Appendix F – Blazing Star Wind Farm 2: Tier III Studies

Northern Long-Eared Bat
Presence/Absence Acoustic Surveys
Blazing Star II Wind Farm
Lincoln County, Minnesota

Final Report
July 27 – 29, 2016

Prepared for:

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Draft Pre-Decisional Document–Confidential Business Information-Not for Distribution

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BACKGROUND AND PROJECT OVERVIEW

Blazing Star II Wind Farm, LLC is considering the development of the Blazing Star II Wind Farm (Project) located in Lincoln County, Minnesota (Figure 1). Blazing Star II Wind Farm, LLC contracted Western EcoSystems Technology, Inc. (WEST) to conduct acoustic presence/probable absence surveys during summer 2016 to better understand the potential use of the Project during the summer months by the federally threatened northern long-eared bat (NLEB, *Myotis septentrionalis*). The primary objective of the summer bat surveys was to collect site-specific information that can be used to evaluate risk to state and federally listed bat species with potential to occur in the Project to inform the need for further consultation with the Minnesota Department of Natural Resources (MDNR) and U.S. Fish and Wildlife Service (USFWS) regarding these species. This report summarizes the results of the NLEB acoustic presence/absence surveys completed for the Project during summer 2016.

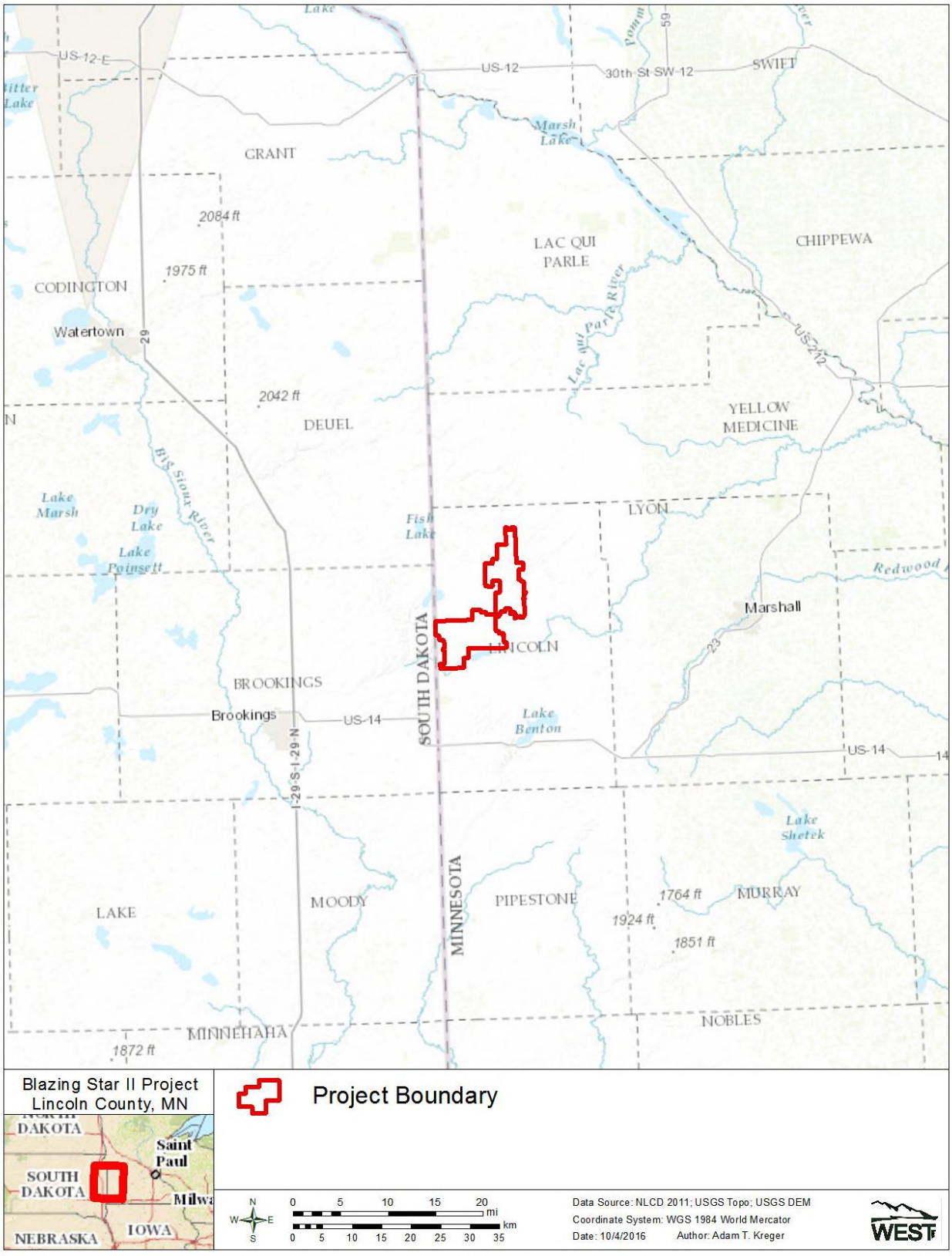


Figure 1. Location of the Blazing Star II Wind Farm in Lincoln County, Minnesota.

METHODS

The bat acoustic surveys followed the USFWS *2016 Range-Wide Indiana Bat Summer Survey Guidelines* (USFWS Guidelines, USFWS 2016), which are also applicable to NLEB, per the *Northern Long-Eared Bat Interim Conference and Planning Guidance* (USFWS 2014). The USFWS Guidelines recommend the following to assess the presence or probable absence of NLEB: 1) desktop habitat assessment, and 2) presence/probable absence surveys using acoustic detectors or mist-netting.

Desktop Habitat Assessment

The USFWS Guidelines (USFWS 2016) define suitable habitat for NLEB as any forest (e.g., deciduous, coniferous, mixed) or forested landscape feature (e.g., woody wetlands, forested riparian areas, shelterbelts) and recommend sampling at least two detector locations for every 123 acre (ac; 0.50 square kilometers [km^2]) site of suitable habitat within a non-linear project area for at least four detector nights. WEST conducted a desktop assessment of potential NLEB habitat within the Project. Potential foraging or roosting habitat within the Project was fairly limited, with relatively few areas where shelterbelts and larger forested patches (>15 ac) were separated by less than 1,000 feet (ft; 305 meters [m]); this connected habitat totaled approximately 20 ac (0.58 [km^2]). Two acoustic survey sites with potential NLEB habitat were selected within the Project on leased lands (Figure 2).

