Appendix K

Revised

Bird and Bat Conservation Strategy

Big Bend Wind, LLC
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Bird and Bat Conservation Strategy

for the Big Bend Wind Project

Prepared for Big Bend Wind, LLC
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ACRONYMS AND ABBREVIATIONS

ac	acres
AMMs	Avoidance and Minimization Measures
BBCS	Bird and Bat Conservation Strategy
BGEPA	Bald and Golden Eagle Protection Act
Big Bend Wind	Big Bend Wind, LLC
BMPs	best management practices
ECPG	Eagle Conservation Plan Guidance
ESA	Endangered Species Act
ft	foot, feet
ha	hectares
HF	high frequency
IBA	Important Bird Area
IPaC	Information, Planning and Consultation
kHz	kiloHertz
km	kilometer(s)
LF	low frequency
MBS	Minnesota Biological Survey
MBTA	Migratory Bird Treaty Act
met	meteorological
mi	mile(s)
min	minute(s)
MNDOC	Minnesota Department of Commerce – Energy and Environmental Review & Analysis Unit
MNDNR	Minnesota Department of Natural Resources
MW	megawatts
NHIS	Natural Heritage Information System
NLEB	northern long-eared bat
NWI	National Wetlands Inventory
Project	Big Bend Wind Project
RSH	rotor-swept-height
USEPA	US Environmental Protection Agency
USFWS	US Fish and Wildlife Service
WEG	Land-Based Wind Energy Guidelines
WEST	Western EcoSystems Technology, Inc.
WIRS	Wildlife Incident Reporting System
WTGs	wind turbine generators

1 INTRODUCTION

1.1 Purpose of the Bird and Bat Conservation Strategy

Big Bend Wind, LLC (Big Bend Wind) is developing the Big Bend Wind Project (Project) in Cottonwood and Watonwan counties, Minnesota. Consistent with the tiered approach presented in the US Fish and Wildlife Service (USFWS) *Land-Based Wind Energy Guidelines* (WEG; USFWS 2012) and the *Eagle Conservation Plan Guidance* (ECPG; USFWS 2013), Big Bend Wind has completed a variety of bird and bat studies to evaluate risk in coordination with the USFWS and Minnesota Department of Natural Resources (MNDNR). These studies and resulting recommendations from USFWS and MNDNR staff have been used to inform development of appropriate impact avoidance, minimization, monitoring, and adaptive management measures for the Project.

The purpose of this Bird and Bat Conservation Strategy (BBCS) is to document Big Bend Wind's compliance with relevant wildlife laws and regulations by adhering to the processes outlined in the WEG and ECPG for developing, constructing, and operating wind energy projects, and to explain the analyses, studies, and reasoning that support progressing from one tier to the next in the tiered approach presented in the WEG. The Tier 4 monitoring program has been designed to evaluate collision risk and an Adaptive Management Plan to respond to findings, if necessary, is also presented. This BBCS also documents the measures to be implemented during siting, construction, and operations that avoid and minimize impacts to federal and state-listed bats so that no permit is warranted for the Project to proceed to construction and operations.

1.2 Facility Description

The Project is located in Cottonwood and Watonwan counties, Minnesota (**Figure 1.1**), and will include the construction and operation of up to 52 wind turbine generators (WTGs), ranging from 5.8 megawatts (MW) to 6.0 MW in capacity, for a Project nameplate capacity of up to 300 MW. In addition to the WTGs, Project facilities will include access roads, an underground electrical collection system, a collector substation, a step-up substation, one permanent meteorological (met) tower, an operations and maintenance building, and one temporary construction laydown area that will be reclaimed after construction is complete. The Project will interconnect to an existing 345-kilovolt (kV) transmission line via an approximately 18-mile (mi) 161 kV aboveground transmission line between the collector substation and Xcel Energy's Crandall Switching Station located at the south end of the Project. A temporary construction laydown area will be used to store construction trailers, equipment, and a portable batch plant if needed, with the majority of the laydown area reclaimed prior to the commencement of operations.

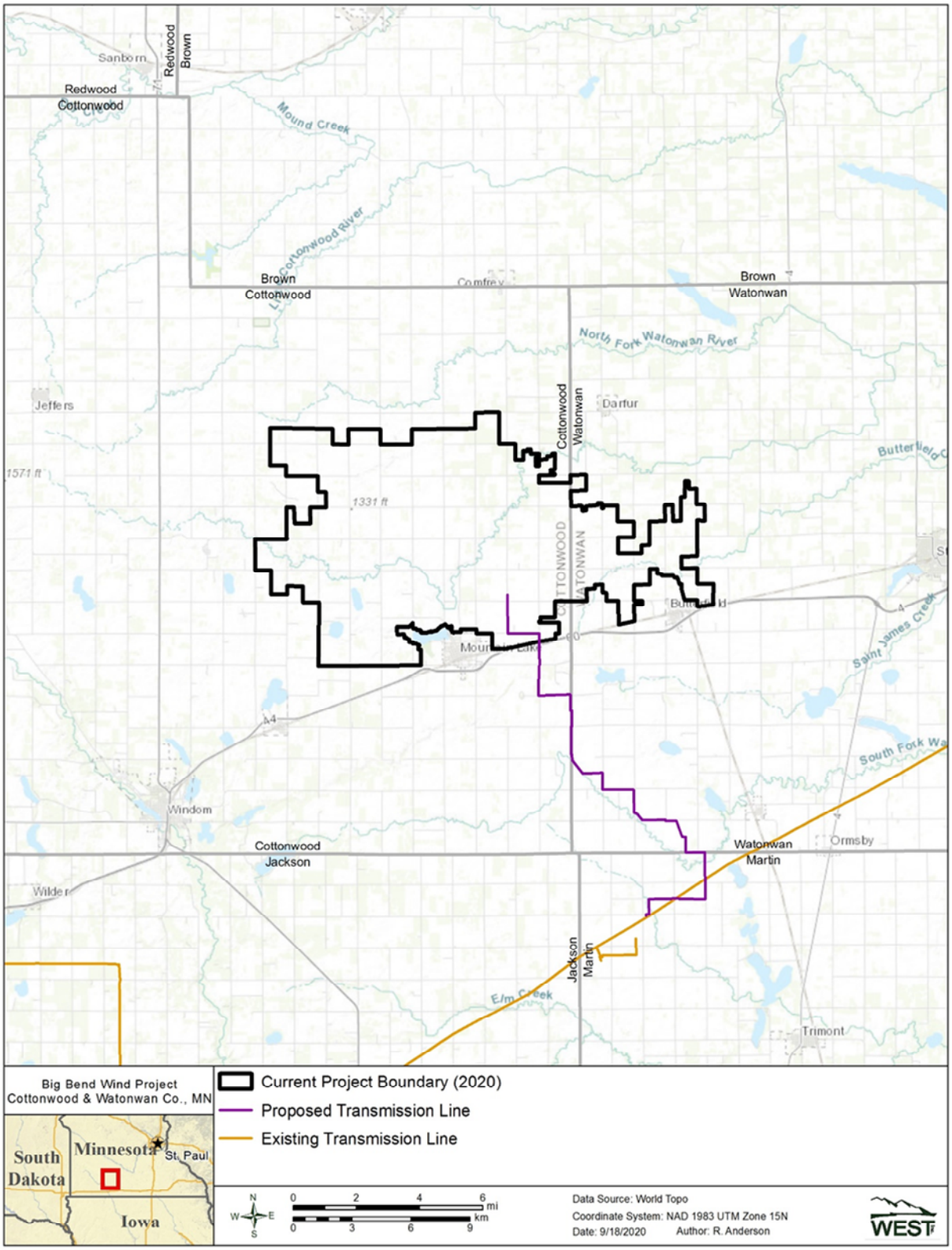

Figure 1.1. Location of the Big Bend Wind Project in Cottonwood and Watonwan counties, Minnesota.

