 17***	***CC - 18***	***CC - 19***	***CC - 20***
American White Pelican (*Pelecanus erythrorhynchos*)															10					
Double-crested Cormorant (*Phalacrocorax auritus*)																				
Great Blue Heron (*Ardea herodias*)	1	1	3	2			1	1			1	1			1	1	2			
Great Egret (*Ardea alba*)																				
Snowy Egret (*Egretta thula*)																				
Turkey Vulture (*Cathartes aura*)	32	37	40	77	20	26	32	35	76	27	16	21	40	30	38	35	25	28	25	17
Osprey (*Pandion haliaetus*)																				
Bald Eagle (*Haliaeetus leucocephalus*)		2	3	2	4	6	2	1	3	5	4	2	5		3		2	1	3	1
Northern Harrier (*Circus cyaneus*)	3	2	6	2		2	2		1	1	2	1	9	1	4	3		6	2	3
Sharp-shinned Hawk (*Accipiter striatus*)					1				2	1			2	1	1					
Cooper's Hawk (*Accipiter cooperii*)					1	1				1			1		1			1		
Red-shouldered Hawk (*Buteo lineatus*)								1												
Swainson's Hawk (*Buteo swainsoni*)																				1
Red-tailed Hawk (*Buteo jamaicensis*)	9	6	4	18	8	9	1	6	13	16	7	9	10	11	8	15	15	6	9	11
Rough-legged Hawk (*Buteo lagopus*)	2	7	1	2	3						1		1			2			1	
American Kestrel (*Falco sparverius*)	3	3			1	1		1		1	3				1	2	10	1		2
Merlin (*Falco columbarius*)																				

	Survey Point																			
Species	***CC-01***	***CC - 02***	***CC - 03***	***CC - 04***	***CC - 05***	***CC - 06***	***CC - 07***	***CC - 08***	***CC - 09***	***CC - 10***	***CC - 11***	***CC - 12***	***CC - 13***	***CC - 14***	***CC - 15***	***CC - 16***	***CC - 17***	***CC - 18***	***CC - 19***	***CC - 20***
Prairie Falcon (*Falco mexicanus*)								1												
Ring-billed Gull (*Larus delawarensis*)													1							
Great Horned Owl (*Bubo virginianus*)															1		1			
Barred Owl (*Strix varia*)		1																		
Short-eared Owl (*Asio flammeus*)																				
American Crow (*Corvus brachyrhynchos*)	10	9	19	16	6	11	6	61	15	17	8	4	5	105	50	26	4	4	5	9
Unknowns																				
Duck spp.			21	20			5							1						30
Hawk spp.	1		3	3			2	1	3	3	2	4	4	1	2	1		3	2	2
Larus Gull spp.																				
Total Birds	**74**	**212**	**131**	**145**	**44**	**61**	**61**	**368**	**133**	**76**	**160**	**910**	**152**	**381**	**3152**	**87**	**72**	**125**	**642**	**108**
Species Richness*	**10**	**14**	**12**	**9**	**8**	**9**	**9**	**10**	**9**	**10**	**13**	**8**	**12**	**9**	**14**	**8**	**8**	**10**	**8**	**13**
Total Unknowns	**1**	**0**	**24**	**23**	**0**	**0**	**7**	**1**	**3**	**3**	**2**	**4**	**4**	**2**	**2**	**1**	**0**	**3**	**2**	**32**

*Species richness does not include unidentified birds.

Table D-2 Large Bird Point Count Survey Data by Point, Cont.

Species	Survey Point																				
	CC-21	***CC-22***	***CC-23***	***CC-24***	***CC-25***	***CC-26***	***CC-27***	***CC-28***	***CC-29***	***CC-30***	***CC-31***	***CC-32***	***CC-33***	***CC-34***	***CC-35***	***CC-36***	***CC-37***	***CC-38***	***CC-39***	***CC-40***	**Total**
Greater White-fronted Goose (*Anser albifrons*)			4	1	80	1	10	20	20		2				68						2391
Snow Goose (*Chen caerulescens*)	2	4	2	120	200	1	130	100	51				2		100				1		3681
Canada Goose (*Branta canadensis*)	71	55	434	1	25			50	83		12			51	45	26	2	1	47		1171
Gadwall (*Anas strepera*)		1																			18
American Wigeon (*Anas americana*)	12		2																		26
Mallard (*Anas platyrhynchos*)	4									3					4	2					25
Blue-winged Teal (*Anas discors*)									2					4	2	9		2			19
Northern Shoveler (*Anas clypeata*)		12																		1	13
Green-winged Teal (*Anas crecca*)								3	2							8					27
Ring-necked Duck (*Aythya collaris*)	2	1	14						4		3				6			6	1		40
Surf Scoter (*Melanitta perspicillata*)		1																			1
Bufflehead (*Bucephala albeola*)			7						2		4										32
Hooded Merganser (*Lophodytes cucullatus*)																					2
Ring-necked Pheasant (*Phasianus colchicus*)								1								1					20
Wild Turkey (*Meleagris gallopavo*)							10					2	14								35
Pied-billed Grebe (*Podilymbus podiceps*)									1												2
American White Pelican (*Pelecanus erythrorhynchos*)																					10

	Survey Point																				
Species	***CC-21***	***CC-22***	***CC-23***	***CC-24***	***CC-25***	***CC-26***	***CC-27***	***CC-28***	***CC-29***	***CC-30***	***CC-31***	***CC-32***	***CC-33***	***CC-34***	***CC-35***	***CC-36***	***CC-37***	***CC-38***	***CC-39***	***CC-40***	**Total**
Double-crested Cormorant (*Phalacrocorax auritus*)				1		25															26
Great Blue Heron (*Ardea herodias*)	3	3	1		1	2	1	1	3		3	1					3	1			38
Great Egret (*Ardea alba*)																				1	1
Snowy Egret (*Egretta thula*)				1																	1
Turkey Vulture (*Cathartes aura*)	14	23	33	13	23	17	42	42	31	41	21	46	15	35	19	7	25	2	28	12	1166
Osprey (*Pandion haliaetus*)								1													1
Bald Eagle (*Haliaeetus leucocephalus*)	1	1	1	1	2	2		1	5		7	3	2	5	4	3	2		4		93
Northern Harrier (*Circus cyaneus*)		1	2		2	1		1	2	3		2	3	3	2	2	2	6	4	8	94
Sharp-shinned Hawk (*Accipiter striatus*)		1																1	2		12
Cooper's Hawk (*Accipiter cooperii*)					1	1	2		1	1				1		1		1			15
Red-shouldered Hawk (*Buteo lineatus*)																					1
Swainson's Hawk (*Buteo swainsoni*)																					1
Red-tailed Hawk (*Buteo jamaicensis*)	8	11	7	11	9	8	13	16	21	7	3	21	10	19	3	4	11	6	10	5	394
Rough-legged Hawk (*Buteo lagopus*)	2						1	1			1	7					3				35
American Kestrel (*Falco sparverius*)	2			2		3	1	4	4		1	3	1		1	2	2	2			57
Merlin (*Falco columbarius*)	1							2		1							1				5
Prairie Falcon (*Falco mexicanus*)																					1
Ring-billed Gull (*Larus delawarensis*)																					1
Great Horned Owl (*Bubo virginianus*)																					2

	Survey Point																				
Species	***CC-21***	***CC-22***	***CC-23***	***CC-24***	***CC-25***	***CC-26***	***CC-27***	***CC-28***	***CC-29***	***CC-30***	***CC-31***	***CC-32***	***CC-33***	***CC-34***	***CC-35***	***CC-36***	***CC-37***	***CC-38***	***CC-39***	***CC-40***	**Total**
Barred Owl (*Strix varia*)															2				1		4
Short-eared Owl (*Asio flammeus*)						1															1
American Crow (*Corvus brachyrhynchos*)	5	17	2	5	1	7	21	44	16	8	24	13	16	10	16	6	24	4	6	25	660
Duck spp.					2			2	4							30					115
Hawk spp.	1	1		1	1		3	3	2	1	3	1		2		3	1	5			65
Larus Gull spp.				30																	30
Total Birds	**128**	**132**	**509**	**187**	**347**	**69**	**234**	**292**	**254**	**65**	**84**	**99**	**63**	**130**	**272**	**104**	**76**	**37**	**104**	**52**	**10332**
Species Richness*	**13**	**13**	**12**	**10**	**10**	**12**	**10**	**15**	**16**	**7**	**11**	**9**	**8**	**8**	**13**	**12**	**10**	**11**	**10**	**6**	**39**
Total Unknowns	**1**	**1**	**0**	**31**	**3**	**0**	**3**	**5**	**6**	**1**	**3**	**1**	**0**	**2**	**0**	**33**	**1**	**5**	**0**	**0**	**210**

*Species richness does not include unidentified birds.