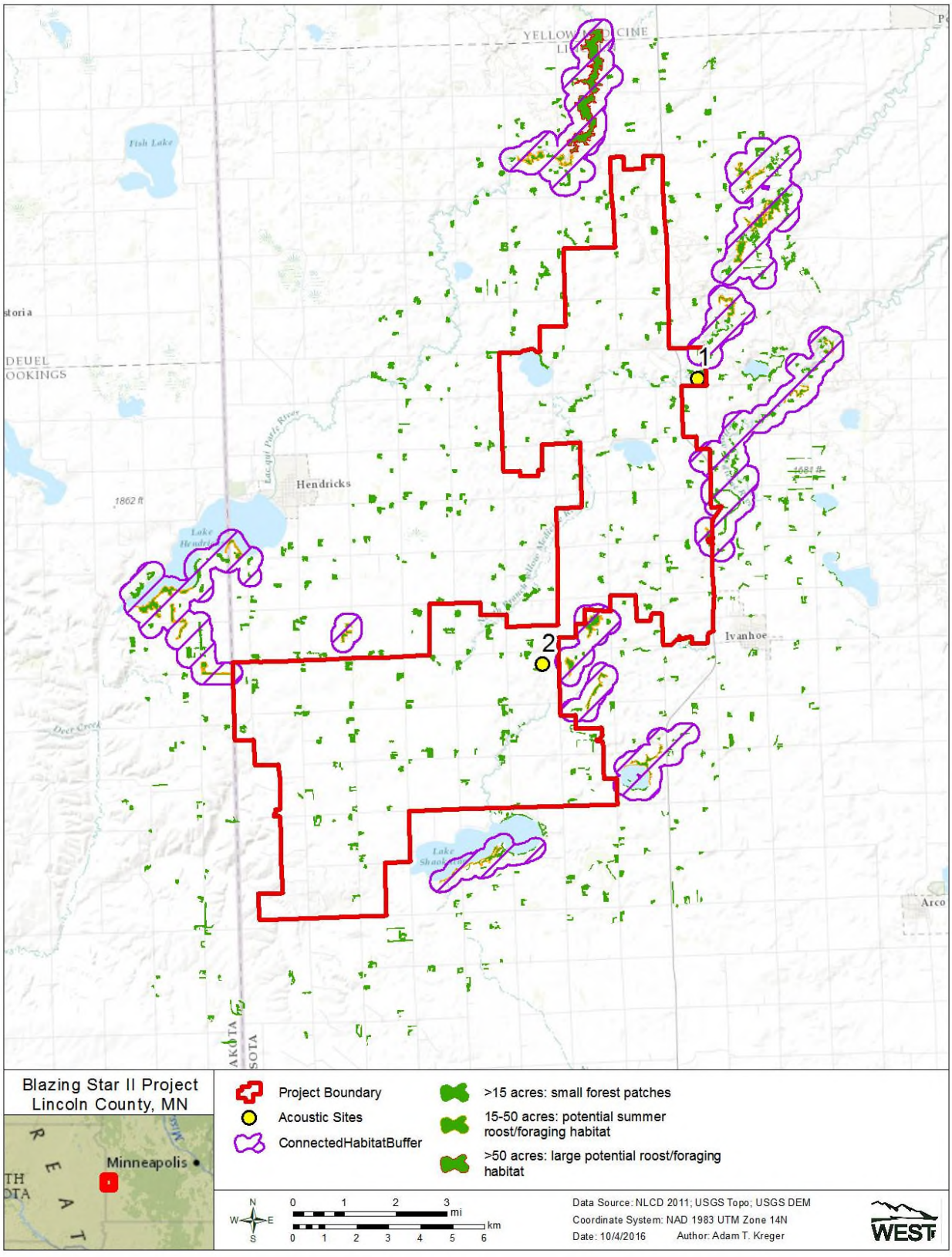


Figure 2. Blazing Star II Wind Farm Acoustic Sampling Sites in Lincoln County, Minnesota.

Acoustic Surveys

Acoustic surveys were conducted from July 27 – 29, 2016, following USFWS Guidelines (USFWS 2016). Surveys were conducted at two sites with two detector locations (stations) at each site for a total of four acoustic survey stations (Figure 3). Each station was surveyed for at least two nights for a total of eight valid detector nights. Bats were surveyed using full spectrum Song Meter SM3 acoustic recorders (Wildlife Acoustics, Inc.). WEST placed detectors in suitable habitat for NLEB, including forest edges, small clearings and forest-canopy openings, near water sources and/or forested riparian edges. Detectors were placed in areas with open tree canopies or canopy heights greater than 33 ft (10 m) and were spaced at least 656 ft (200 m) apart. Detectors were elevated at least 9.8 ft. (3.0 m) above ground level (AGL) to minimize acoustic interference from vegetation. Detectors were programmed to record from sunset to sunrise each survey night.

Acoustic monitoring began before sunset and continued for the entire night. If weather conditions such as persistent rain (more than 30 minutes), strong sustained winds (greater than 9 miles per hour [mph] average for more than 30 minutes), or cold temperatures (below 10°C [50°F] for more than 30 minutes) occurred during the first five hours of a survey night, then that location was surveyed for an additional night unless target species were detected or bat activity was unaffected by weather conditions (USFWS 2016). For each acoustic survey location, the date, start and end time, site description, site coordinates, and weather data were recorded. Representative photographs of each acoustic survey station were taken.

Bat calls were quantitatively identified using the USFWS-approved Automated Acoustic Bat Identification Software Program (Kaleidoscope Pro, version 3.1.7, Wildlife Acoustics, Inc.). If the automated bat identification program identified calls as NLEB with a high degree of probability ($p < 0.05$), then qualitative analysis was conducted to determine if NLEB were present or absent at the site. Qualitative echolocation call analysis was conducted by a biologist experienced with acoustic identification and who met required USFWS qualifications (Dr. Kevin Murray of WEST; USFWS 2016). If probable NLEB echolocation call sequences identified by Kaleidoscope were not characteristic of NLEB, contained distinct calls produced by species other than NLEB, or were of insufficient quality, they were reclassified. Per USFWS Guidelines (USFWS 2016), NLEB were considered present at sites with probable calls verified by qualitative analysis. NLEB were considered absent from sites with no probable NLEB calls or from sites with probable NLEB calls (as identified by the Kaleidoscope software) that were not verified by qualitative analysis.