1.3 Environmental Setting and Habitat

The 43,518 acres (ac) Project area is located within the Des Moines Lobe Level IV Ecoregion, within the Western Corn Belt Plains Level III Ecoregion (US Environmental Protection Agency [USEPA] 2017), which covers much of Iowa and portions of southern Minnesota and eastern Nebraska. This ecoregion is characterized by glaciated till plains and undulating loess plains. Much of the region was originally dominated by tallgrass prairie, riparian forest, oak-prairie savannas, and woody and herbaceous wetlands. Today, most of the area has been cleared for farms producing corn (*Zea mays*), soybeans (*Glycine max*), and livestock (USEPA 2017). Many smaller streams in this ecoregion have been tilled, ditched, and tied into existing drainage systems, resulting in a reduction in wetland and aquatic habitats (USEPA 2017). The dominant land cover types within the current Project boundary are cultivated crops (92.4%) and developed areas (3.6%; **Table 1.1**; **Figure 1.2**). Herbaceous, emergent herbaceous wetlands, open water, hay/pasture, deciduous forest, mixed forest, barren land, woody wetlands, evergreen forest and shrub/scrub make up the remainder (4.0%) of land cover types within the current Project area (National Land Cover Database 2016).

Table 1.1. Land cover types and composition within the Big Bend Wind Project in Cottonwood and Watonwan counties, Minnesota.

Habitat	Acres	Percent Composition
Cultivated Crops	40,222	92.4
Developed	1,586	3.6
Hay/Pasture	439	1.0
Emergent Wetlands	379	0.9
Open Water	360	0.8
Herbaceous	252	0.6
Deciduous Forest	142	0.3
Mixed Forest	83	0.2
Barren Land	38	0.1
Woody Wetlands	15	<0.1
Shrub/Scrub	1	<0.1
Total*	**43,518**	**100**

Data were obtained from the National Land Cover Database (2016).* Totals may vary based on rounding.

Consistent with recommendations in Tier 1 and Tier 2 of the WEG, the Project is sited in a landscape that generally avoids natural habitats that are considered high quality and regionally significant, such as riparian woodlands, oak (*Quercus* spp.) woodlands, and native grasslands that may support comparatively greater bird and bat abundance and species diversity than habitats within the Project area.

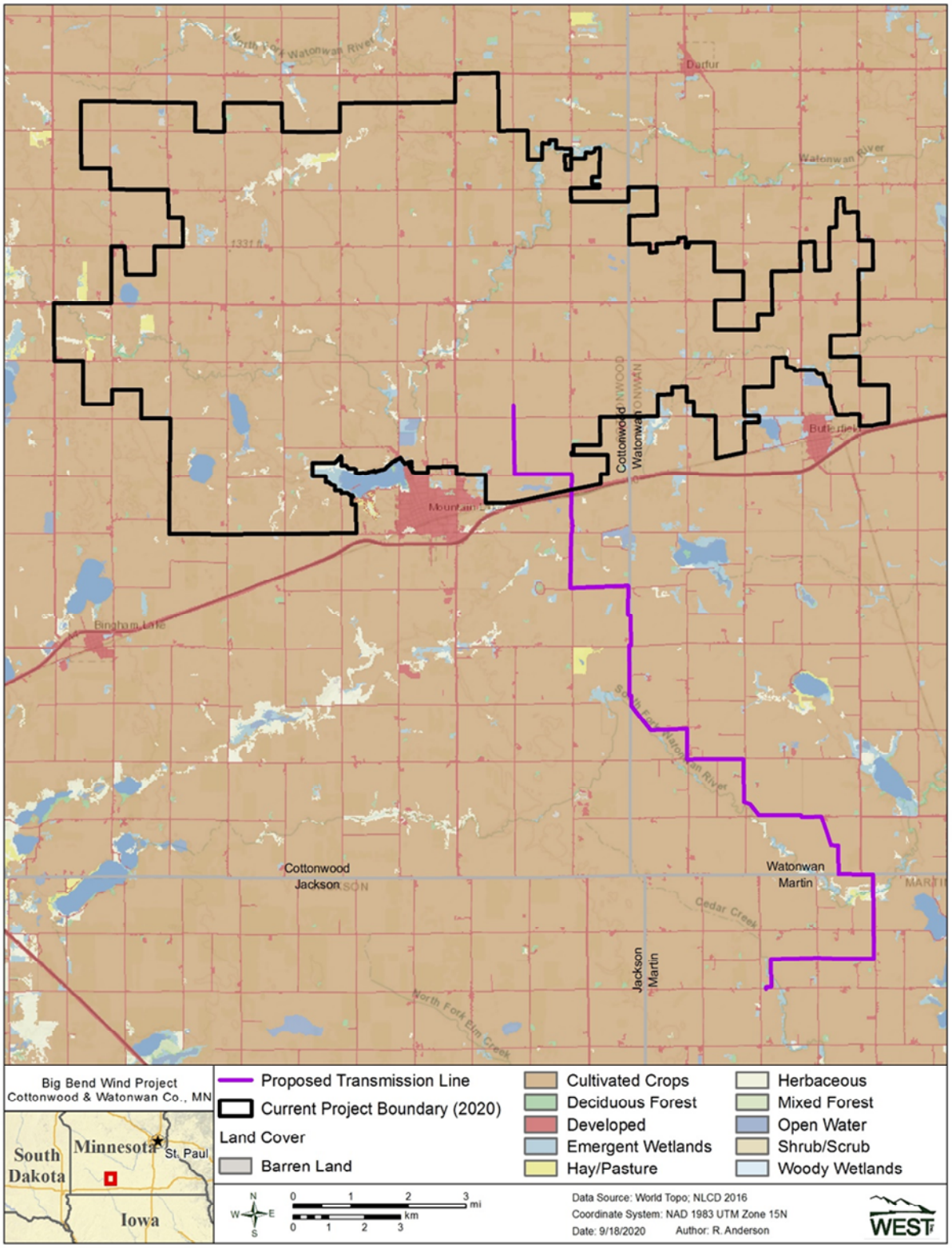

Figure 1.2. Land cover and composition within the Big Bend Wind Project boundary, in Cottonwood and Watonwan counties, Minnesota.

1.4 Background and Consultation History

Project development was initiated by Big Bend Wind in early November 2017 within a 250,460 ac area that included portions of Cottonwood, Watonwan, Brown, and Martin counties, Minnesota (Original Assessment Area; **Figure 1.3**). The Project boundary changed several times throughout the development process. The Original Assessment Area was reduced to 103,923 ac in mid-November 2017 (2017 Project Boundary; **Figure 1.3**). In March 2018, the Project boundary was expanded to include an additional area to the south to provide flexibility based on initial stakeholder concerns and landowner feedback (2018 Project Boundary; **Figure 1.3**). In March 2019, the Project boundary was reduced to focus on agricultural land south of Jeffers and to exclude waterbodies and other areas which provide habitat for species of concern (2019 Project Boundary; **Figure 1.3**). In early 2020, the boundary expanded east into Watonwan County in response to stakeholder feedback and was then further reduced in size, resulting in the final and current boundary encompassing 43,518 ac (Current Project Boundary; **Figure 1.3**).

Tier 1 and 2 studies were completed for the Original Assessment Area and the 2017 Project Boundary. Tier 3 studies were initiated in November 2017 by Western EcoSystems Technology, Inc. (WEST) and Copperhead Environmental Consulting Inc., (Copperhead) throughout the Project area and were completed in February 2021. The spatial extent of the Tier 3 studies was adapted in response to the Project boundary changes as they occurred in order to consistently capture and represent the Project in its current state. The purpose of these studies was to characterize the avian, bat and vegetation communities, assess potential risks to wildlife, and inform Project siting.