Table D-3 Avian Point Count Survey Data by Month

Species	*05/17*	*06/17*	*07/17*	*08/17*	*09/17*	*10/17*	*11/17*	*12/17*	*01/18*	*02/18*	*03/18*	*04/18*	*05/18*	*06/18*	*07/18*	*08/18*	Total
Greater White-fronted Goose (*Anser albifrons*)											603						603
Snow Goose (*Chen caerulescens*)											1325						1325
Canada Goose (*Branta canadensis*)	4				3		6		28		32	5	1				79
Gadwall (*Anas strepera*)												2					2
American Wigeon (*Anas americana*)											2						2
Mallard (*Anas platyrhynchos*)																8	8
Blue-winged Teal (*Anas discors*)												6					6
Northern Shoveler (*Anas clypeata*)											12	7					19
Green-winged Teal (*Anas crecca*)												16					16
Ring-necked Duck (*Aythya collaris*)											10	23					33
Bufflehead (*Bucephala albeola*)											4	15					19
Hooded Merganser (*Lophodytes cucullatus*)											2						2
Northern Bobwhite (*Colinus virginianus*)	26	27	40	5	3								5	15	12	4	137
Ring-necked Pheasant (*Phasianus colchicus*)	7	4				2	1		1				1	4			20
Wild Turkey (*Meleagris gallopavo*)								1					3				4
Pied-billed Grebe (*Podilymbus podiceps*)						1											1
Great Blue Heron (*Ardea herodias*)												4		1			5
Green Heron (*Butorides virescens*)				1													1
Turkey Vulture (*Cathartes aura*)	2		15	42	76	36						21	24	7	32	12	267

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Species	*05/17*	*06/17*	*07/17*	*08/17*	*09/17*	*10/17*	*11/17*	*12/17*	*01/18*	*02/18*	*03/18*	*04/18*	*05/18*	*06/18*	*07/18*	*08/18*	Total
Bald Eagle (*Haliaeetus leucocephalus*)						1	3	1	4	2							11
Northern Harrier (*Circus cyaneus*)						1		1	4		3	2					11
Cooper's Hawk (*Accipiter cooperii*)					1												1
Red-tailed Hawk (*Buteo jamaicensis*)	1		2	3	5	15	7	13	11	8	4	5	3		4	3	84
Rough-legged Hawk (*Buteo lagopus*)									1	3	1						5
American Kestrel (*Falco sparverius*)					3		2	2	3	2		4	1		2		19
Merlin (*Falco columbarius*)					1					2							3
American Coot (*Fulica americana*)				3													3
Killdeer (*Charadrius vociferus*)	8	7	7	12	7	1					1	9	7	12	4	3	78
Upland Sandpiper (*Bartramia longicauda*)	1	2												1			4
Wilson's Snipe (*Gallinago delicata*)												1					1
Mourning Dove (*Zenaida macroura*)	13	17	23	13	8	15				9		12	10	8	8	21	157
Great Horned Owl (*Bubo virginianus*)										1							1
Barred Owl (*Strix varia*)	1									2							3
Short-eared Owl (*Asio flammeus*)											1						1
Common Nighthawk (*Chordeiles minor*)					1												1
Chimney Swift (*Chaetura pelagica*)													3	2			5
Belted Kingfisher (*Megaceryle alcyon*)							3									1	4
Red-headed Woodpecker (*Melanerpes erythrocephalus*)	6	2		6	10			3		1		5	5	2		4	44
Red-bellied Woodpecker (*Melanerpes carolinus*)	10	7	8	3	10	5		6		8	6	6	3	3	1	1	77

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Downy Woodpecker (*Picoides pubescens*)	1			1	1	1	2	1		4	3	2			1	2	19
Hairy Woodpecker (*Picoides villosus*)					2		1							2		1	6
Northern Flicker (*Colaptes auratus*)	1	1	1	8	5	11	11	3	5	1	1	18	2	4	1	6	79
Eastern Wood-Pewee (*Contopus virens*)													4	2		1	7
Willow Flycatcher (*Empidonax traillii*)															1	1	2
Eastern Phoebe (*Sayornis phoebe*)	4	1	1		1							2	5		2	1	17
Great Crested Flycatcher (*Myiarchus crinitus*)				1									1	3			5
Eastern Kingbird (*Tyrannus tyrannus*)	8	6	8	18	1								9	1	2	11	64
Loggerhead Shrike (*Lanius ludovicianus*)			7				1							1	2		11
Northern Shrike (*Lanius excubitor*)								2									2
Bell's Vireo (*Vireo bellii*)	1		1	1	4								4	3	5	1	20
Warbling Vireo (*Vireo gilvus*)	1	2															3
Blue Jay (*Cyanocitta cristata*)	10	6	11	25	73	20	29	18	7	5	4	8	2	7	6	8	239
American Crow (*Corvus brachyrhynchos*)	12	11	21	12	20	29	49	30	32	28	19	10	4	12	7	15	311
Horned Lark (*Eremophila alpestris*)	4			1		7		11	12	54	72	8	13	4	6	3	195
Purple Martin (*Progne subis*)				12													12
Tree Swallow (*Tachycineta bicolor*)				120	228	69						2		1	8	1	429
Northern Rough-winged Swallow (*Stelgidopteryx serripennis*)																1	1
Bank Swallow (*Riparia riparia*)													1		2	4	7
Cliff Swallow (*Petrochelidon pyrrhonota*)	2													2	13	66	83

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Barn Swallow (*Hirundo rustica*)	23	8	30	36	61	4							7	14	3	37	223
Black-capped Chickadee (*Poecile atricapillus*)		1		3	4			3	4	7	5	5					32
Tufted Titmouse (*Baeolophus bicolor*)														1		1	2
White-breasted Nuthatch (*Sitta carolinensis*)				5	4	1	3	2		2		3			2		22
Brown Creeper (*Certhia americana*)							1										1
Carolina Wren (*Thryothorus ludovicianus*)							3					3					6
House Wren (*Troglodytes aedon*)	6	4	7	1	1									2	4	2	27
Blue-gray Gnatcatcher (*Polioptila caerulea*)	1		3												2	1	7
Eastern Bluebird (*Sialia sialis*)	3	2	5	12	14	19	4	2	2	3	12	8	3	2	3	3	97
Wood Thrush (*Hylocichla mustelina*)			1													1	2
American Robin (*Turdus migratorius*)	8	17	6	2	1	15	18	11	5	7	33	67	11	23	8	4	236
Gray Catbird (*Dumetella carolinensis*)	3	3	1	15	4								2	6	1	5	40
Northern Mockingbird (*Mimus polyglottos*)	3	8	13										1	3	2		30
Brown Thrasher (*Toxostoma rufum*)	10	3	1	1									3	3	3	2	26
Cedar Waxwing (*Bombycilla cedrorum*)								40									40
Yellow Warbler (*Dendroica petechia*)	1		5										3	1	1		11
Yellow-rumped Warbler (*Dendroica coronata*)						2											2
Common Yellowthroat (*Geothlypis trichas*)	17	19	41	2	1								12	15	12	3	122
Yellow-breasted Chat (*Icteria virens*)				1													1
Eastern Towhee (*Pipilo erythrophthalmus*)				3													3

Species	*05/17*	*06/17*	*07/17*	*08/17*	*09/17*	*10/17*	*11/17*	*12/17*	*01/18*	*02/18*	*03/18*	*04/18*	*05/18*	*06/18*	*07/18*	*08/18*	Total
American Tree Sparrow (*Spizella arborea*)							7	13	82	158	25	13					298
Chipping Sparrow (*Spizella passerina*)		2											2	1	3		8
Field Sparrow (*Spizella pusilla*)	6	17	27	4		3						24	7	9	9	10	116
Lark Sparrow (*Chondestes grammacus*)													2		1		3
Savannah Sparrow (*Passerculus sandwichensis*)				2		1					6	12					21
Grasshopper Sparrow (*Ammodramus savannarum*)	13	13	18										8	10	4	3	69
Fox Sparrow (*Passerella iliaca*)												1					1
Song Sparrow (*Melospiza melodia*)	4			1	2						4	42		9	3	13	78
Harris's Sparrow (*Zonotrichia querula*)												10					10
White-crowned Sparrow (*Zonotrichia leucophrys*)						3											3
Dark-eyed Junco (*Junco hyemalis*)							50	19	25	90	27	83					294
Northern Cardinal (*Cardinalis cardinalis*)	6	1	5	3			1			8	6	26	2	7	4	2	71
Rose-breasted Grosbeak (*Pheucticus ludovicianus*)					3										2		5
Blue Grosbeak (*Passerina caerulea*)			5													1	6
Indigo Bunting (*Passerina cyanea*)													5	6	6	8	25
Dickcissel (*Spiza americana*)	79	65	100										63	75	70	8	460
Bobolink (*Dolichonyx oryzivorus*)	25	8	4										10	7	5	5	64
Red-winged Blackbird (*Agelaius phoeniceus*)	59	42	67	17	13	94	243	4			452	115	82	65	54	46	1353
Eastern Meadowlark (*Sturnella magna*)	20	24	21		33		1				19	21	14	15	18	7	193
Western Meadowlark (*Sturnella neglecta*)	4	3	10	6	6	7	8		5		23	14	3	5	4		98