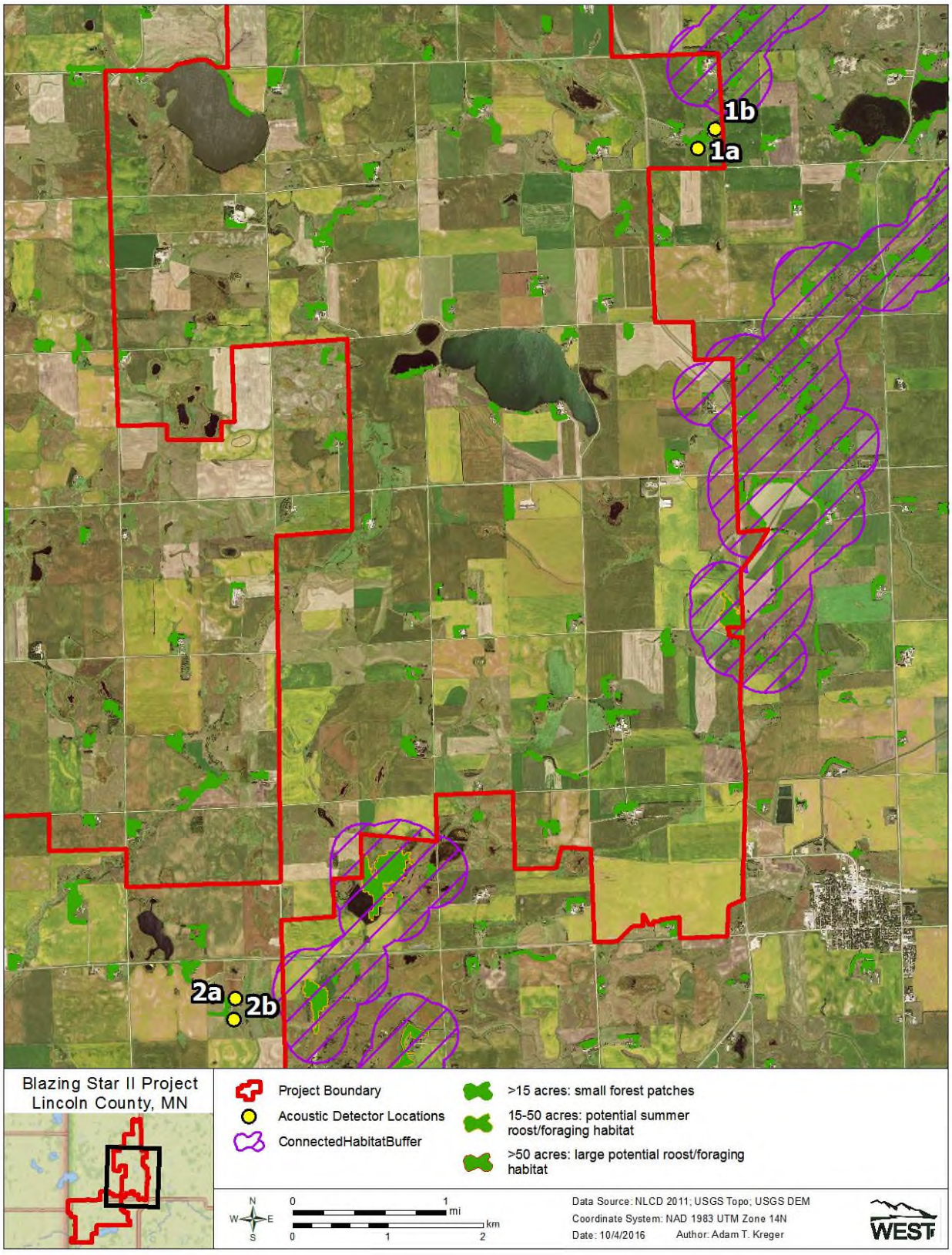


Figure 3. Location of the Blazing Star II Wind Farm Acoustic Detector Station Locations in Lincoln County, Minnesota.

RESULTS

Acoustical Analysis

Acoustic surveys were completed at two survey sites (four survey stations) from July 27 – 29, 2016, for a total of 8 detector nights, all of which were valid (met weather and other criteria). UTM coordinates and site descriptions for each survey station are listed in Table 1. Photographs and datasheets with site descriptions are found in Appendix A.

Table 1. Location and site description of acoustic survey stations at the Blazing Star II Wind Farm.

Site ID	Station ID	Easting†	Northing†	Site Description
1	A	717287	4934886	Southern bank of stream in grassy field near forest patch.
1	B	717473	4935092	Western bank of deep, muddy stream in field with forest to the north.
2	A	712429	4925942	Grassy field with tree corridor to the south.
2	B	712418	4925720	Marshy area with tree-lined banks.

† = NAD 1983, Zone 14

To assess study conditions for compliance with USFWS Guidelines (USFWS 2016), weather was monitored using the Hendricks weather station (MMN030) on Weather Underground's Wundermap (http://www.wunderground.com/wundermap/). Stations BZ2-1a, BZ-1b, BZ2-2a, and BZ2-2b were deployed on July 27 and retrieved on July 29. Weather conditions met USFWS criteria for these stations on the nights of July 27 and July 29. Together, these four stations collected eight nights of valid data, meeting the requirement of at least four detector nights per site.

Kaleidoscope identified a total of 1,377 bat call files and identified 1,362 files (98.9%) to species. Average number of bat calls per detector night was 170.3. Table 2 summarizes the number of detector nights, number of bat call files, and number of bat calls identified to species at each survey station. Table 3 provides information on species identifications for each survey station.

Table 2. Number of bat calls recorded at each acoustic survey station determined by Kaleidoscope for the Blazing Star II Wind Farm.

Acoustic Survey Site	Acoustic Survey Station	ID program	Total Bat Calls	Calls Identified	Detector Nights	Bat Calls/ Detector Night
1	A	Kaleidoscope	774	768 (99.2%)	2	387
	B	Kaleidoscope	147	144 (98.0%)	2	74
2	A	Kaleidoscope	71	70 (98.6%)	2	36
	B	Kaleidoscope	385	380 (98.7%)	2	193
Total			**1,377**	**1,362 (98.9%)**	**8**	**170.3**

Table 3. Summary of Kaleidoscope echolocation call identifications for the Blazing Star II Wind Farm.

Site ID	Station ID	EPFU[1]	LABO	LACI	LANO	MYLU	MYSE	UNK	Total
1	A	366	232	42	116	11	0	6	**774**
1	B	46	60	14	23	1	0	3	**147**
2	A	36	14	3	16	1	0	1	**71**
2	B	223	98	14	39	5	1	5	**385**
Total		**671**	**404**	**73**	**194**	**18**	**2**	**15**	**1,377**

[1] EPFU = Big Brown Bat; LABO = Eastern Red Bat; LACI = Hoary Bat; LANO = Silver-haired Bat; MYLU = Little Brown Bat; MYSE = Northern Long-eared Bat; PESU = Tri-colored bat; UNK = Unknown.

Based on the screening done by the call identification programs, only station BZ2-2b recorded potential NLEB calls with a p-value <0.05 for the maximum-likelihood estimation (Table 4); Kaleidoscope did not identify any potential NLEB calls at stations BZ2-1a, BZ2-1b, or BZ2-2a. Qualitative analysis did not verify the presence of NLEB at any survey stations (Tables 4 and 5).

Table 4. Summary of NLEB call identifications by Kaleidoscope and qualitative analysis[1] for stations with potential northern long-eared bat calls at the Blazing Star II Wind Farm.

Site ID	Station ID	Date	Identification Method	MYSE (NLEB)
2	B	July 27, 2016	Kaleidoscope	1
			Qualitative	0

[1] Only calls with p-values < 0.05 for the maximum-likelihood estimation were included in qualitative analysis (USFWS 2016).

Table 5. Summary of actions at each acoustic survey station for the Blazing Star II Wind Farm.

Site	Station ID	NLEB Calls	Probable NLEB Calls (P < 0.05)	NLEB Qualitatively Verified	Recommended Action
1	A	No	No	No	no further action
1	B	No	No	No	no further action
2	A	No	No	No	no further action
2	B	Yes	Yes	No	no further action

DISCUSSION

Limited information is available on NLEB migratory pathways and behaviors. While there is some information suggesting this species tends to follow forested areas and avoid open areas if possible, these bats may occasionally move through non-forested areas.

If these bats occur in the Project area during the summer months, they will likely occur within or near (within 1,000 ft [305 m]) suitable wooded habitat patches. WEST conducted acoustical surveys for NLEB at four detector locations within two sites in areas of suitable habitat within the Blazing Star II Wind Farm.