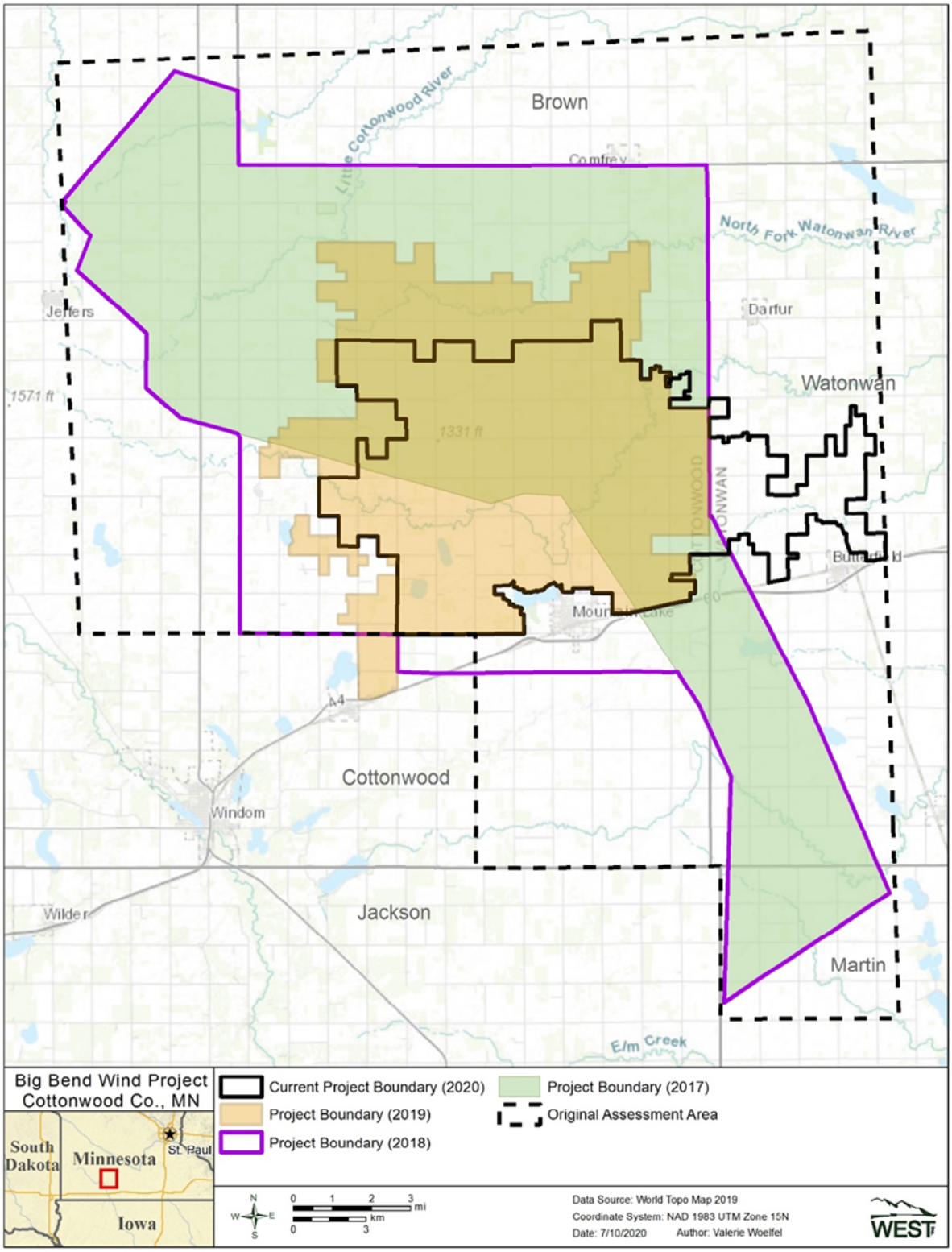

Figure 1.3. Boundary changes for the Big Bend Wind Project in Cottonwood and Watonwan counties, Minnesota.

Consistent with recommendations in the USFWS WEG and ECPG for agency consultation, Big Bend Wind has communicated on a regular basis with the USFWS and MNDNR regarding birds, bats, and other environmental topics, as illustrated in **Table 1.2**.

Table 1.2. Background and agency coordination milestones for the proposed Big Bend Wind Project.

Date	Subject
November 2, 2017	Big Bend Wind requested data from US Fish and Wildlife Service (USFWS) regarding listed bat roosts and hibernacula, eagle nests, and any other federally listed species that are known to occur within 10 miles of the Original Assessment Area.
November 2, 2017	Big Bend Wind submitted Natural Heritage Information System (NHIS) data request to Minnesota Department of Natural Resources (MNDNR) using the Original Assessment Area.
December 18, 2017	MNDNR provided the Natural Heritage Review of the Original Assessment Area.
December 19, 2017	Big Bend Wind met with USFWS and MNDNR to evaluate the results of the completed Tier 1 and Tier 2 analysis and assess the Tier 3 study plan.
February 2, 2018	Big Bend Wind provided Biological Study Plan to MNDNR for review/approval.
April 5, 2018	MNDNR approved Biological Study Plan.
March 14, 2019	Big Bend Wind provided copies of Tier 3 wildlife studies to USFWS and MNDNR and requested to set up a meeting with both agencies.
April 19, 2019	Big Bend Wind and Western EcoSystems Technology, Inc. (WEST) met with MNDNR to evaluate the results of the completed studies.
April 24, 2019	Big Bend Wind and WEST communicated with USFWS via conference call to evaluate the results of the completed studies.
May 8, 2020	Big Bend Wind requests comment from MNDNR on the Project as part of the state permitting process.
July 7, 2020	MNDNR provides comments on the Big Bend Wind Project in advance of the Big Bend Wind submitting an application for a large wind energy conversion system permit.
November 10, 2020	Big Bend Wind and WEST had a teleconference with USFWS and MNDNR to provide an update on the Project and studies completed to date, confirm avoidance and minimization measures, and discuss permitting timeline.

1.5 Key Avian and Bat Laws, Regulations, Authorizations

The federal regulatory framework for protecting birds includes the Endangered Species Act of 1973, as amended (ESA), the Migratory Bird Treaty Act (MBTA), the Bald and Golden Eagle Protection Act (BGEPA) of 1940, and Executive Order (EO) 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds* of 2001. The MBTA prohibits the take of migratory birds and does not include provisions for allowing unauthorized take; however, no permit to authorize take of MBTA protected species is available. Take is defined under the MBTA as pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, destroy, molest, disturb, or otherwise harm migratory bird species protected by MBTA, their nests, or their eggs. EO 13186 orders federal agencies, who may affect migratory birds directly or indirectly, to work with other federal agencies to support the conservation of migratory bird populations (2001).

The Minnesota threatened and endangered species list, as administered by the MNDNR, includes any species or subspecies of animal or plant designated as endangered or threatened pursuant to the federal ESA, as well as those species designated as threatened or endangered by the Commissioner of Natural Resources. Under Minnesota Statute 84.0895 Protection of Threatened and Endangered Species, it is unlawful to "take, import, transport, or sell any portion of an endangered species of wild animal or plant, or sell or possess with intent to sell an article made with any part of the skin, hide, or parts of an endangered species of wild animal or plant" unless the commissioner issues a permit for an otherwise prohibited act (Minnesota Statutes, section 84.0895, 2019b). Minnesota Statute 84.0895 states that on certain types of cropland, plants destroyed as a result of certain farming practices are exempt, along with the accidental destruction of listed plants where the plant was not known to exist (2019b).

The key federal, state, and local approvals and reviews for avian and bat species are presented in **Table 1.3**.

Table 1.3. Big Bend Wind Project: Key avian and bat laws, regulations, and authorizations.

Jurisdiction/ Agency	Permit/Consultations	Trigger/Nexus	Comments
US Fish and Wildlife Service (USFWS)	Endangered Species Act of 1973 (ESA) Section 7 or 10 Consultation/Biological Opinion; Incidental Take Permitting	Potential take of federally listed species or their habitats	Big Bend Wind completed baseline surveys and consulted with USFWS to evaluate potential impacts on ESA-protected species. **Completed Tier 3 studies suggest relatively low risk to federal ESA-protected species from the Project.**
	Planning under the Migratory Bird Treaty Act of 1918 (MBTA)	Potential take of migratory birds (no permits available)	Big Bend Wind completed baseline documentation of avian use to evaluate potential impacts on MBTA-protected species and to develop impact avoidance and monitoring measures at the Project. **This BBCS is developed consistent with the USFWS WEG to avoid and minimize impacts to MBTA-protected species.**

Table 1.3. Big Bend Wind Project: Key avian and bat laws, regulations, and authorizations.			
Jurisdiction/ Agency	**Permit/Consultations**	**Trigger/Nexus**	**Comments**
	Planning under the Bald and Golden Eagle Protection Act of 1940	Potential take of bald or golden eagles.	Big Bend Wind completed baseline studies to evaluate potential impacts to eagles. **This BBCS is developed consistent with the ECPG to avoid and minimize impacts to bald eagles. Golden eagles are unlikely to occur at the Project on a regular basis.**
Minnesota Department of Natural Resources	Minnesota Endangered Species Statute 84.0895 Protection of Threatened and Endangered Species	Potential take of Minnesota ESA-protected species.	Big Bend Wind completed baseline surveys to evaluate potential impacts to state-listed species. **Survey results suggest relatively low risk to Minnesota ESA-protected species.**
Local	None	-	No Cottonwood or Watonwan County regulations pertain to wind energy development and wildlife.