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Species	*05/17*	*06/17*	*07/17*	*08/17*	*09/17*	*10/17*	*11/17*	*12/17*	*01/18*	*02/18*	*03/18*	*04/18*	*05/18*	*06/18*	*07/18*	*08/18*	Total
Common Grackle (*Quiscalus quiscula*)	6						71			15		8	3	1	2		106
Brown-headed Cowbird (*Molothrus ater*)	3	3	10		27			5	4		5		6	1	4	2	70
Orchard Oriole (*Icterus spurius*)														1		1	2
Baltimore Oriole (*Icterus galbula*)	4	1											2	1		3	11
American Goldfinch (*Spinus tristis*)	4	14	26	46	33	42	29	11	2			15	3	16	5	29	275
Unknowns																	
Blackbird spp.				50		128	38	4		232	50			6	10		518
Flycatcher spp.				1													1
Hawk spp.			1	1			4	1	2	2							11
Sparrow spp.				13		14	31	4	11	1	17	2	3	1	4	25	126
Woodpecker spp.								1	3	1	1						6
Meadowlark spp.		1	3	24		11	1	52		9		1		2	3	1	108
Total Birds	**431**	**352**	**555**	**536**	**670**	**558**	**628**	**264**	**253**	**665**	**2790**	**666**	**368**	**405**	**371**	**402**	**9914**
Species Richness*	**44**	**34**	**35**	**37**	**36**	**26**	**25**	**23**	**19**	**23**	**31**	**42**	**45**	**48**	**47**	**48**	**104**
Total Unknowns	**0**	**1**	**4**	**89**	**0**	**153**	**74**	**62**	**16**	**245**	**68**	**3**	**3**	**9**	**17**	**26**	**770**

*Species richness does not include unidentified birds.

Table D-4 Large Bird Point Count Survey Data by Month

Species	*05/17*	*06/17*	*07/17*	*08/17*	*09/17*	*10/17*	*11/17*	*12/17*	*01/18*	*02/18*	*03/18*	*04/18*	*05/18*	*06/18*	*07/18*	*08/18*	**Total**
Greater White-fronted Goose (*Anser albifrons*)						3					2388						2391
Snow Goose (*Chen caerulescens*)									1		3679	1					3681
Canada Goose (*Branta canadensis*)	10			7	73	2	158	88	78	469	266	11	8		1		1171
Gadwall (*Anas strepera*)												18					18
American Wigeon (*Anas americana*)											26						26
Mallard (*Anas platyrhynchos*)				2	3						6	6				8	25
Blue-winged Teal (*Anas discors*)												19					19
Northern Shoveler (*Anas clypeata*)							1				12						13
Green-winged Teal (*Anas crecca*)							2				17	8					27
Ring-necked Duck (*Aythya collaris*)											22	18					40
Surf Scoter (*Melanitta perspicillata*)												1					1
Bufflehead (*Bucephala albeola*)											13	19					32
Hooded Merganser (*Lophodytes cucullatus*)											2						2
Ring-necked Pheasant (*Phasianus colchicus*)	1	2		1		3		2	5				2	3		1	20
Wild Turkey (*Meleagris gallopavo*)	1	3		1				14		10		2	3			1	35
Pied-billed Grebe (*Podilymbus podiceps*)						1						1					2
American White Pelican (*Pelecanus erythrorhynchos*)						10											10
Double-crested Cormorant (*Phalacrocorax auritus*)						26											26
Great Blue Heron (*Ardea herodias*)	5	3	2	2	1	2		1				11	3	2	4	2	38

Species	*05/17*	*06/17*	*07/17*	*08/17*	*09/17*	*10/17*	*11/17*	*12/17*	*01/18*	*02/18*	*03/18*	*04/18*	*05/18*	*06/18*	*07/18*	*08/18*	Total
Great Egret (*Ardea alba*)						1											1
Snowy Egret (*Egretta thula*)						1											1
Turkey Vulture (*Cathartes aura*)	81	79	128	67	295	95						85	95	60	110	71	1166
Osprey (*Pandion haliaetus*)						1											1
Bald Eagle (*Haliaeetus leucocephalus*)	1					9	17	14	22	16	6	5	3				93
Northern Harrier (*Circus cyaneus*)				2	3	21	20	13	8	14	10	3					94
Sharp-shinned Hawk (*Accipiter striatus*)					8	4											12
Cooper's Hawk (*Accipiter cooperii*)				1	5	3					1	2		3			15
Red-shouldered Hawk (*Buteo lineatus*)					1												1
Swainson's Hawk (*Buteo swainsoni*)												1					1
Red-tailed Hawk (*Buteo jamaicensis*)	11	5	7	10	12	73	50	45	33	33	33	32	24	6	10	10	394
Rough-legged Hawk (*Buteo lagopus*)						1	7	5	6	11	4	1					35
American Kestrel (*Falco sparverius*)			4		7	4	6	8	6	4	2	10	1	2	3		57
Merlin (*Falco columbarius*)					3					2							5
Prairie Falcon (*Falco mexicanus*)										1							1
Ring-billed Gull (*Larus delawarensis*)												1					1
Great Horned Owl (*Bubo virginianus*)										1		1					2
Barred Owl (*Strix varia*)							1	1		2							4
Short-eared Owl (*Asio flammeus*)											1						1
American Crow (*Corvus brachyrhynchos*)	7	8	12	12	37	31	234	52	113	64	48	25	7	2	3	5	660

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Species	*05/17*	*06/17*	*07/17*	*08/17*	*09/17*	*10/17*	*11/17*	*12/17*	*01/18*	*02/18*	*03/18*	*04/18*	*05/18*	*06/18*	*07/18*	*08/18*	Total
Unknowns																	
Duck spp.						21	30				55	9					115
Hawk spp.	1		1			16	12	3	5	9	13	2	1			2	65
Larus Gull spp.						30											30
Total Birds	**118**	**100**	**154**	**105**	**448**	**358**	**538**	**246**	**277**	**636**	**6604**	**292**	**147**	**78**	**131**	**100**	**10332**
Species Richness*	**8**	**6**	**5**	**10**	**12**	**19**	**10**	**11**	**9**	**12**	**18**	**23**	**9**	**7**	**6**	**7**	**0**
Total Unknowns	**1**	**0**	**1**	**0**	**0**	**67**	**42**	**3**	**5**	**9**	**68**	**11**	**1**	**0**	**0**	**2**	**210**

*Species richness does not include unidentified birds.

Appendix E LITERATURE REVIEW BIRD DATA SUMMARY

Table E-1 Bird Species Identified Through Literature Review and Field Surveys

			USGS Breeding Bird Survey Route (average birds/year)						Birds in Missouri	Christmas Bird Count Circle (average birds/year)				
Common Name	**Scientific Name**	**Listed Status**	**Watson**	**Newpoint**	**Barnard**	**Bedford IA**	**College Springs IA**	**College Springs 2 IA**	**Nodaway**	**Loess Bluffs**	**Maryville**	**Taylor County IA**	**eBird**	**Project Area Field Survey**
Greater White-fronted Goose	*Anser albifrons*								T	1223.5	109.1		x	X
Snow Goose	*Chen caerulescens*								T	206673.9	547.8	123.3	x	X
Ross's Goose	*Chen rossii*								T	16.6	2.3		x	
Cackling Goose	*Branta hutchinsii*								**	81.4	367.2	13.4	x	
Canada Goose	*Branta canadensis*		3.2	1.6	4.8	8.4		128.0	PR	1553.4	3674.5	858.5	x	X
Trumpeter Swan	*Cygnus buccinator*	MO SCC							W	281.3	17.1	5.0	x	
Tundra Swan	*Cygnus columbianus*								T	5.1	2.0		x	
Wood Duck	*Aix sponsa*		0.1	0.5	0.1	0.2		0.1	S	12.2	2.0		x	
Gadwall	*Anas strepera*								W	144.1	48.2	13.4	x	X
American Wigeon	*Anas americana*								W	19.6	7.5	858.5	x	X
American Black Duck	*Anas rubripes*								W	3.2	1.4	5.0		
Mallard	*Anas platyrhynchos*					0.1			PR	54186.9	1733.2	13.4	x	X
Blue-winged Teal	*Anas discors*					0.1			T	1.5			x	X
Cinnamon Teal	*Anas cyanoptera*								T				x	
Northern Shoveler	*Anas clypeata*								T	212.7	63.5	858.5	x	X
Northern Pintail	*Anas acuta*								W	1207.7	1.8	5.0	x	
Green-winged Teal	*Anas crecca*								W	353.7	11.9	1.0	x	X
Canvasback	*Aythya valisineria*								W	11.4	12.6	1.5	x	
Redhead	*Aythya americana*								T	6.8	4.3		x	
Ring-necked Duck	*Aythya collaris*								T	250.3	26.0	4.0	x	X
Greater Scaup	*Aythya marila*								T		12.6	1.0	x	
Lesser Scaup	*Aythya affinis*								T	21.8	29.8	13.0	x	
White-winged Scoter	*Melanitta deglandi*								W				x	