NLEB was not qualitatively verified at any of the four acoustic stations at any of the surveyed sites. Therefore this species is considered likely absent from the proposed Project. Surveys are considered complete for all four survey stations at the two sites, and no further action is recommended to confirm NLEB bat absence pursuant to USFWS *Northern Long-eared Bat Interim Conference and Planning Guidance* (USFWS 2014) and *2016 Range-Wide Indiana Bat Summer Survey Guidelines* (USFWS 2016).

LITERATURE CITED

U.S. Fish and Wildlife Service (USFWS). 2014. Northern Long-eared Bat Interim Conference and Planning Guidance. January 6, 2014. USFWS Regions 2, 3, 4, 5, & 6. Available online at: http://www.fws.gov/northeast/virginiafield/pdf/NLEBinterimGuidance6Jan2014.pdf

U.S. Fish and Wildlife Service (USFWS). 2016. 2016 Range-Wide Indiana Bat Summer Survey Guidelines (April 2016). USFWS Endangered Species Program: Midwest Region.

Appendix A. Blazing Star II Wind Farm Acoustic Survey Station Photographs and Datasheets

Acoustic Detector Station BZ2-1a

Station BZ2-1a Location

Station BZ2-1a Orientation

Station BZ2-1a Detection Cone

Acoustic Presence/Probable Absence 2016 Form

Project: Blazing Star II **Station ID:** 1a

Start Date/Time (military): 20160727 1355 End Date/Time: 20160729 1016

Observer(s): ETG RLK

Station Information:

County: Lincoln State: MN

Datum: NAD27 (NAD83) Zone: 14T Easting: (6 digits) 717287 Northing: (7 digits) 4934892

Detector Type: SM2+ Detector Serial #: 15488 Tablet Location*:

Detector Housing: (Ammo Box) Toolbox Plastic Tote Other:

Battery source: (Internal) External If External: _____volts _____ amp/hrs

SD
A→013
B→CWTC

Microphone

Mic Serial#* 2011 Mic Ht (m): (from ground) 3.048 Mic Channel* 12 Audio Div* — Data Div* 1

Mic Horizontal Orientation: 10 Mic Vertical Orientation: 21 Sound Reception: (None) Horn Bat Hat PVC Elbow

All Detector Checklist						Anabat Only				
Date/Time	Battery Voltage	Mic Check Good? Y/N	Cables; detector housing; mic holder Good?	Data Card(s) Replaced?	Battery Changed?	Sensitivity Setting (normally 6)	Test Indicators (checkmark)	Volume (lowest setting) Yes/No	LED Lights (circle) (should be Standby, unless between 1800 and 0800hrs)	Comments i.e., detector set, detector picked up, moved, knocked over, vandalized, etc.
20160727 1402	6.5	✓	✓	✓	✓		"Data" lit Static Heard		Record Standby Status Error Data	
20160729 1017	5.53						"Data" lit Static Heard		Record Standby Status Error Data	
							"Data" lit Static Heard		Record Standby Status Error Data	
							"Data" lit Static Heard		Record Standby Status Error Data	

Habitat Description *(within 100m)*

% Forested: 20 %Open/Ag: 66 %Water: 15 **Dominant Tree Spp:** Elm

Stand Age: Young (Mature) Old

Detector Sampling (circle 1 or more):

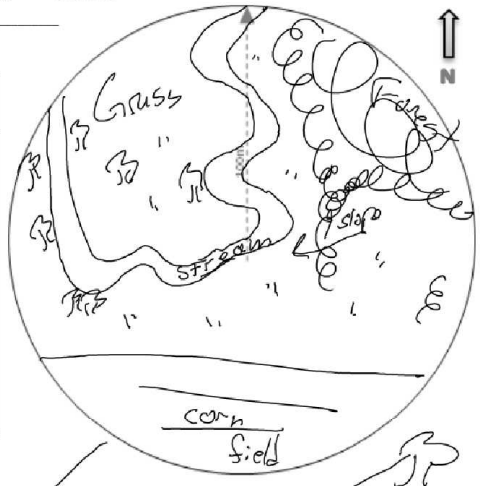
(Creek Riparian) Pond ~~Bottomland Forest~~ Upland Forest (Field Edge) Open Field

Cave Entrance Mine Portal Bridge Structure Other:

Topography: (Flat) Slope High Point Low Point Other:

Habitat Description: *Map out habitat features within 100 m radius of Song Meter (x). Indicate direction of microphone using an arrow. Include any features of interest (water, buildings, rocky outcrops, etc.). Provide a written description in the space below, including details on width of the road/trail/cutline, size of pond/lake, distance to nearest water, etc.).*

Detector is on the southern bank of a flowing stream. Stream starts in the NE, flows past the center and then snakes northward. To the NW is a thick patch of trees on a downward slope to the creek. Along the grassy areas are some isolated trees (52). To the south is a corn field. Mic is pointing north due to a western wind, also the trees & land make a good corridor.



Photos (check)

Detector Location_____ *(detector + main habitat surveyed)*

Detector Orientation_____ *(detector + surrounding habitat)*

Detection Cone_____ *(air space sampled)*

Station BZ2-1a Datasheet

Acoustic Detector Station BZ2-1b

Station BZ2-1b Location

Station BZ2-1b Orientation

Station BZ2-1b Detection Cone

Acoustic Presence/Probable Absence 2016 Form

Project: Blazing Star IL **Station ID:** 1b

Start Date/Time (military): 20160727 1328 End Date/Time: 20160729 0951

Observer(s): ETG RLK

Station Information:

County: Lincoln State: MV

Datum: NAD27 (NAD83) Zone: 14T Easting: (6 digits) 717476 Northing: (7 digits) 4935090

Detector Type: SM2+ Detector Serial #: 13703 Tablet Location*: \

Detector Housing: Ammo Box Toolbox Plastic Tote Other: N/A

Battery source: (Internal) External If External: _____volts _____ amp/hrs

SD

A → 006

B → BW4

Microphone

Mic Serial#* 2720 Mic Ht (m): (from ground) 3.048 Mic Channel* R Audio Div* \ Data Div* \

Mic Horizontal Orientation: 173 Mic Vertical Orientation: 22 Sound Reception: (None) Horn Bat Hat PVC Elbow

All Detector Checklist						**Anabat Only**				
Date/Time	Battery Voltage	Mic Check Good? Y/N	Cables; detector housing; mic holder Good?	Data Card(s) Replaced?	Battery Changed?	Sensitivity Setting (normally 6)	Test Indicators (checkmark)	Volume (lowest setting) Yes/No	LED Lights (circle) (should be Standby, unless between 1800 and 0800hrs)	Comments i.e., detector set, detector picked up, moved, knocked over, vandalized, etc.
20160727 1330	6.52	✓	✓	✓	✓		"Data" lit Static Heard		Record Standby Status Error Data	
20160729 1001	5.56						"Data" lit Static Heard		Record Standby Status Error Data	
							"Data" lit Static Heard		Record Standby Status Error Data	
							"Data" lit Static Heard		Record Standby Status Error Data	

Habitat Description *(within 100m)*

% Forested: 45 %Open/Ag: 95 %Water: 10 **Dominant Tree Spp:** Elm

Stand Age: Young (Mature) Old

Detector Sampling (*circle 1 or more*):