2 SITE CHARACTERIZATION AND BASELINE STUDIES (TIERS 1, 2, & 3)

2.1 Preliminary Site Evaluation and Characterization (Tiers 1 and 2)

2.1.1 Tier 1

Tier 1 of the WEG calls for an initial screening of the broad geographic area in which a project is proposed to be located. Such screening is useful for identifying regions where wind energy development poses significant risks to species of concern and their habitats, including the fragmentation of large-scale habitats and threats to regional populations of federally or state-listed species; for screening a landscape or set of multiple potential sites to avoid those with the highest habitat values; and for beginning to determine if a single identified potential site poses serious risk to species of concern or their habitats (USFWS 2012).

Initial development of this Project began in 2017 and focused on an approximately 250,460 ac area of interest (Original Assessment Area) in Cottonwood, Watonwan, Brown, and Martin counties (**Figure 1.3**). As part of the preliminary site evaluation, a desktop review was completed to evaluate types of habitat within the area and identify areas with reduced potential for species of concern. In addition, preliminary agency input was requested from USFWS and MNDNR regarding any instances of federally and state-listed animals and plants, natural communities, and other species of concern or significant habitats that occur within the initial area of interest (**Table 1.2**).

The land cover within the Original Assessment Area is primarily cultivated crops; however, there are a few limited wooded areas, native plant communities, and wetlands present that have the potential to support a variety of wildlife and plant species, including migratory birds, bats, and

other listed or species of concern. There are no comparatively large areas of intact native habitats and relatively few habitat- or topographic-based attractants to concentrate species of concern.

Conservation lands, such as the Des Moines River IBA and Heron Lake IBA are located to the southwest of the Original Assessment Area. In addition, native plant communities, sites of biodiversity significance, and Minnesota Biological Survey (MBS) areas are located within the Original Assessment Area. However, these areas were avoided in subsequent Project boundaries as Big Bend Wind progressed through the tiered process of the WEG during project development.

Although the Watonwan River intersects the central portion of the Original Assessment Area, lakes, ponds, and forested/shrub-scrub wetlands are primarily in the southern portion, while riverine habitats and emergent wetlands are distributed throughout. Big Bend Wind is committed to avoiding and minimizing impacts to wetlands and waterbodies per US Army Corps of Engineers and Public Waters Inventory permit standards.

2.1.2 Tier 2

Following the Tier 1 evaluation, the Project boundary was reduced and a Tier 2 evaluation was conducted. While the Tier 2 evaluation was conducted using the 2017 Project boundary, the results are representative of the current Project boundary because the areas overlap substantially and because the type of assessment occurs at the landscape level. A discussion of minor differences between 2017 Project boundary and current Project boundary can be found in **Section 3 Discussion and Impact Analysis**.

In accordance with Tier 2 of the WEG, a further review of readily available desktop information was completed by Big Bend Wind in November 2017 within the 2017 Project boundary that overlapped portions of Cottonwood, Watonwan and Martin Counties to assess potential adverse effects to wildlife and their habitats. Data sources included federal and state agency personnel; USFWS Information, Planning and Consultation (IPaC) system website, State of Minnesota websites (e.g., MNDNR Endangered, Threatened, and Special Concern Species; MNDNR Areas of Biodiversity Significance; MNDNR Native Plant Communities); US Geological Survey Breeding Bird Survey; aerial imagery; and non-governmental organization websites (e.g., Audubon Society, American Wind Wildlife Institute Landscape Assessment Tool, e-Bird, Cornell Lab of Ornithology, Hawk Migration Association of North America).

A review of federally listed species with the potential to occur within the 2017 Project boundary was completed using the USFWS IPaC system on November 14, 2017. Results of this search included the federally endangered Poweshiek skipperling (*Oarisma poweshiek*), and the federally threatened northern long-eared bat (NLEB; *Myotis septentrionalis*), Dakota skipper (*Hesperia dacotae*) and prairie bush clover (*Lespedeza leptostachya*). In addition, 16 birds of conservation concern were listed in the USFWS IPaC report on November 14, 2017 as potentially occurring within the 2017 Project boundary (**Table 2.1**).

Table 2.1. Birds of conservation concern, by habitat type and season, with potential to occur within the 2017 Project boundary.

Grassland	Marsh/Waterbodies	Open Woodlands/Shrub	Forest
American golden-plover (m)	Black tern (b)	Red-headed woodpecker (yr)	Black-billed cuckoo (b)
Bobolink (b)	Dunlin (m)		Long-eared owl (w)
Buff-breasted sandpiper (m)	Franklin's gull (m)		
Smith's longspur (m)	Hudsonian godwit (m)		
	Lesser yellowlegs (m)		
	Ruddy turnstone (m)		
	Semipalmated sandpiper (m)		
	Short-billed dowitcher (m)		
	Willet (b)		

b = breeding, w = wintering, yr = year round, m = migrating.

Source: All About Birds (2017), US Fish and Wildlife Service Information, Planning and Consultation (2017) search of Project Boundary.

A review of state-listed species with potential to occur within Cottonwood, Watonwan, and Martin counties was completed using the MNDNR Rare Species Guide on November 17, 2017. Six state-endangered and three state-threatened species were identified as potentially occurring: the state-endangered king rail (*Rallus elegans*), Henslow's sparrow (*Ammodramus henslowii*), burrowing owl (*Athene cunicularia*), loggerhead shrike (*Lanius ludovicianus*), Poweshiek skipperling, and Dakota skipper; and the state-threatened Wilson's phalarope (*Phalaropus tricolor),* Blanding's turtle (*Emydoidea blandingii*), and eastern spotted skunk (*Spilogale putorius*).

The Tier 2 site characterization study also evaluated potential impacts to avian and bat populations not considered sensitive or special status, including waterfowl/waterbirds, grassland birds, diurnal raptors, and bats. Results from this study concluded that use of the Project area (2017 and current boundary) by raptors in general was likely at low densities, use by golden eagles (*Aquila chrysaetos*) was minimal, and use by bald eagles (*Haliaeetus leucocephalus*) was likely at low to moderate levels. Utilization of any open water by waterfowl/waterbirds during migration is likely. Limited native prairie and few grassland areas onsite will provide minimal suitable habitat for grassland birds. Despite relatively little forested habitat within the Project area, tree-roosting bats are likely to be present in and near potentially suitable forested tracts.

Results of the site evaluation and characterization analysis of the 2017 Project boundary which are representative of the current Project boundary are presented in **Table 2.2** below. This information was reviewed with USFWS and MNDNR (December 19, 2017) and a Tier 3 Biological Study Plan was agreed upon for implementation based on this review, as discussed in the next section.

Table 2.1. Evaluation and characterization of the Big Bend Wind Project: Responses to questions posed in Tier 1 and Tier 2 of the 2012 Wind Energy Guidelines.