			USGS Breeding Bird Survey Route (average birds/year)						Birds in Missouri	Christmas Bird Count Circle (average birds/year)				
Common Name	**Scientific Name**	**Listed Status**	**Watson**	**Newpoint**	**Barnard**	**Bedford IA**	**College Springs IA**	**College Springs 2 IA**	**Nodaway**	**Loess Bluffs**	**Maryville**	**Taylor County IA**	**eBird**	**Project Area Field Survey**
Black Scoter	*Melanitta americana*								T				x	
Surf Scoter	*Melanitta perspicillata*								T	1.0				X
Long-tailed Duck	*Clangula hyemalis*								W	1.0	1.0		x	
Bufflehead	*Bucephala albeola*								T	5.8	9.3		x	X
Common Goldeneye	*Bucephala clangula*								W	89.0	44.1	3.0	x	
Hooded Merganser	*Lophodytes cucullatus*								PR	39.5	4.0	1.3	x	X
Common Merganser	*Mergus merganser*								W	73.9	31.6	12.8	x	
Red-breasted Merganser	*Mergus serrator*								T		1.5		x	
Ruddy Duck	*Oxyura jamaicensis*								T	15.4	22.1		x	
Northern Bobwhite	*Colinus virginianus*		22.4	5.1	26.2	17.5	33.0	25.7	PR	11.3	18.4	15.3	x	X
Ring-necked Pheasant	*Phasianus colchicus*		8.3	2.2	7.6	18.6	43.5	25.0	PR	22.2	13.4	9.4	x	X
Wild Turkey	*Meleagris gallopavo*		1.1	0.9	1.0	3.4		2.0	PR	103.2	30.7	40.4	x	X
Common Loon	*Gavia immer*								T				x	
Red-throated Loon	*Gavia stellata*								T				x	
Pied-billed Grebe	*Podiceps auritus*			0.1					T	5.7	3.6	1.0	x	X
Horned Grebe	*Podiceps auritus*								T				x	
Eared Grebe	*Podiceps nigricollis*								T	1.0			x	
Western Grebe	*Aechmophorus occidentalis*								T				x	
Double-crested Cormorant	*Phalacrocorax auritus*			0.9		0.1			T	74.0	1.5		x	X
American White Pelican	*Pelecanus erythrorhynchos*			7.7					T	7.6			x	X
American Bittern	*Botaurus lentiginosus*	MO-E							S				x	
Least Bittern	*Ixobrychus exilis*								S				x	
Great Blue Heron	*Ardea herodias*		0.4	4.1	1.5	1.0	1.0	0.5	S	15.1	1.9	1.0	x	X

			USGS Breeding Bird Survey Route (average birds/year)						Birds in Missouri	Christmas Bird Count Circle (average birds/year)				
Common Name	**Scientific Name**	**Listed Status**	**Watson**	**Newpoint**	**Barnard**	**Bedford IA**	**College Springs IA**	**College Springs 2 IA**	**Nodaway**	**Loess Bluffs**	**Maryville**	**Taylor County IA**	**eBird**	**Project Area Field Survey**
Green Heron	*Butorides virescens*			0.1	0.1	0.1			S				x	X
Black-crowned Night-Heron	*Nycticorax nycticorax*			0.1					S	1.0			x	
Little Blue Heron	*Egretta caerulea*								S				x	
Tri-colored Heron	*Egretta tricolor*								T				x	
Great Egret	*Ardea alba*			2.3		7.3			S				x	X
Snowy Egret	*Egretta thula*	MO-E							T				x	X
Cattle Egret	*Bubulcus ibis*								S				x	
White-faced Ibis	*Plegadis chihi*								T				x	
Turkey Vulture	*Cathartes aura*		9.3	13.6	3.5		0.5	3.8	S				x	X
Osprey	*Pandion haliaetus*	MO SCC							T				x	X
Bald Eagle	*Haliaeetus leucocephalus*	BGEPA		0.1					PR	177.5	8.6	19.2	x	X
Golden Eagle	*Aquila chrysaetos*	BGEPA							W	1.0	1.0	1.0	x	
Northern Harrier	*Circus cyaneus*	MO-E				0.1			PR	17.8	5.2	4.5	x	X
Sharp-shinned Hawk	*Accipiter striatus*	MO SCC				0.1			W	1.9	1.2	1.4	x	X
Cooper's Hawk	*Accipiter cooperii*					0.1	0.5	0.1	PR	2.9	1.3	1.4	x	X
Northern Goshawk	*Accipiter gentilis*								W	1.0	1.0	1.0		
Red-shouldered Hawk	*Buteo lineatus*		0.2						PR	1.0	2.0	1.0	x	X
Red-tailed Hawk	*Buteo jamaicensis*		2.7	3.1	1.3	0.9	4.0	5.0	PR	96.6	33.7	32.3	x	X
Rough-legged Hawk	*Buteo lagopus*								W	2.4	1.3	4.5	x	X
Swainson's Hawk	*Buteo swainsoni*	MO SCC	0.1						T					X
Ferruginous Hawk	*Buteo regalis*								T	1.0				
Virginia Rail	*Rallus limicola*	MO SCC							T				x	
Yellow Rail	*Coturnicops noveboracensis*								T				x	
Sora	*Porzana carolina*	MO SCC							T				x	

			USGS Breeding Bird Survey Route (average birds/year)						Birds in Missouri	Christmas Bird Count Circle (average birds/year)				
Common Name	**Scientific Name**	**Listed Status**	**Watson**	**Newpoint**	**Barnard**	**Bedford IA**	**College Springs IA**	**College Springs 2 IA**	**Nodaway**	**Loess Bluffs**	**Maryville**	**Taylor County IA**	**eBird**	**Project Area Field Survey**
American Coot	*Fulica americana*								S	97.9	64.1		x	X
Sandhill Crane	*Grus canadensis*	MO SCC		0.1					T	12.6			x	
Black-necked Stilt	*Himantopus mexicanus*								S				x	
American Avocet	*Recurvirostra americana*								T				x	
Killdeer	*Charadrius vociferus*		8.1	7.3	18.6	9.5	13.0	12.2	S	10.0	3.3	1.0	x	X
Wilson's Snipe	*Gallinago delicata*								T		1.2		x	X
Wilson's Phalarope	*Phalaropus tricolor*								T				x	
Red-necked Phalarope	*Phalaropus lobatus*								T				x	
Greater Yellowlegs	*Tringa melanoleuca*								T	3.0			x	X
Lesser Yellowlegs	*Tringa flavipes*								T				x	
Semipalmated Plover	*Charadrius semipalmatus*								T				x	
Black-bellied Plover	*Pluvialis squatarola*								T				x	
American Golden-Plover	*Pluvialis dominica*								T				x	
Spotted Sandpiper	*Actitis macularius*								T				x	
Solitary Sandpiper	*Tringa solitaria*								T				x	
Upland Sandpiper	*Bartramia longicauda*			0.1	2.7	0.4	1.0	1.1	S				x	X
Baird's Sandpiper	*Calidris bairdii*								T	1.0			x	
White-rumped Sandpiper	*Calidris fuscicollis*								T				x	
Buff-breasted Sandpiper	*Tryngites subruficollis*								T				x	
Least Sandpiper	*Calidris minutilla*								T				x	
Pectoral Sandpiper	*Calidris melanotos*								T				x	
Western Sandpiper	*Calidris mauri*								T				x	
Semipalmated Sandpiper	*Calidris pusilla*								T				x	

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Stilt Sandpiper	*Calidris himantopus*								T				x	
Sanderling	*Calidris alba*								T				x	
Hudsonian Godwit	*Limosa haemastica*								T				x	
Short-billed Dowitcher	*Limnodromus griseus*								T				x	
Long-billed Dowitcher	*Limnodromus scolopaceus*								T				x	
Dunlin	*Calidris alpina*								T				x	
Willet	*Tringa semipalmata*								T				x	
Ruddy Turnstone	*Arenaria interpres*								T				x	
Black-legged Kittiwake	*Rissa tridactyla*								W		1.0			
Franklin's Gull	*Leucophaeus pipixcan*								T		2.0		x	
Ring-billed Gull	*Larus delawarensis*								W	45.6	7.3	1.0	x	X
Herring Gull	*Larus argentatus*								W	1.0	1.0	4.0	x	
Bonaparte's Gull	*Chroicocephalus philadelphia*								T				x	
Forster's Tern	*Sterna forsteri*								T				x	
Black Tern	*Chlidonias niger*								T				x	
Caspian Tern	*Hydroprogne caspia*								T				x	
Mourning Dove	*Zenaida macroura*		42.2	30.5	31.4	41.2	117.0	61.8	PR	35.8	30.8	18.5	x	X
Yellow-billed Cuckoo	*Coccyzus americanus*		3.3	4.5	2.7	0.8	19.5	2.1	S				x	X
Black-billed Cuckoo	*Coccyzus erythropthalmus*		0.1		0.1	0.2		0.1	S				x	
Common Nighthawk	*Chordeiles minor*		3.6	0.1	0.1				S				x	X
Eastern Whip-poor-will	*Caprimulgus vociferus*				0.2				S					
Chuck-will's-widow	*Antrostomus carolinensis*								S				x	
Chimney Swift	*Chaetura pelagica*			12.5	4.1	0.6	0.5	0.8	S				x	X