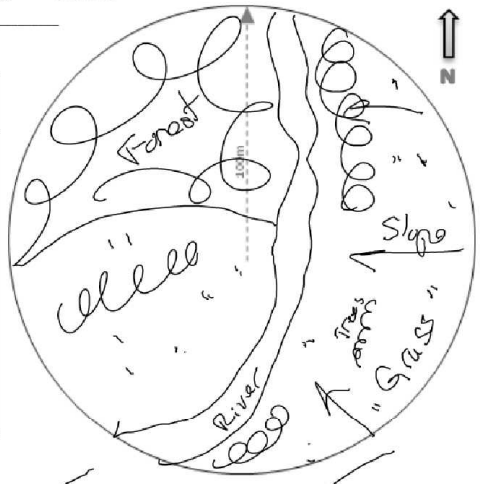
~~Creek Riparian~~ Pond ~~Bottomland Forest~~ Upland Forest Field Edge Open Field

Cave Entrance Mine Portal Bridge Structure Other:_____

Topography: (Flat) Slope High Point ~~Low Point~~ Other:_____

Habitat Description: *Map out habitat features within 100 m radius of Song Meter (x). Indicate direction of microphone using an arrow. Include any features of interest (water, buildings, rocky outcrops, etc.). Provide a written description in the space below, including details on width of the road/trail/cutline, size of pond/lake, distance to nearest water, etc.).*

Detector is on western bank of a deep, muddy, flowing stream. The east to center descends sharply to the stream. The west is hilly but mostly flat. To the north and NW is dense forest. To the south + SW the stream curves back to the farm property. There are many patches of trees, but areas are mostly grassy.



Photos (check)

Detector Location_____ *(detector + main habitat surveyed)*

Detector Orientation_____ *(detector + surrounding habitat)*

Detection Cone_____ *(air space sampled)*

Station BZ2-1b Datasheet

Acoustic Detector Station BZ2-2a

Station BZ2-2a Location

Station BZ2-2a Orientation

Station BZ2-2a Detection Cone

Acoustic Presence/Probable Absence 2016 Form

Project: Blazing Star II **Station ID:** 2a

Start Date/Time (military): 20160727 1249 End Date/Time: 20160729 0924

Observer(s): ETG RLK

Station Information:

County: Lincoln State: MN

Datum: NAD27 (NAD83) Zone: 14T Easting: (6 digits) 712428 Northing: (7 digits) 4925946

Detector Type: SM2+ Detector Serial #: 16519 Tablet Location*:

Detector Housing: Ammo Box Toolbox Plastic Tote Other: N/A

Battery source: (Internal) External If External: _____volts _____ amp/hrs

Microphone

Mic Serial#* 2686 Mic Ht (m): (from ground) 3.048 Mic Channel* 12 Audio Div* Data Div*

Mic Horizontal Orientation: 261 Mic Vertical Orientation: 21 Sound Reception: (None) Horn Bat Hat PVC Elbow

SD
A → 008
B → 612

All Detector Checklist						Anabat Only				
Date/Time	Battery Voltage	Mic Check Good? Y/N	Cables; detector housing; mic holder Good?	Data Card(s) Replaced?	Battery Changed?	Sensitivity Setting (normally 6)	Test Indicators (checkmark)	Volume (lowest setting) Yes/No	LED Lights (circle) (should be Standby, unless between 1800 and 0800hrs)	Comments i.e., detector set, detector picked up, moved, knocked over, vandalized, etc.
20160727 1250	6.48	✓	✓	✓	✓		"Data" lit Static Heard		Record Standby Status Error Data	
20160729 0929	5.56						"Data" lit Static Heard		Record Standby Status Error Data	
							"Data" lit Static Heard		Record Standby Status Error Data	
							"Data" lit Static Heard		Record Standby Status Error Data	

Habitat Description *(within 100m)*

% Forested: 15 %Open/Ag: 85 %Water: 0 **Dominant Tree Spp:** Box Elder + Russian Olive.

Stand Age: Young Mature Old

Detector Sampling (*circle 1 or more*):

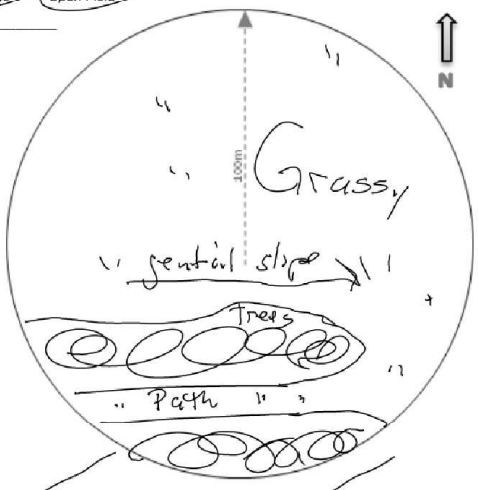
Creek Riparian Pond Bottomland Forest Upland Forest (Field Edge) (Open Field)

Cave Entrance Mine Portal Bridge Structure Other:

Topography: (Flat) Slope High Point Low Point Other:

Habitat Description: *Map out habitat features within 100 m radius of Song Meter (x). Indicate direction of microphone using an arrow. Include any features of interest (water, buildings, rocky outcrops, etc.). Provide a written description in the space below, including details on width of the road/trail/cutline, size of pond/lake, distance to nearest water, etc.).*

Detector is ~10m North of a Tree corridor. To the south + SW there are 2 lines of trees w/ a protected path between. The remaining area is open, overgrown field. Red tail hawk nest nearby. There is a slight downward slope to the east, but still mostly flat.



Photos (check)

Detector Location_____ *(detector + main habitat surveyed)*

Detector Orientation_____ *(detector + surrounding habitat)*

Detection Cone_____ *(air space sampled)*

Station BZ2-2a Datasheet

Acoustic Detector Station BZ2-2b

Station BZ2-2b Location

Station BZ2-2b Orientation

Station BZ2-2b Detection Cone

SD
A → 037
B → 305

Acoustic Presence/Probable Absence 2016 Form

Project: Blazing Star — **Station ID:** BZ2-26

Start Date/Time (military): 20160727 1222 — End Date/Time: 20160729 0912

Observer(s): ETG RLK

Station Information:

County: Lincoln State: MN

Datum: NAD27 NAD83 Zone: 14T Easting: (6 digits) 712423 Northing: (7 digits) 4925722

Detector Type: SM2+ Detector Serial #: 16823 Tablet Location*:

Detector Housing: Ammo Box Toolbox Plastic Tote Other: N/A

Battery source: (Internal) External If External: _____volts _____ amp/hrs

Microphone

Mic Serial#* 2744 Mic Ht (m): (from ground) 3.048 Mic Channel* R Audio Div* \ Data Div* \

Mic Horizontal Orientation: 192 Mic Vertical Orientation: 22 Sound Reception: (None) Horn Bat Hat PVC Elbow