Question	Response
Are known species of concern present on the proposed site, or is habitat (including designated critical habitat) present for these species?	No federally or state-designated critical habitat occurs within the Project area. The federally threatened northern long-eared bat (*Myotis septentrionalis*; NLEB) has the potential to occur in the Project area. The federally threatened Prairie bush clover (*Lespedeza leptostachya*) is unlikely to occur in the Project area due to limited suitable tallgrass prairie habitat. Nine state-listed species have the potential to occur within the Project area. Burrowing owl (*Athene cunicularia*; state endangered) is rare in Minnesota and therefore unlikely to occur. Loggerhead shrike (*Lanius ludovicianus*; state endangered) is unlikely to occur given that recent observations of this species have been limited to only Dakota and Clay counties, Minnesota. Henslow's sparrow (*Ammodramus henslowii*; state endangered) may occur, although their preferred habitat of uncultivated grasslands and old fields is limited within the Project area. King rail (*Rallus elegans*; state endangered) has the potential to occur; however, limited marsh habitat exists to attract this species. Critical habitat exists within Cottonwood County (IPaC 2020) for Powesheik skipperling (state endangered), but not within the Project area. This species' preferred habitat includes wet and dry native prairie. Dakota skipper (*Hesperia dacotae*) is unlikely to occur because it prefers dry-mesic to dry prairie habitat, which is minimal within the Project area. Eastern spotted skunk (*Spilogale putorius*; state threatened) prefers open lands with sufficient cover, including structures associated with agricultural areas, and is unlikely to occur. Blanding's turtle (*Emydoidea blandingii*; state threatened) may occur in aquatic/wetland areas and adjacent agricultural areas; however, there is limited suitable habitat onsite. Wilson's phalarope (*Phalaropus tricolor*; state threatened) prefers habitat of wet prairie and grass or sedge-dominated wetlands. Suitable habitat exists near Mountain Lake and near other small waterbodies within the Project area; therefore, Wilson's phalarope may occur within the Project area. The majority of birds of particular concern that have the potential to occur may occur in the Project area at some point during migration, but relatively few are likely to breed in the general region (**Table 2.1**). Bald eagles occur locally throughout the year, but are more common in winter, with use primarily associated with the town of Mountain Lake (eBird 2017). Use of the Project area is expected to be consistent with eagle use in the region. Golden eagle (*Aquila chrysaetos*) use is unlikely as the Project area is outside this species range (eBird 2017).
Does the landscape contain areas where development is precluded by law or designated as sensitive according to scientifically credible information?	The landscape contains several native plant communities and areas of biodiversity significance. The current Project boundary has been designed to avoid the majority of these areas.

Table 2.1. Evaluation and characterization of the Big Bend Wind Project: Responses to questions posed in Tier 1 and Tier 2 of the 2012 Wind Energy Guidelines.	
Question	**Response**
Are there plant communities of concern present or likely to be present at the site(s)?	The federally listed prairie bush clover and ten state-listed plant species have the potential to occur within the Project area but their occurrence is confined to native plant communities, which are limited within the Project area due to the extent of cultivated lands.
Are there known critical areas of congregation of species of concern, including, but not limited to: maternity roosts, hibernacula, staging areas, winter ranges, nesting sites, migration stopovers or corridors, leks, or other areas of seasonal importance?	Suitable potential summer habitat for the federally threatened NLEB occurs within the Project area. There are no known hibernacula or maternity roosts within the Project area, with the nearest NLEB hibernacula located approximately 50 miles northeast of the Project area. Bald eagles may potentially use the habitat in and around the Project area for nesting. The open waterbodies and wetlands within the Project area may be used as stopover habitat for migrating waterfowl.
Using best available scientific information has the developer or relevant federal, state, tribal, and/or local agency identified the potential presence of a population of a species of habitat fragmentation concern?	Species of habitat fragmentation concern that may occur in the Project area include grassland-dependent species (e.g., Henslow's sparrow) and forest-dependent bat species (e.g., NLEB) but the majority of the Project area is highly fragmented and impacts to these species have likely already been realized.
Which species of birds and bats, especially those known to be at risk by wind energy facilities, are likely to use the proposed site based on an assessment of site attributes?	Bald eagles, along with a variety of other raptor species, will likely occur within the Project area. Waterfowl, waterbirds, and passerines are also likely to occur, especially during migration, but generally have low risk profiles with wind energy facilities. Seven species of bats have the potential to occur within the Project area and have known risk, including: hoary bat (*Lasiurus cinereus*), big brown bat (*Eptesicus fuscus*), little brown bat (*Myotis lucifugus*), eastern red bat (*Lasiurus borealis*), silver-haired bat (*Lasionycteris noctivagans*), tri-colored bat (*Perimyotis subflavus*) and NLEB (Solick et al. 2019).
Is there a potential for significant adverse impacts to species of concern based on the answers to the questions above, and considering the design of the proposed project?	The potential for significant impacts to species of concern is low based on available data. Although the Project area is likely to be used by bald eagles and has potential to be used by other sensitive bird and bat species, limited habitat is available and is unlikely to support any concentration of these species and therefore significant adverse impacts to these species is unlikely.

2.2 Tier 3 Surveys Completed to Date

Based on the results of the Tier 1 and 2 reviews, coordination with USFWS and MNDNR, and MNDNR's approval of the Big Bend Biological Study Plan (LeBeau 2018), Tier 3 surveys were designed and completed at the Project area and vicinity to understand wildlife usage, evaluate risk, and inform siting and operational protocols. The studies listed in **Table 2.3** and discussed in the following sections were developed using various Project boundaries as Big Bend Wind progressed through the WEG. A discussion of the applicability of these survey results to the

current boundary can be found in **Section 3 Discussion and Impact Analysis**.

Table 2.2. Avian and bat monitoring and survey efforts for the Big Bend Wind Project.		
Study Type	**Study Period**	**Reference**
Avian Use Surveys – Year 1	November 2017- October 2018	Foo et al. 2019
Avian Wetland Use Surveys	March 15 – June 15, 2018	Foo and LeBeau 2018
Raptor Nest Survey	April 2018	LeBeau and Foo 2018a
Eagle Nest Monitoring Survey	May 2018 - July 2018	LeBeau and Foo 2018b
General Acoustic Bat Survey	May 2018 – August 2018	Solick et al. 2019
Avian Use Surveys – Year 2	November 2018 – February 2020	Bailey et al. 2020
Aerial Eagle Nest Survey	May 2019	Foo and LeBeau 2019
Northern Long-eared Bat Habitat Assessment	May 2019 – May 2020	Hyzy et al. 2020
Raptor Nest Surveys	March 2020	Janos 2020
Eagle Nest Monitoring Survey	March 2020 – August 2020	Foo and Bailey 2020
Avian Wetland Use Surveys (Watonwan County)	March 2020 – June 2020	Foo and LeBeau 2020
Native Prairie Habitat Assessment	June 2020	Markhart and Foo 2020
Avian Use Surveys (Watonwan County)	March 2020 – February 2021	Foo et al. 2021

Avian Use Surveys 2017-2018

WEST completed Year 1 of avian use surveys over a 12-month period, with the objective to evaluate species composition and seasonal and spatial use of the Project by birds, with a particular focus on bald eagles and species of concern (i.e., defined as federally and state-listed species and species of particular concern as identified in the USFWS IPaC). WEST completed surveys at 42 survey points established throughout the Project from November 2017 to October 2018 (**Figure 2.1**; Foo et al. 2019). In March 2018, the Project boundary expanded and fifteen points were added. These points were not surveyed during the winter season (November 2017 – February 2018); however, eagle use at those points is expected to be comparable to the points that were surveyed during the winter (Foo et al. 2019). The 2019 Project boundary change occurred prior to finalizing the Year 1 avian use survey report; therefore, the analysis of Year 1 data was updated to present only results from points within the 2019 Project boundary (Foo et al. 2019).

Surveys consisted of 10-minute (min) counts for small birds within 100-meter (m) radius plots, followed by 60-min counts within 800-m radius plots, where all large birds were recorded in the first 20 min and only eagles were recorded for the remaining 40 min. Observations of species of concern were recorded any time they were observed. Observations of species of concern outside of the appropriate survey period, beyond the 100- or 800-m radius plot, were recorded as incidental observations to document occurrence on site, but were excluded from statistical analyses.

A total of 67 small bird species (2,535 observations) were recorded over 72 hours of small bird surveys. Four species composed almost half (48.4%) of small bird observations: horned lark (*Eremophila alpestris*; 20.2%), red-winged blackbird (*Agelaius phoeniceus*; 10.7%), common grackle (*Quiscalus quiscula*; 9.6%), and barn swallow (*Hirundo rustica*; 7.9%). All other species accounted for less than 7% of the observations, individually. Small bird species richness was highest in summer (2.05 observations/100 m plot/10 min survey), followed by spring (1.45), fall (0.68), and winter (0.18). Overall small bird use was highest during the fall (7.98 observations/100-m plot/10-min survey), followed by spring (7.75), summer (4.58), and winter (3.01). The majority (98.2%) of small birds recorded at all points were passerines.