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Ruby-throated Hummingbird	*Archilochus colubris*		0.9	0.5	0.3				S				x	
Barn Owl	*Tyto alba*								PR	1.0	1.0			
Eastern Screech-Owl	*Megascops asio*								PR	2.7	2.7	1.5		
Great Horned Owl	*Bubo virginianus*		0.3	0.2	0.5	0.5		1.1	PR	5.1	4.6	3.4	x	X
Barred Owl	*Strix varia*		0.1	0.2			1.0	0.2	PR	2.4	2.8	3.5	x	X
Snowy Owl	*Bubo scandiacus*								W	1.0	1.0		x	
Long-eared Owl	*Asio otus*								W	1.0	1.0		x	
Short-eared Owl	*Asio flammeus*	MO SCC							W	7.9	2.0	2.0	x	X
Northern Saw-whet Owl	*Aegolius acadicus*								W		1.0		x	
Belted Kingfisher	*Megaceryle alcyon*			0.2				0.1	PR	2.4	1.2	1.4	x	X
Red-headed Woodpecker	*Melanerpes erythrocephalus*		5.4	2.8	3.8	2.8	11.0	7.3	PR	5.3	6.4	7.4	x	X
Red-bellied Woodpecker	*Melanerpes carolinus*		8.9	10.5	8.2	3.3	3.5	2.2	PR	72.4	26.3	16.9	x	X
Yellow-bellied Sapsucker	*Sphyrapicus varius*								W	4.5	1.4	1.7	x	
Downy Woodpecker	*Picoides pubescens*		1.8	3.4	0.7	1.0	2.0	1.1	PR	64.0	26.9	21.3	x	X
Hairy Woodpecker	*Picoides villosus*			0.2	0.1	0.1	6.0	0.2	PR	20.5	3.7	6.4	x	X
Northern Flicker	*Colaptes auratus*		1.3	1.5	3.2	3.2		1.6	PR	53.1	15.0	20.8	x	X
Pileated Woodpecker	*Dryocopus pileatus*								PR	3.9	1.0		x	X
American Kestrel	*Falco sparverius*		0.8	0.2	1.1	0.3	1.0	0.5	PR	6.3	19.1	8.7	x	X
Merlin	*Falco columbarius*								W	2.5	1.0	1.0	x	X
Peregrine Falcon	*Falco peregrinus*	MO-E							T	1.0			x	
Prairie Falcon	*Falco mexicanus*								W	1.7	1.0	1.0		X
Olive-sided Flycatcher	*Contopus cooperi*								T				x	
Eastern Wood-Pewee	*Contopus virens*		2.5	6.1	2.7	1.3		1.6	S				x	X
Willow Flycatcher	*Empidonax traillii*				0.2	0.4		0.8	S				x	X

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Acadian Flycatcher	*Empidonax virescens*		0.1	0.1					S					
Alder Flycatcher	*Empidonax alnorum*			0.2					T				x	
Least Flycatcher	*Empidonax minimus*		0.4	0.2					T				x	
Great Crested Flycatcher	*Myiarchus crinitus*		4.0	4.2	2.1	1.6	0.5	0.9	S				x	X
Scissor-tailed Flycatcher	*Tyrannus forficatus*						0.5		S				x	
Eastern Phoebe	*Sayornis phoebe*		4.4	5.3	3.3	1.6	1.0	4.0	S				x	X
Western Kingbird	*Tyrannus verticalis*		0.4	1.0	0.2			0.1	S				x	X
Eastern Kingbird	*Tyrannus tyrannus*		9.8	8.8	9.3	10.2	10.5	9.9	S				x	X
Loggerhead Shrike	*Lanius ludovicianus*	MO SCC	0.6		0.7	0.6	1.5	1.7	PR	1.8	2.5	1.3	x	X
Northern Shrike	*Lanius excubitor*								W	1.0	1.0	1.3	x	X
White-eyed Vireo	*Vireo griseus*			0.2					S				x	
Bell's Vireo	*Vireo bellii*		1.4	1.3		3.4	0.5	1.2	S				x	X
Yellow-throated Vireo	*Vireo flavifrons*		0.6	1.5	0.3				S				x	
Warbling Vireo	*Vireo gilvus*		6.0	10.5	2.3	0.4	0.5	5.3	S				x	X
Red-eyed Vireo	*Vireo olivaceus*		0.5	2.1	0.5	0.1		0.1	S				x	
Philadelphia Vireo	*Vireo philadelphicus*								T				x	
Blue Jay	*Cyanocitta cristata*		9.1	10.1	8.9	5.7	9.5	7.6	PR	83.4	69.6	64.3	x	X
American Crow	*Corvus brachyrhynchos*		5.6	4.6	6.3	20.6	8.5	3.6	PR	65.4	65.2	172.5	x	X
Horned Lark	*Eremophila alpestris*		3.6	1.5	12.0	0.2		5.3	PR	60.3	68.8	106.4	x	X
Purple Martin	*Progne subis*		1.6	5.1	0.7		2.0	2.8	S				x	X
Tree Swallow	*Tachycineta bicolor*		0.8	2.0		1.1		0.2	S				x	X
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*		6.1	1.4	4.3	1.2		0.3	S				x	
Bank Swallow	*Riparia riparia*		0.6	27.5		0.1			S				x	X

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Cliff Swallow	*Petrochelidon pyrrhonota*		29.3	64.8	13.2	42.9		14.6	S				x	X
Barn Swallow	*Hirundo rustica*		28.9	40.8	23.3	21.2	32.0	31.2	S				x	X
Black-capped Chickadee	*Poecile atricapillus*		1.9	1.2	1.3	0.5	0.5	0.3	PR	82.9	33.7	30.5	x	X
Tufted Titmouse	*Baeolophus bicolor*		1.9	3.4	1.7	0.1		0.1	PR	35.3	12.3	3.5	x	X
Red-breasted Nuthatch	*Sitta canadensis*								W	1.7	2.8	2.2	x	
White-breasted Nuthatch	*Sitta carolinensis*		1.6	0.7	0.9	1.2		0.5	PR	50.5	28.0	20.8	x	X
Brown Creeper	*Certhia americana*								W	11.5	3.8	4.4	x	X
Winter Wren	*Troglodytes troglodytes*								W	5.3	1.0	1.0	x	
House Wren	*Troglodytes aedon*		20.9	16.3	12.8	10.1	11.5	19.0	S				x	X
Sedge Wren	*Cistothorus platensis*		0.8		0.1	0.6		0.3	S	2.5			x	
Marsh Wren	*Cistothorus palustris*								S	5.7			x	
Bewick's Wren	*Thryomanes bewickii*		0.1						S					
Carolina Wren	*Thryothorus ludovicianus*		1.1	3.3	0.5			0.1	PR	22.5	1.8	1.3	x	X
Golden-crowned Kinglet	*Regulus satrapa*								W	12.2	8.7	4.6	x	
Ruby-crowned Kinglet	*Regulus calendula*								T	1.8		2.0	x	
Blue-gray Gnatcatcher	*Polioptila caerulea*		0.3	0.7	0.1	0.2		0.1	S				x	X
Eastern Bluebird	*Sialia sialis*		6.4	8.5	10.1	2.3	4.0	4.2	PR	26.8	18.1	28.4	x	X
Townsend's Solitaire	*Myadestes townsendi*								W			1.0		
Hermit Thrush	*Catharus guttatus*								W	3.4		1.0	x	
Wood Thrush	*Hylocichla mustelina*		0.8	2.3	0.3				S				x	X
Swainson's Thrush	*Catharus ustulatus*								T				x	
American Robin	*Turdus migratorius*		40.9	45.4	47.5	30.1	60.0	86.8	PR	73.2	38.2	238.3	x	X

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Gray Catbird	*Dumetella carolinensis*		8.1	8.5	2.3	15.6	4.5	6.7	S	1.0	1.0	1.0	x	X
Brown Thrasher	*Toxostoma rufum*		10.9	9.2	10.1	13.2	24.5	15.6	S	1.0	1.0	3.0	x	X
Northern Mockingbird	*Mimus polyglottos*		0.7	0.2	3.7	0.4	1.0	1.6	PR	1.0	2.0		x	X
American Pipit	*Anthus rubescens*								T	2.0	1.0		x	
Sprauge's Pipt	*Anthus spragueii*								T				x	
Cedar Waxwing	*Bombycilla cedrorum*		2.0	3.3	0.9	2.8	2.0	3.9	PR	46.6	60.1	185.8	x	X
Northern Waterthrush	*Parkesia noveboracensis*								T				x	
Louisiana Waterthrush	*Parkesia motacilla*								S				x	
Lapland Longspur	*Calcarius lapponicus*								W	144.4	168.0	11.3	x	
Smith's Longspur	*Calcarius pictus*								T				x	
Indigo Bunting	*Passerina cyanea*		13.3	39.8	14.3	3.9	7.5	9.2	S				x	X
Snow Bunting	*Plectrophenax nivalis*								W	43.0	12.3	1.0	x	
Wilson's Warbler	*Cardellina pusilla*								T				x	
Tennessee Warbler	*Leiothlypis peregrina*		0.1	0.2					T				x	
Kentucky Warbler	*Geothlypis formosa*		0.8	0.3					S				x	
Mourning Warbler	*Geothlypis philadelphia*								T				x	
Hooded Warbler	*Setophaga citrina*		0.1						S					
American Redstart	*Setophaga ruticilla*		0.1	0.1				0.1	S				x	
Northern Parula	*Setophaga americana*		0.5	0.2					S				x	
Yellow Warbler	*Setophaga petechia*		1.6	4.2	0.5	0.6	0.5	3.5	S				x	X
Chestnut-sided Warbler	*Setophaga pensylvanica*								T				x	
Blackpoll Warbler	*Setophaga striata*								T				x	
Palm Warbler	*Setophaga palmarum*								T				x	