All Detector Checklist						**Anabat Only**			
Date/Time	Battery Voltage	Mic Check Good? Y/N	Cables; detector housing; mic holder Good?	Data Card(s) Replaced?	Battery Changed?	Sensitivity Setting (normally 6)	Test Indicators (checkmark)	Volume (lowest setting) Yes/No	LED Lights (circle) (should be Standby, unless between 1800 and 0800hrs)	Comments i.e., detector set, detector picked up, moved, knocked over, vandalized, etc.
20160727 1223	6.48	✓	✓	✓	✓		"Data" lit Static Heard		Record Standby Status Error Data	
20160729 0919	5.52						"Data" lit Static Heard		Record Standby Status Error Data	
							"Data" lit Static Heard		Record Standby Status Error Data	
							"Data" lit Static Heard		Record Standby Status Error Data	

Habitat Description *(within 100m)*

% Forested: 47 %Open/Ag: 50 %Water: 3 **Dominant Tree Spp:** American Elm. + Box Elder

Stand Age: Young (Mature) Old

Detector Sampling (*circle 1 or more*):

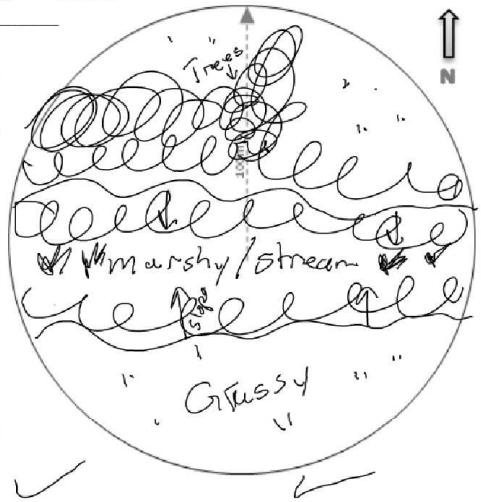
~~Creek Riparian~~ Pond (Bottomland Forest) Upland Forest Field Edge Open Field

Cave Entrance Mine Portal Bridge Structure Other:

Topography: Flat Slope High Point (Low Point) Other:

Habitat Description: *Map out habitat features within 100 m radius of Song Meter (x). Indicate direction of microphone using an arrow. Include any features of interest (water, buildings, rocky outcrops, etc.). Provide a written description in the space below, including details on width of the road/trail/cutline, size of pond/lake, distance to nearest water, etc.).*

Detector is within a marshy area that's likely a stream when there is more water present. Marsh runs E-W. Trees populate both banks, but the trees continue North up the hilly-slope. To the south there is also an upwards slope leading out to a field.



Photos (check)

Detector Location_____ (detector + main habitat surveyed) ✓

Detector Orientation_____ (detector + surrounding habitat) ✓

Detection Cone_____ (air space sampled) ✓

Station BZ2-2b Datasheet

Northern Long-Eared Bat
Presence/Absence Acoustic Surveys
Blazing Star II Wind Farm
Lincoln County, Minnesota

Final Report
June 16 – 20, 2017

Prepared for:

Blazing Star II Wind Farm, LLC

7650 Edinborough Say, Suite 725
Edina, Minnesota 55425

Prepared by:

Brenna Hyzy, Joyce Pickle, and Kevin Murray

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August 28, 2017

Draft Pre-Decisional Document-Confidential Business Information-Not for Distribution

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REPORT REFERENCE

Hyzy, B., J. Pickle, K. Murray. 2017. Northern Long-Eared Bat Presence/Absence Acoustic Surveys, Blazing Star II Wind Farm, Lincoln County, Minnesota. Draft Report: June 16 - 20, 2017. Prepared for Blazing Star II Wind Farm, LLC. Prepared by Western EcoSystems Technology, Inc. (WEST), Golden Valley, Minnesota.

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BACKGROUND AND PROJECT OVERVIEW

Blazing Star II Wind Farm, LLC is considering the development of the Blazing Star II Wind Farm (Project) located in Lincoln County, Minnesota (Figure 1). Blazing Star II Wind Farm, LLC contracted Western EcoSystems Technology, Inc. (WEST) to conduct acoustic presence/probable absence surveys during summer 2017 to better understand the potential use of the Project during the summer months by the federally threatened northern long-eared bat (NLEB, *Myotis septentrionalis*). WEST had previously conducted presence/probable absence surveys at the Project in 2016; since that survey, the Project boundary changed and additional leased lands were available for survey. The primary objective of the 2017 summer bat surveys was to collect additional site-specific information that can be used to evaluate risk to this state and federally listed bat species and to inform further discussions with the Minnesota Department of Natural Resources (MDNR) and U.S. Fish and Wildlife Service (USFWS) regarding this species. This report summarizes the results of the NLEB acoustic presence/absence surveys completed for the Project during summer 2017.