A total of 35 large bird species (5,606 observations) were recorded over 144 hours of large bird surveys. The majority of large bird observations (85.4%) were of waterfowl observed during spring migration. Canada goose (*Branta canadensis*) was the most abundant (61.6%), followed by snow goose (*Chen caerulescens*, 9.7%) and mallard (*Anas platyrhynchos*, 7.3%). All other species accounted for less than 3% of observations, individually. Large bird species richness was highest in spring (1.00 species/800-m plot/20-min survey), followed by fall (0.68), summer (0.67), and winter (0.23). Overall large bird species richness was 0.65 species/800-m plot/20-min survey.

A total of 63 bald eagle observations (31 of these were incidental) and no golden eagles were recorded during the surveys. Thirty-one of the 32 bald eagles observed during the surveys were observations (recorded within 800 m and below 200 m of the observer). Bald eagle risk observations were documented at 16 of the 42 survey points (Figure 5). Bald eagle observations were documented throughout the Project and not concentrated within a single area; however, the majority of observations were recorded in close proximity to rivers and lakes. No golden eagles were observed during surveys or incidentally.

No federally or state-listed as threatened or endangered species were observed during the avian use surveys. One state-endangered species was recorded incidentally (Henslow's sparrow; n=2). Four birds of particular concern were observed during surveys and incidentally: black tern (*Chlidonias niger*; n=35, during surveys), red-headed woodpecker (*Melanerpes erythrocephalus*; n=2, during surveys), black-billed cuckoo (*Coccyzus erythropthalmus*; n=1, incidental) and Franklin's gull (*Leucophaeus pipixcan*; n=134, incidental).

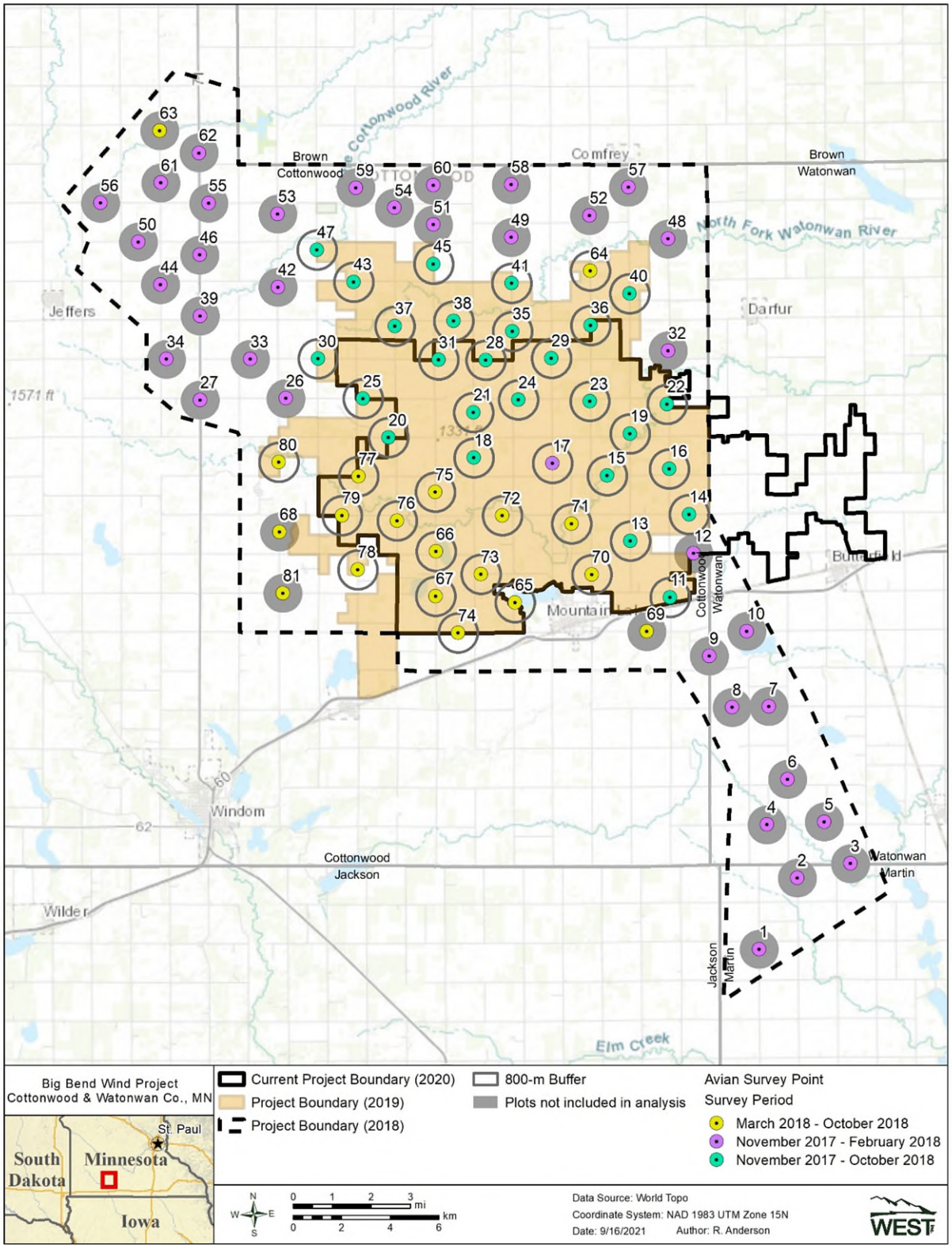

Figure 2.1. Avian use survey points and plots at the Big Bend Wind Project in Cottonwood and Watonwan counties, Minnesota from November 7, 2017 to October 29, 2018.
Note: *Point 17 was removed in February 2018 due to land access issues.*

Avian Wetland Use Survey 2018

WEST completed avian wetland use surveys within the 2018 Project boundary between March 15 and June 15, 2018 to determine the bird species associated with the wetlands and waterbodies in and around the Project area and to approximate their overall use during the spring migration and early nesting period (Foo and LeBeau 2018). Study design followed the MNDNR *Avian and Bat Survey Protocols for Large Wind Energy Conversion Systems in Minnesota* (Mixon et al. 2014).

Surveys were completed three times at seven survey points established near open water lakes and larger wetlands in accordance with the MNDNR-approved Biological Study Plan (LeBeau 2018; **Figure 2.2**). Surveys were scheduled to occur so that at least one survey was completed during ice out and peak waterfowl migration. Surveys were completed for 60 min between dawn and 10:00 am or within three hours prior to sunset at each point within an 800-m radius circular plot. All species of large birds were recorded, but emphasis was placed on recording wetland/waterbody-dependent species, federal and state-listed species, and species of concern.

A total of 25 species were recorded (1,280 individual observations) over 21 hours of avian wetland use surveys. Waterfowl were the most commonly recorded wetland bird type (95.8%) and included 15 species with a total of 1,226 observations in 109 groups. Mallard was the most commonly recorded species (540 observations in 15 groups), comprising 42.2% of all observations, followed by greater white-fronted goose (*Anser albifrons)* (280 observations in six groups), comprising 21.9% of all observations. Waterbirds, primarily double-crested cormorant (*Phalacrocorax auritus*), were the second-most commonly recorded bird group (2.5%). Great blue heron (*Ardea herodias)* was the only other waterbird observed. Diurnal raptors made up 0.3% of all observations: three bald eagles, one red-tailed hawk (*Buteo jamaicensis*), and one rough-legged hawk (*Buteo lagopus*) were observed.

Waterfowl were observed during 81% of the wetland use surveys and had a mean use of 58.38 observations/800-m plot/60-min survey, higher than any other bird type recorded due to large flocks migrating through the Project area. Waterbirds were observed during 19% of the surveys (1.52 observations/800-m plot/60-min survey); rails/coots were observed during 9.5% of the surveys (0.29 observations/800-m plot/60-min survey); and gulls were observed during 4.8% of the surveys (0.38).

No federally or state-listed species were observed during the 2018 avian wetland use surveys. One species of concern, bald eagle (n=3), was recorded during the surveys.