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Magnolia Warbler	*Setophaga magnolia*								T				x	
Orange-crowned Warbler	*Vermivora celata*								T				x	
Black-and-white Warbler	*Mniotilta varia*								S				x	
Nashville Warbler	*Leiothlypis ruficapilla*								T				x	X
Common Yellowthroat	*Geothlypis trichas*		11.7	15.9	14.1	24.9	11.0	23.3	S	1.7			x	X
Yellow-rumped Warbler	*Dendroica coronata*								T	3.3	2.0	7.6	x	
Prothonotary Wabler	*Protonotaria citrea*								S				x	
Ovenbird	*Seiurus aurocapilla*		0.4						S					
American Tree Sparrow	*Spizella arborea*								W	670.0	307.0	314.6	x	X
Chipping Sparrow	*Spizella passerina*		13.1	10.3	7.1	4.2	13.0	16.2	S				x	X
Clay-colored Sparrow	*Spizella pallida*								T				x	
Field Sparrow	*Spizella pusilla*		7.0	5.8	1.9	6.3	3.0	7.0	PR	1.0			x	X
Fox Sparrow	*Passerella iliaca*								W	6.4	1.3	1.0	x	X
Dark-eyed Junco	*Junco hyemalis*								W	483.7	286.5	328.5	x	X
White-crowned Sparrow	*Zonotrichia leucophrys*								W	9.1	5.0	5.7	x	X
Harris's Sparrow	*Zonotrichia querula*								W	16.9	19.5	16.4	x	X
White-throated Sparrow	*Zonotrichia albicollis*								W	15.9	8.1	10.0	x	X
LeConte's Sparrow	*Ammodramus leconteii*								T				x	
Vesper Sparrow	*Pooecetes gramineus*		2.0		1.9	0.8		5.8	S	1.0	1.0		x	X
Nelson's Sparrow	*Ammodramus nelsoni*								T				x	
Grasshopper Sparrow	*Ammodramus savannarum*		8.1	2.2	6.7	9.8	10.5	7.2	S				x	X
Henslow's Sparrow	*Ammodramus henslowii*		0.4			0.4		0.2	S					X

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Lark Sparrow	*Chondestes grammacus*		2.8	4.2	1.5		4.0	1.9	S				x	X
Savannah Sparrow	*Passerculus sandwichensis*		0.1						W	2.7	1.7		x	X
Song Sparrow	*Melospiza melodia*		5.6	1.4	8.0	17.7	2.5	11.6	PR	76.8	11.3	4.5	x	X
Lincoln's Sparrow	*Melospiza lincolnii*								T	2.2	1.0		x	X
Swamp Sparrow	*Melospiza georgiana*								W	30.0	1.4	1.5	x	
Yellow-breasted Chat	*Icteria virens*		0.2	0.9					S				x	X
Spotted Towhee	*Pipilo maculatus*								W	2.0			x	
Eastern Towhee	*Pipilo erythrophthalmus*		3.0	4.2	0.3	1.4		0.8	PR	1.6	1.0		x	X
Summer Tanager	*Piranga rubra*		0.5	1.0	0.4				S				x	
Scarlet Tanager	*Piranga olivacea*		0.4	0.2		0.1			S					
Northern Cardinal	*Cardinalis cardinalis*		18.6	22.2	14.9	5.2	24.5	18.8	PR	157.4	91.4	56.1	x	X
Rose-breasted Grosbeak	*Pheucticus ludovicianus*		8.4	7.4	0.9	1.4	1.5	4.3	S				x	X
Blue Grosbeak	*Passerina caerulea*		0.1	1.5	0.1				S				x	X
Bobolink	*Dolichonyx oryzivorus*		1.4	0.2	1.1	15.2			S				x	X
Eastern Meadowlark	*Sturnella magna*		4.7	6.2	10.3	13.7	3.5	2.6	PR	13.1	2.5		x	X
Western Meadowlark	*Sturnella neglecta*		22.1	0.1	24.5	14.3	63.5	8.8	PR	17.5	9.4	16.0	x	X
Orchard Oriole	*Icterus spurius*		6.8	15.9	1.3	1.1	6.5	48.2	S				x	X
Baltimore Oriole	*Icterus galbula*		12.9	20.1	7.9	2.6	14.0	3.8	S				x	X
Red-winged Blackbird	*Agelaius phoeniceus*		66.4	42.2	86.3	174.6	212.0	10.6	PR	256659.2	180.7	202.0	x	X
Yellow-headed Blackbird	*Xanthocephalus xanthocephalus*			0.5				173.1	T	1.0			x	
Rusty Blackbird	*Euphagus carolinus*								W	10.2	24.8	39.5	x	
Brewer's Blackbird	*Euphagus cyanocephalus*								T	20.5		4.0	x	X
Brown-headed Cowbird	*Molothrus ater*		28.8	31.4	23.4	31.2	32.0	39.6	PR	44.0	47.5	17.7	x	X

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Common Grackle	*Quiscalus quiscula*		26.1	37.7	40.1	17.9	56.0	46.7	PR	21783.9	10.8	7.0	x	X
Great-tailed Grackle	*Quiscalus mexicanus*			0.5	0.3	0.4			PR	363.4			x	
House Finch	*Carpodacus mexicanus*		2.6	2.4		0.1		0.8	PR	21.6	29.2	32.8	x	
Purple Finch	*Carpodacus purpureus*								W	5.4	3.6	15.8	x	
Red Crossbill	*Loxia curvirostra*								W			1.0		
Common Redpoll	*Acanthis flammea*								W	1.5				
Pine Siskin	*Spinus pinus*								W	2.3	20.0	1.0	x	
American Goldfinch	*Spinus tristis*		19.0	17.2	10.3	13.2	15.0	14.3	PR	71.7	56.3	62.5	x	X
Dickcissel	*Spiza americana*		55.5	42.5	60.5	53.4	128.0	115.8	S				x	X

Sources: Audubon 2018a; eBird 2019; Pardieck et al. 2016, Jacobs 2003,
Key:
BGEPA = Protected under the Bald and Golden Eagle Protection Act
Mo-E = State-listed Endangered Species
MO SCC = Missouri Species of Conservation Concern

PR = Permanent Resident
S= Summer Resident
T= Transient Migrant
W= Winter Resident