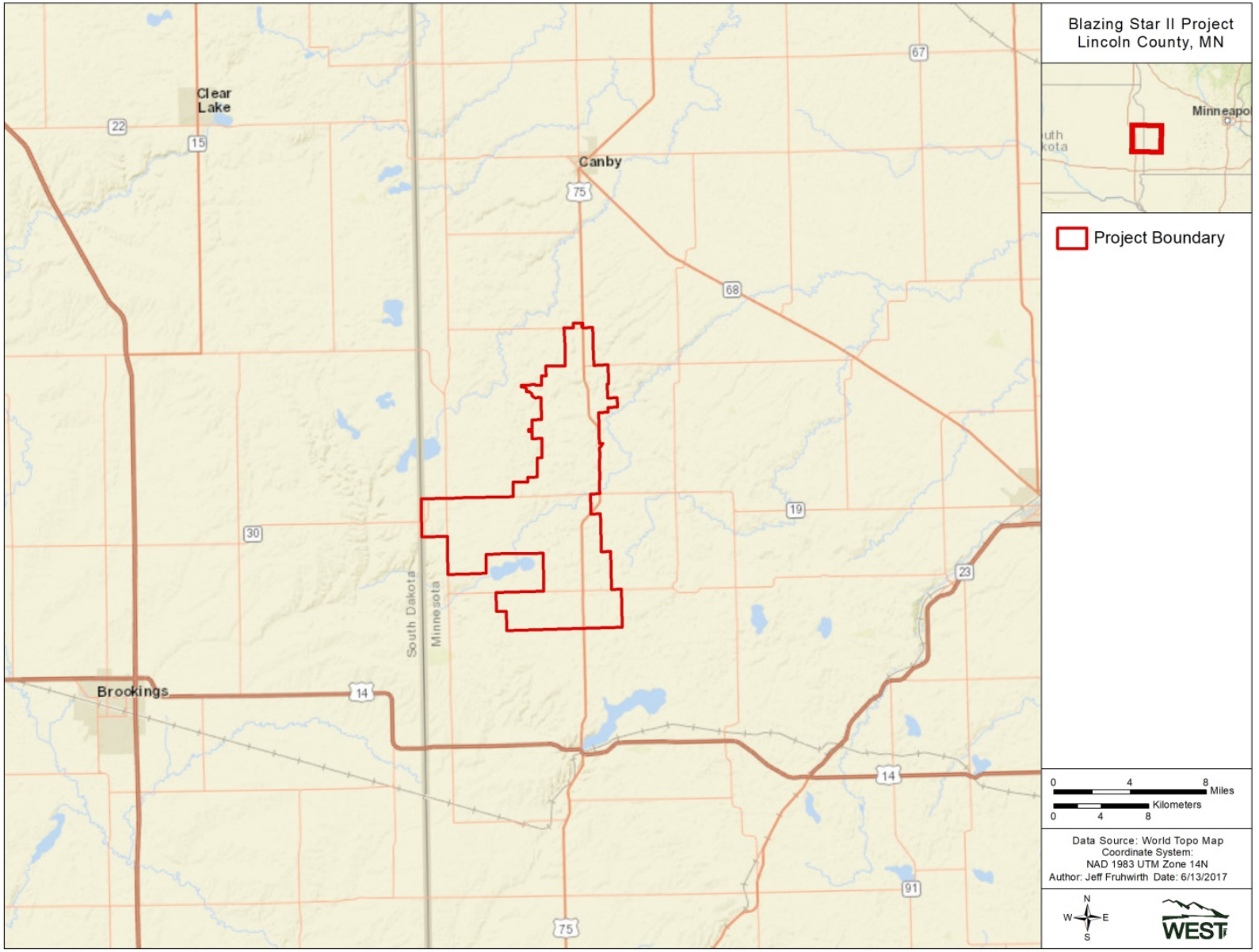
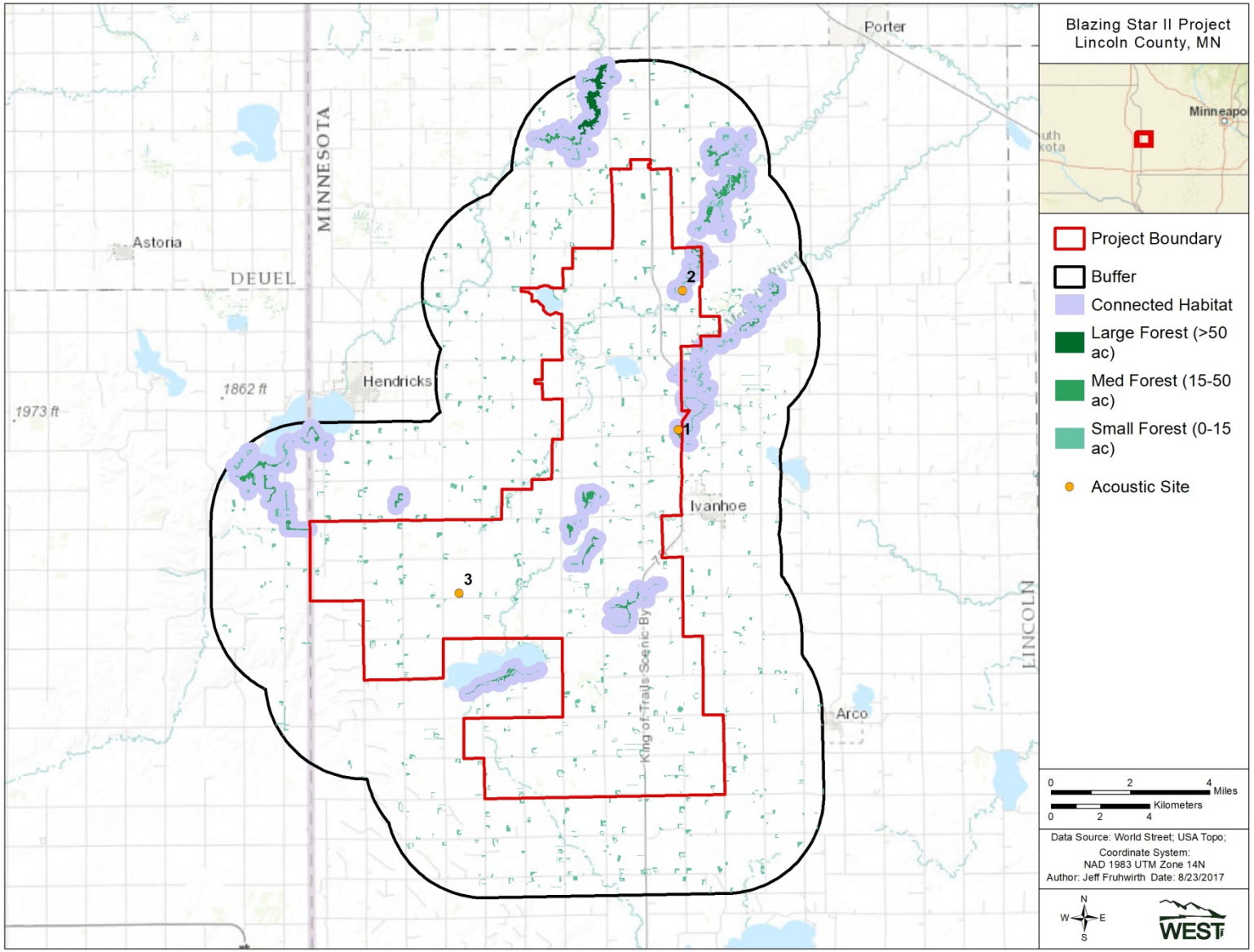


Figure 1. Location of the Blazing Star II Wind Farm in Lincoln County, Minnesota.


Blazing Star II Project
Lincoln County, MN
Project Boundary
Buffer
Connected Habitat
Large Forest (>50 ac)
Med Forest (15-50 ac)
Small Forest (0-15 ac)
Acoustic Site
Porter
MINNESOTA
Astoria
DEUEL
Hendricks
1862 ft
1973 ft
Ivanhoe
LINCOLN
Arco
King of Trails Scenic By
1
2
3
0 2 4 Miles
0 2 4 Kilometers
Data Source: World Street; USA Topo;
Coordinate System:
NAD 1983 UTM Zone 14N
Author: Jeff Fruhwirth Date: 8/23/2017
N
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WEST

METHODS

The bat acoustic surveys followed the USFWS *2017 Range-Wide Indiana Bat Summer Survey Guidelines* (USFWS Guidelines, USFWS 2017), which are also applicable to NLEB, per the *Northern Long-Eared Bat Interim Conference and Planning Guidance* (USFWS 2014). The USFWS Guidelines recommend the following to assess the presence or probable absence of NLEB: 1) desktop habitat assessment, and 2) presence/probable absence surveys using acoustic detectors or mist-netting.

Desktop Habitat Assessment

The USFWS Guidelines (USFWS 2017) recommend sampling at least two detector locations for every 123 acre (ac; 0.50 square kilometers [km^2]) site of suitable habitat within a non-linear project area for at least four detector nights. WEST conducted a desktop assessment of potential NLEB habitat within the Project. For purposes of this review, WEST categorized habitat patches that are 14 acres or less as potential commuting/travel corridors (generally shelterbelts or small woodlots); patches 15-49 acres were considered small roost/foraging areas (larger woodlots and riparian forests); and patches greater than 50 acres were considered medium-large roost/foraging areas (larger contiguous forests or riparian corridors). Further, USFWS guidance assesses the potential for bats to be present within the Project boundary based on presence of travel/commuting corridors within the Project boundary and connectivity to foraging or roosting habitat within a 2.5-mile buffer of the Project. Connectivity is defined in the guidance as commuting habitat within 1,000 ft and connected to roosting or foraging habitat within the 2.5-mile buffer of the Project boundary (USFWS 2011).