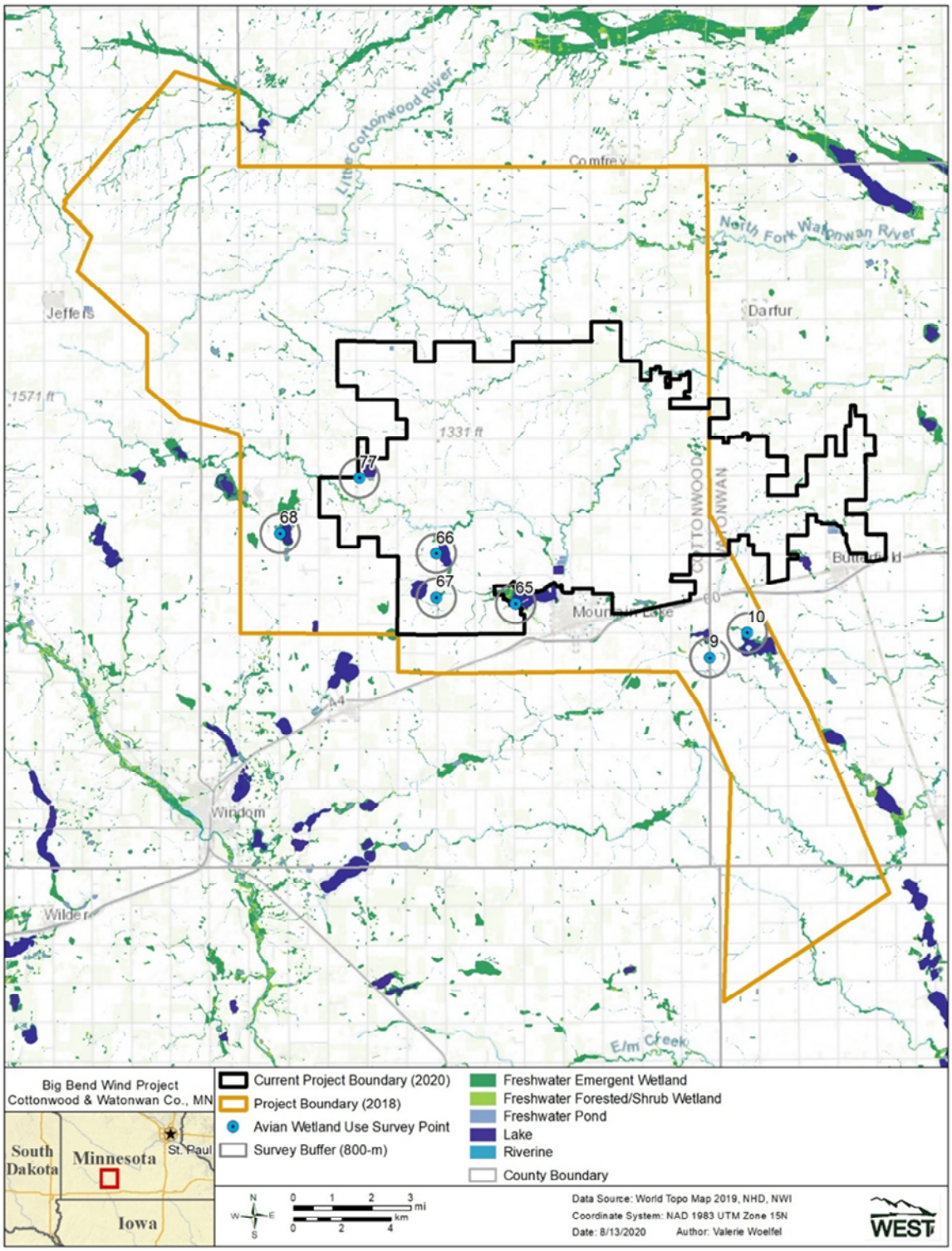

Figure 2.2. Survey points and 800-meter-radius plots for avian wetland use surveys and National Wetland Inventory (NWI)-mapped wetlands and waterbodies within the Big Bend Wind Project in Cottonwood and Watonwan counties, Minnesota (US Geological Survey National Hydrography Dataset 2017 and US Fish and Wildlife Service National Wetland Inventory 2017).

Raptor Nest Surveys 2018

WEST completed an aerial raptor nest survey between March 27 and April 12, 2018 to locate large raptor nests within the 2018 Project boundary and 1 mi buffer, and bald eagle nests within the 2018 Project boundary and 10 mi buffer (LeBeau and Foo 2018b). Aerial raptor nest surveys were completed from an R-44 helicopter and were completed by flying meandering transects spaced approximately 0.5 mi apart at speeds of 60-75 mi per hour.

Sixteen occupied bald eagle nests were documented within 10 mi of the 2018 Project boundary (15 active nests, one inactive nest; **Figure 2.3**). One nest was located within the 2018 Project boundary, two were within 2 mi of the boundary, and 13 were over 2 mi from the boundary. Three nests consistent in size and structure with eagle nests were detected between the 1-mi and 10-mi buffers. One active osprey (*Pandion haliaetus*) nest, three active great horned owl (*Bubo virginianus*) nests, and four active red-tailed hawk nests were identified within 1 mi of the 2018 Project boundary. Five inactive, unidentified raptor nests were also identified and, based on size, were determined to be non-eagle nests.

Avian Use Surveys 2018-2020

Following the methods in Year 1, a second year of avian use surveys was conducted between November 6, 2018 and February 19, 2020 within the 2019 Project boundary. Surveys were completed from November 2018 to October 2019 at 26 survey points, from November 2018 to February 2020 at 15 points added to the study partway through Year 1, and from July 2019 to February 2020 at one survey point added within a small expansion of the Project boundary per USFWS and MNDNR recommendations (**Figure 2.4**).

Thirty-four unique large bird species were recorded during Year 2 of avian use surveys. The most commonly observed large birds were Franklin's gull (34.6% of large bird observations), Canada goose (*Branta Canadensis;* 17.4%), ring-billed gull (*Larus delawarensis;* 17.3%*)* and rock pigeon (*Columba livia;* 9.3%). Seven identified diurnal raptor species and seven unidentified raptor observations were recorded during surveys. Red-tailed hawk was the most commonly observed diurnal raptor (1.4% of large bird observations and 41.4% of diurnal raptor observations).

No federally or state-listed threatened or endangered species were observed during surveys or incidentally. Twenty-eight bald eagles in 28 groups were observed during surveys, 20 additional bald eagle observations were recorded incidentally. Twenty-seven bald eagle risk observations were recorded during surveys. Bald eagle risk observations occurred in fall, winter and spring. No golden eagles were observed. Two birds of particular concern, bald eagle and Franklin's gull, were documented during surveys and incidentally.