Appendix F ACOUSTIC BAT MONTHLY DATA SUMMARY

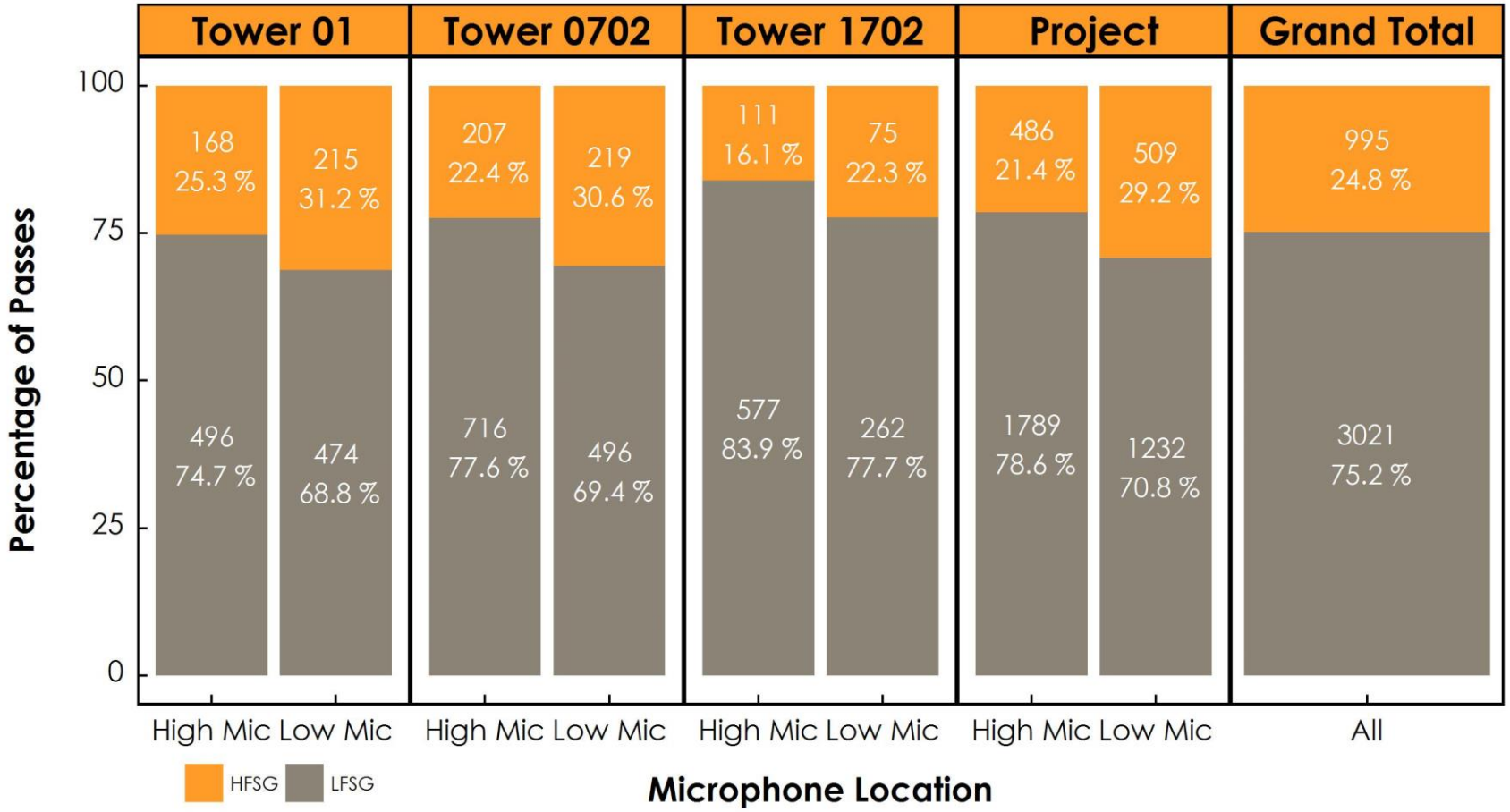
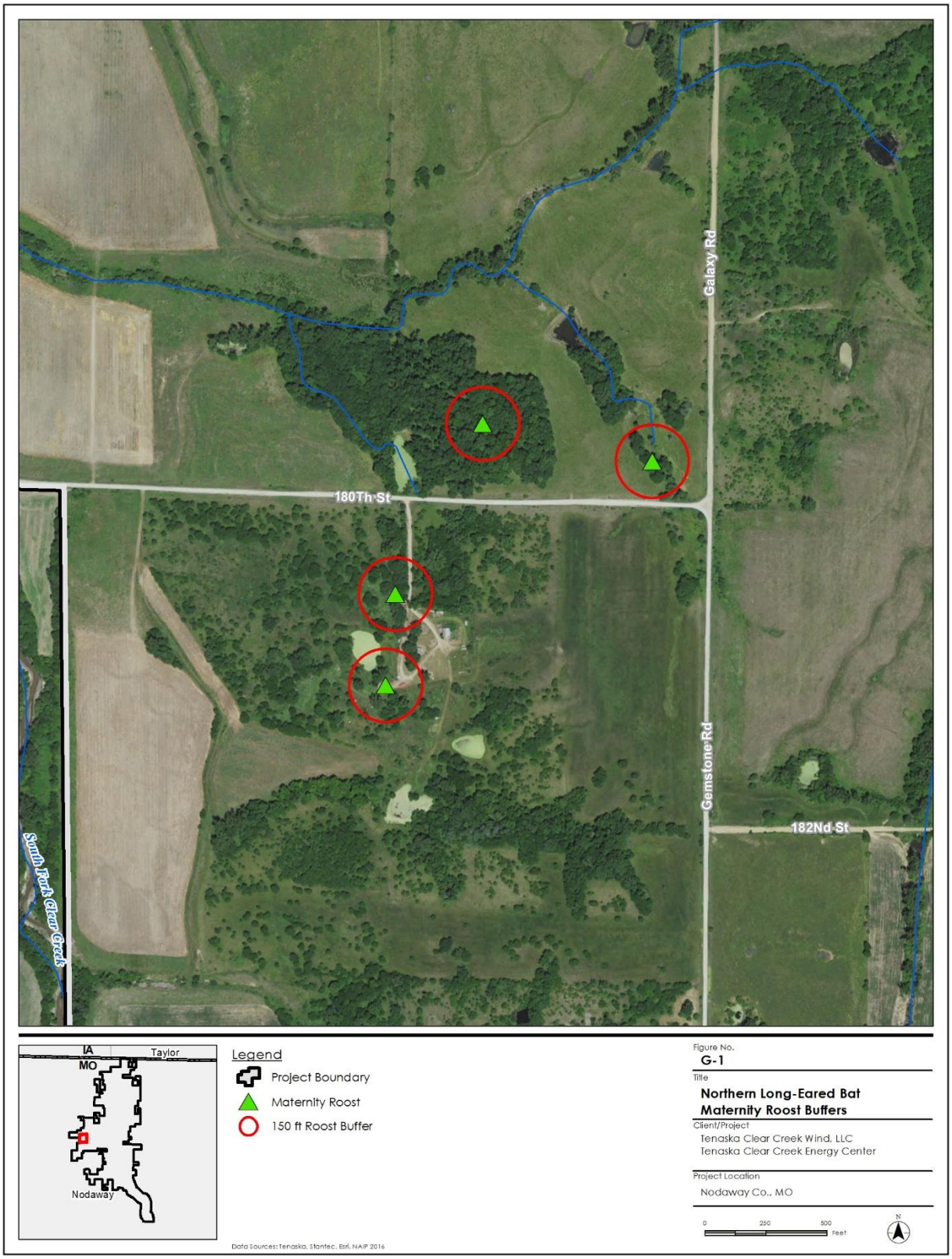
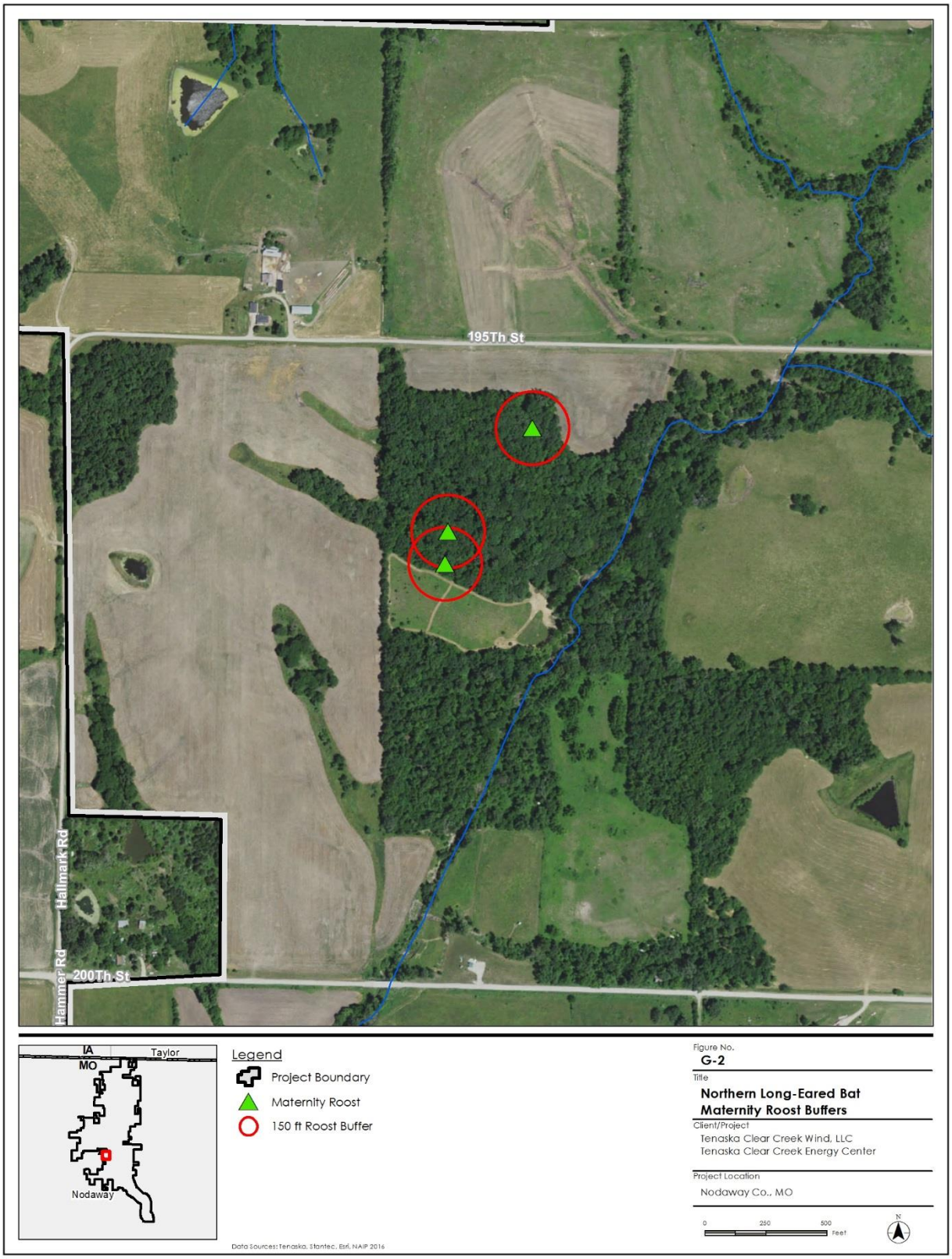
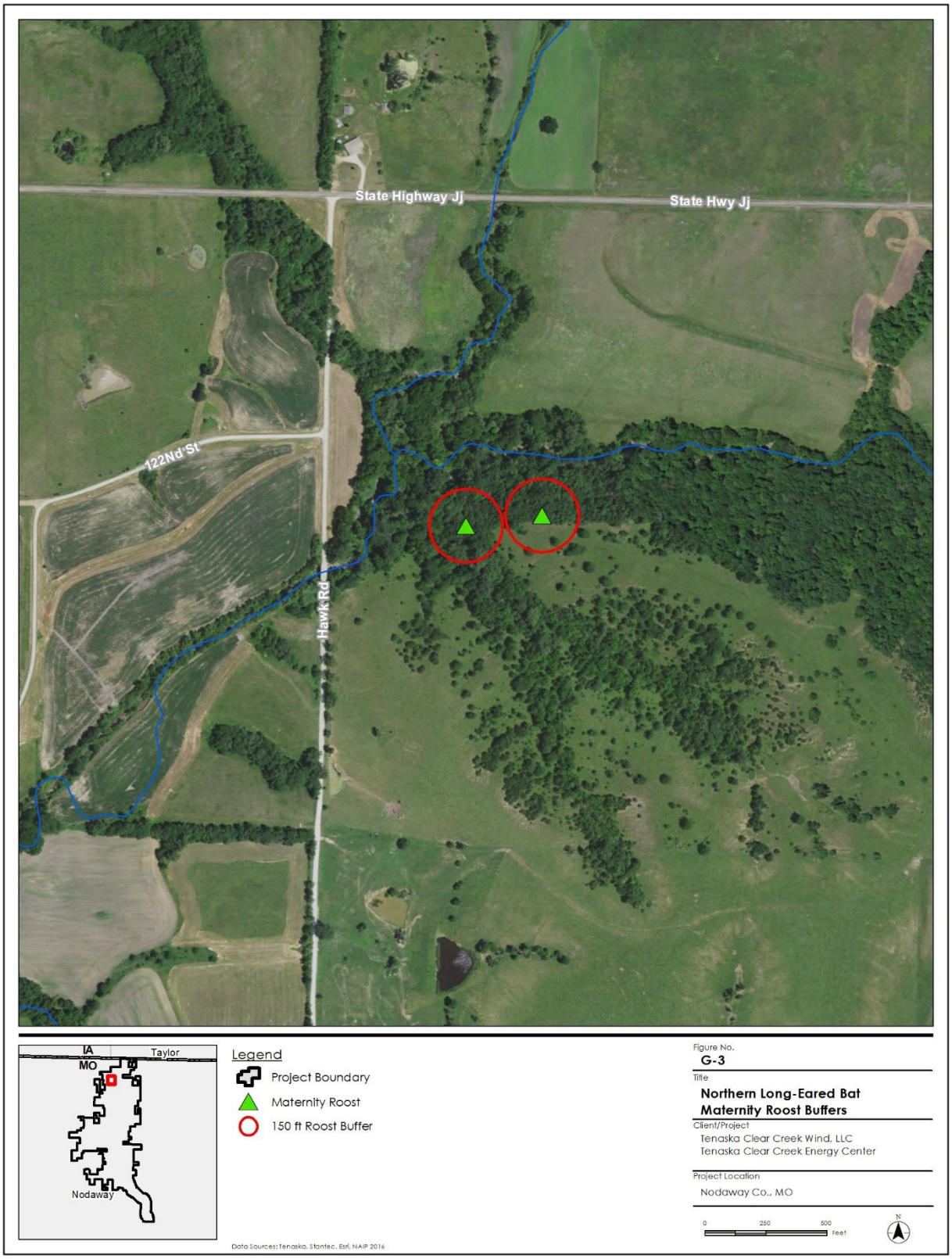


Figure F-1 Species Group Composition by Location

Appendix G BAT ROOST LOCATION FIGURES


Galaxy Rd
180Th St
Gemstone Rd
182Nd St
South Fork Clear Creek
IA
MO
Taylor
Nodaway
Legend
Project Boundary
Maternity Roost
150 ft Roost Buffer
Figure No.
G-1
Title
Northern Long-Eared Bat
Maternity Roost Buffers
Client/Project
Tenaska Clear Creek Wind, LLC
Tenaska Clear Creek Energy Center
Project Location
Nodaway Co., MO
0
250
500
Feet
N
Data Sources: Tenaska, Stantec, Esri, NAIP 2016


195Th St
Hallmark Rd
Hammer Rd
200Th St
IA
MO
Taylor
Nodaway
Legend
Project Boundary
Maternity Roost
150 ft Roost Buffer
Figure No.
G-2
Title
Northern Long-Eared Bat
Maternity Roost Buffers
Client/Project
Tenaska Clear Creek Wind, LLC
Tenaska Clear Creek Energy Center
Project Location
Nodaway Co., MO
0
250
500
Feet
N
Data Sources: Tenaska, Stantec, Esri, NAIP 2016


State Highway Jj
State Hwy Jj
122Nd St
Hawk Rd
IA
MO
Taylor
Nodaway
Legend
Project Boundary
Maternity Roost
150 ft Roost Buffer
Figure No.
G-3
Title
Northern Long-Eared Bat
Maternity Roost Buffers
Client/Project
Tenaska Clear Creek Wind, LLC
Tenaska Clear Creek Energy Center
Project Location
Nodaway Co., MO
0
250
500
Feet
N
Data Sources: Tenaska, Stantec, Esri, NAIP 2016

Appendix H WILDLIFE INCIDENT REPORTING FORM

Example Bird and Bat Reporting Form

SECTION NO. 1 – DISCOVERY DATA

Date Animal Discovered/ Sighted: _____

Animal Status (circle)**: Injury** **Fatality** **Live Sighting** (At-Risk Bird Species)

Number of Animals/Carcasses Observed: _____

Animal/Carcass (circle)**: Complete** **Dismembered** **Feathers**
(Complete would indicate a complete and intact carcass or live/injured animal. Dismembered would indicate a missing or amputated wing or other appendage. Feathers would indicate only feathers were found.)

Notified Operations Supervisor (Name): _____
Date: _____ **Time:** _____

SECTION NO. 2 – LOCATION OF FIND

Structure: _____
(Include turbine number, street name/number, or other landmark feature if no facility is nearby)

Location Remarks:

_____

_____
(Include closest turbine number, distance from turbine, and general direction [for ex., 50 feet south of turbine A-1]. Include any other details, such as –found on the road, power lines overhead, etc.)

SECTION NO. 3 – WILDLIFE IDENTIFICATION

Species: _____
(If known, write the species. If not sure, write Unidentified. **If bird observed is listed on the At-Risk Bird Identification Guide, contact biologist to confirm identification**. Refer to **Bird and Bat Reporting System Guide** for contact information.)

Field identification marks used:

_____

_____
(Identification marks that helped you determine the species of the bird, if you are not sure and have an educated guess, write it here. For example, "red tail and white chest".

Sex (circle)**:** Male Female Unknown

Age (circle)**:** Juvenile Adult Unknown

Number of Photos Attached: _____
(Print digital photos and attach to Bird and Bat Reporting Form)

SECTION NO. 4 – OBSERVATIONAL DATA

Weather (at time of discovery/sighting)**:**
Temperature:_____°F
Precipitation:_____[Record as N (none), L (light), M (moderate), H (heavy), F (fog)]
Snow Cover:_____% of ground covered

FOR A LIVE SIGHTING:

Behavior:

_____

(Describe the behavior at the time of sighting: flying overhead, perched on powerline, scavenging on the ground, etc.)

FOR AN INJURY/FATALITY:

Physical condition: _____

_____

(Describe the physical condition at the time of discovery: obvious injuries, decomposition status, skeleton visible?, parasites?, etc.)

Estimated Time since Death or Injury (days):_____(<1, <4, <7, <14, <30, >30) (Use your best judgment. Carcasses less than a few days old will have round, fluid filled eyes and will lack insect infestation. Carcasses with maggots are probably one to two weeks old. If bones are visible, the carcass is probably over 30 days old. Keep in mind that in cold weather carcasses will look fresh for much longer than in warmer weather.)

Final Carcass Possession: _____
(USFWS/MDC Agent took possession, preserved at operations building, left in the field)

Other Field Notes:

_____

_____

(Note anything else relevant to incident such as final sighting of live animal [i.e., observed flying south through project], presence of other fatalities in the area, evidence of electrocution details, or other applicable information)

Form Completed by: Name: _____

Signature: _____

Date: _____

Operations Manager should immediately email a copy of the Bird and Bat Reporting Form to Tenaska Permitting Department:

[ADD Project Proponent Contact Information HERE]

Disclaimer: All discoveries/sightings of federal- or state-protected species are subject to confirmation by a trained biologist.

Species identification confirmed by: Name:_____Date_____