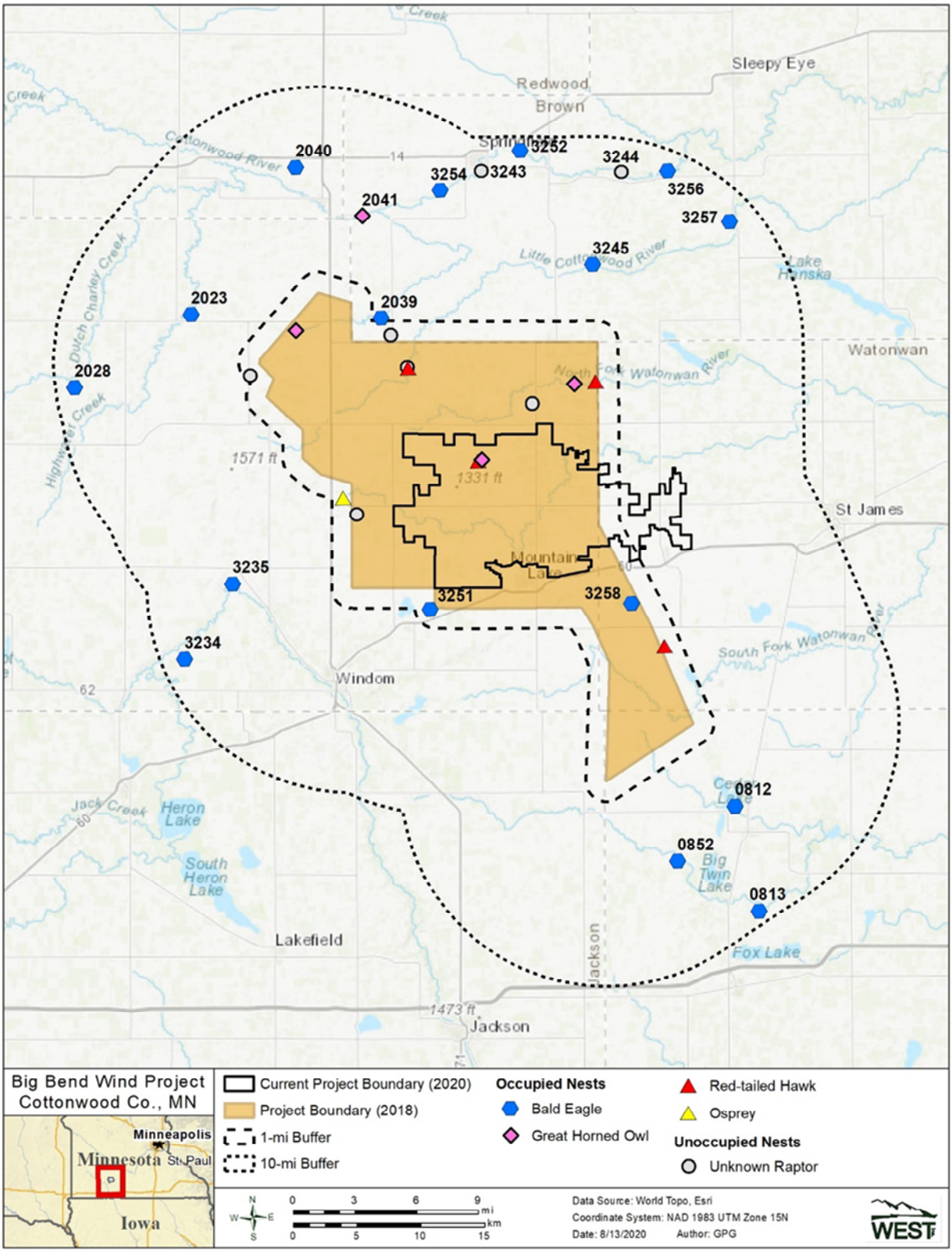

Figure 2.1. Spring 2018 raptor nest survey results for the Big Bend Wind Project in Cottonwood and Watonwan counties, Minnesota.

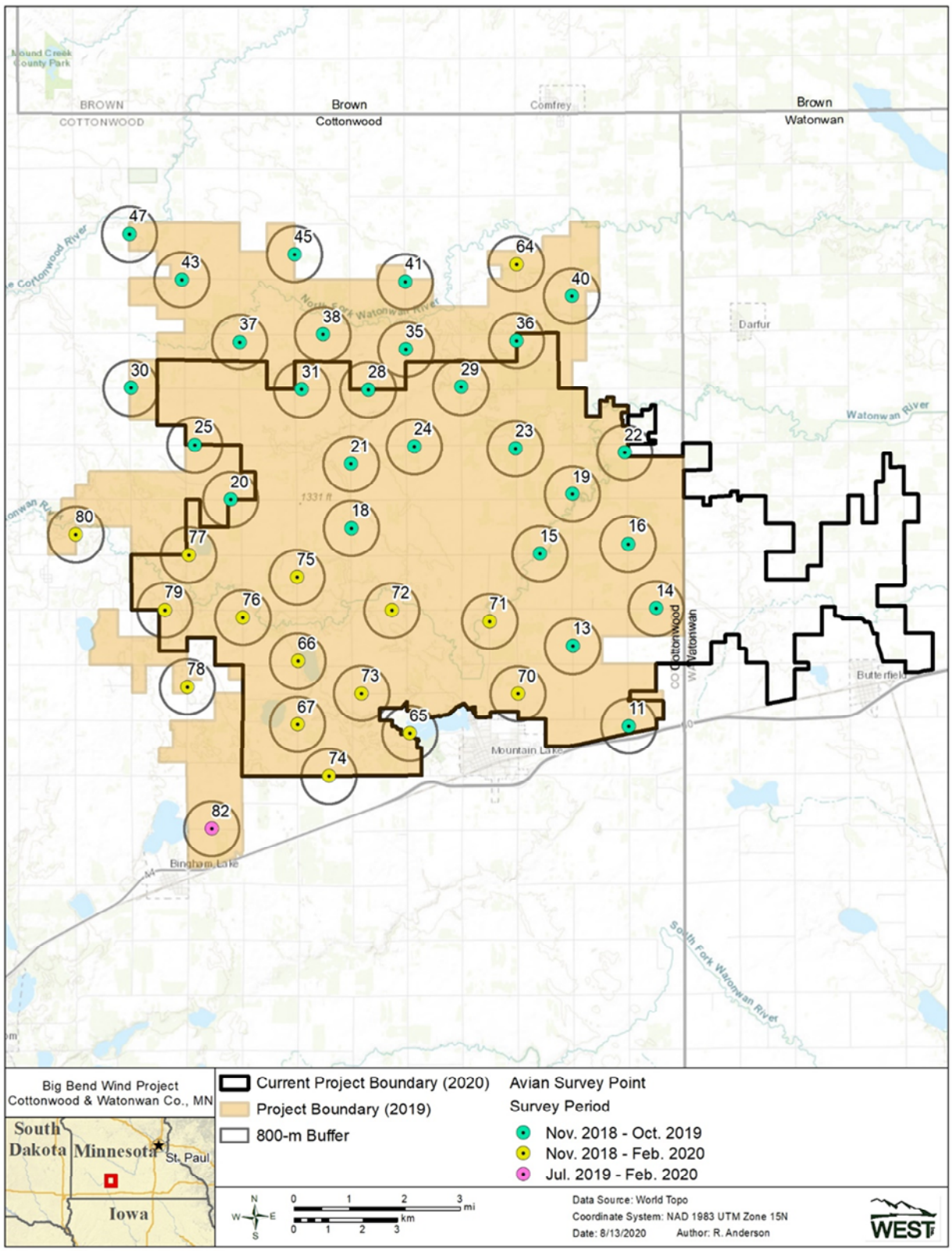

Figure 2.4. Avian use survey points and plots at the proposed Big Bend Wind Project in Cottonwood and Watonwan counties, Minnesota from November 6, 2018 – February 19, 2020.

Bald Eagle Nest Surveys 2019

WEST completed aerial bald eagle nest surveys between March 26 and March 28, 2019. The purpose of this survey was to locate bald eagle nests within 2.0 mi of the Project, and to visit previously documented nests within the half mean inter-nest distance (5.6 mi) that was calculated based on the results of the aerial raptor nest surveys conducted at the Project in 2018 (LeBeau and Foo 2018b). Aerial nest surveys were completed from an R-44 helicopter flying meandering transects spaced approximately 1.0 mi apart at speeds of 60-75 mi per hour.

No bald eagle nests were found within the 2019 Project boundary. Four bald eagle nests were located within the buffers, two within the 2-mi buffer and two within the 5.64-mi buffer, all of which were confirmed to be occupied and active either during the survey or during follow-up nest checks (**Figure 2.5**). Three of the bald eagle nests were historical nests from the 2018 surveys, and one was a new bald eagle nest, located 1.7 mi west of the 2019 Project boundary.

Raptor Nest Surveys 2020

Copperhead completed an aerial raptor nest survey on February 19 and 20, 2020 to locate large raptor nests within the Project boundary and 0.5-mi buffer, and bald eagle nests within the Project boundary and 10-mi buffer (Janos 2020). Aerial raptor nest surveys were completed from a Cessna 172 aircraft along 1-mi wide transects, with two observers, each covering approximately 0.5 mi viewshed. (**Figure 2.6**).

Fourteen nests consistent in size and structure with eagle nests were recorded during surveys (Janos 2020). Of the fourteen nests, eleven were occupied bald eagle nests (five occupied active and six occupied inactive). One occupied eagle nest was inside the Project boundary, one was 1.1 mi from the Project boundary, and nine were more than 2.0 mi from the Project boundary. Three inactive large stick nests consistent in size and structure with bald eagle nests were more than 3.0 mi outside the Project boundary. One inactive raptor nest was also recorded in the Project boundary; however, the nest was not large enough to have been a potential eagle nest.