Potential foraging or roosting habitat within the Project was fairly limited, with relatively few areas where shelterbelts and larger forested patches (>15 ac) were separated by less than 1,000 feet (ft; 305 meters [m]); this connected habitat totaled approximately 273 ac (1.10 [km^2]). Three acoustic survey sites with potential NLEB habitat were selected within the Project on leased lands (Figure 2).

Acoustic Surveys

Acoustic surveys were conducted from June 16 – 20, 2017, following USFWS Guidelines (USFWS 2017). Surveys were conducted at three sites with two detector locations (stations) at each site for a total of six acoustic survey stations (Figures 3a – 3c). Each station was surveyed for at least two nights for a total of 12 valid detector nights. Bats were surveyed using full spectrum Song Meter SM4 acoustic recorders (Wildlife Acoustics, Inc.). WEST placed detectors in suitable habitat for NLEB, including forest edges, small clearings and forest-canopy openings, near water sources and/or forested riparian edges; two of the sites – Sites 1 and 2 - were located within connected habitat areas (i.e. habitat patches larger than 14 ac or patches smaller than 15 ac that are within 1,000 ft of larger patches) and one site – Site 3 - was located in a habitat patch smaller than 15 ac in the vicinity of water sources but farther than 1,000 ft from larger patches. Sites 1 and 3 are located in areas of the Project that were not surveyed during

the 2016 NLEB acoustic presence/absence survey (WEST 2016), while Site 2 was located within a half mile of a 2016 survey location (Site 1 in the 2016 study), located farther north along the same stream within the connected habitat buffer.

Detectors were placed in areas with open tree canopies or canopy heights greater than 33 ft (10 m) and were spaced at least 656 ft (200 m) apart. Detectors were elevated at least 9.8 ft. (3.0 m) above ground level (AGL) to minimize acoustic interference from vegetation. Detectors were programmed to record from sunset to sunrise each survey night.

Acoustic monitoring began before sunset and continued for the entire night. If weather conditions such as persistent rain (more than 30 minutes), strong sustained winds (greater than 9 miles per hour [mph] average for more than 30 minutes), or cold temperatures (below 10°C [50°F] for more than 30 minutes) occurred during the first five hours of a survey night, then that location was surveyed for an additional night unless target species were detected or bat activity was unaffected by weather conditions (USFWS 2017). For each acoustic survey location, the date, start and end time, site description, site coordinates, and weather data were recorded. Representative photographs of each acoustic survey station were taken.

Bat calls were quantitatively identified using the USFWS-approved Automated Acoustic Bat Identification Software Program (Kaleidoscope Pro, version 4.2.0, Wildlife Acoustics, Inc.). If the automated bat identification program identified calls as NLEB with a high degree of probability ($p < 0.05$), then qualitative analysis was conducted to determine if NLEB were present or absent at the site. Qualitative echolocation call analysis was conducted by a biologist experienced with acoustic identification and who met required USFWS qualifications (Dr. Kevin Murray of WEST; USFWS 2017). If probable NLEB echolocation call sequences identified by Kaleidoscope were not characteristic of NLEB, contained distinct calls produced by species other than NLEB, or were of insufficient quality, they were reclassified. Per USFWS Guidelines (USFWS 2017), NLEB were considered present at sites with probable calls verified by qualitative analysis. NLEB were considered absent from sites with no probable NLEB calls or from sites with probable NLEB calls (as identified by the Kaleidoscope software) that were not verified by qualitative analysis.

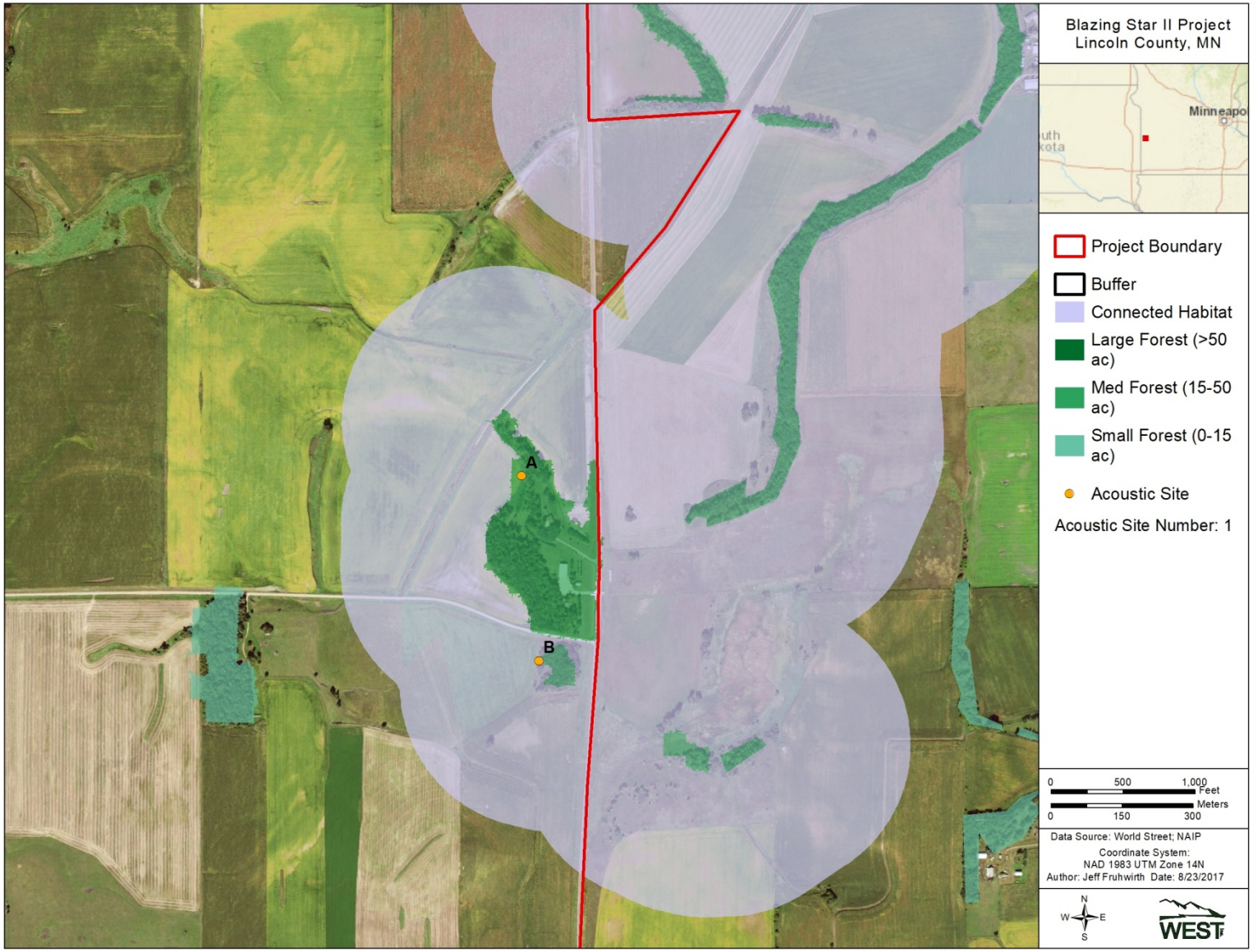


Figure 2a. Location of the Blazing Star II Wind Farm Acoustic Detector Stations 1A and 1B in Lincoln County, Minnesota.

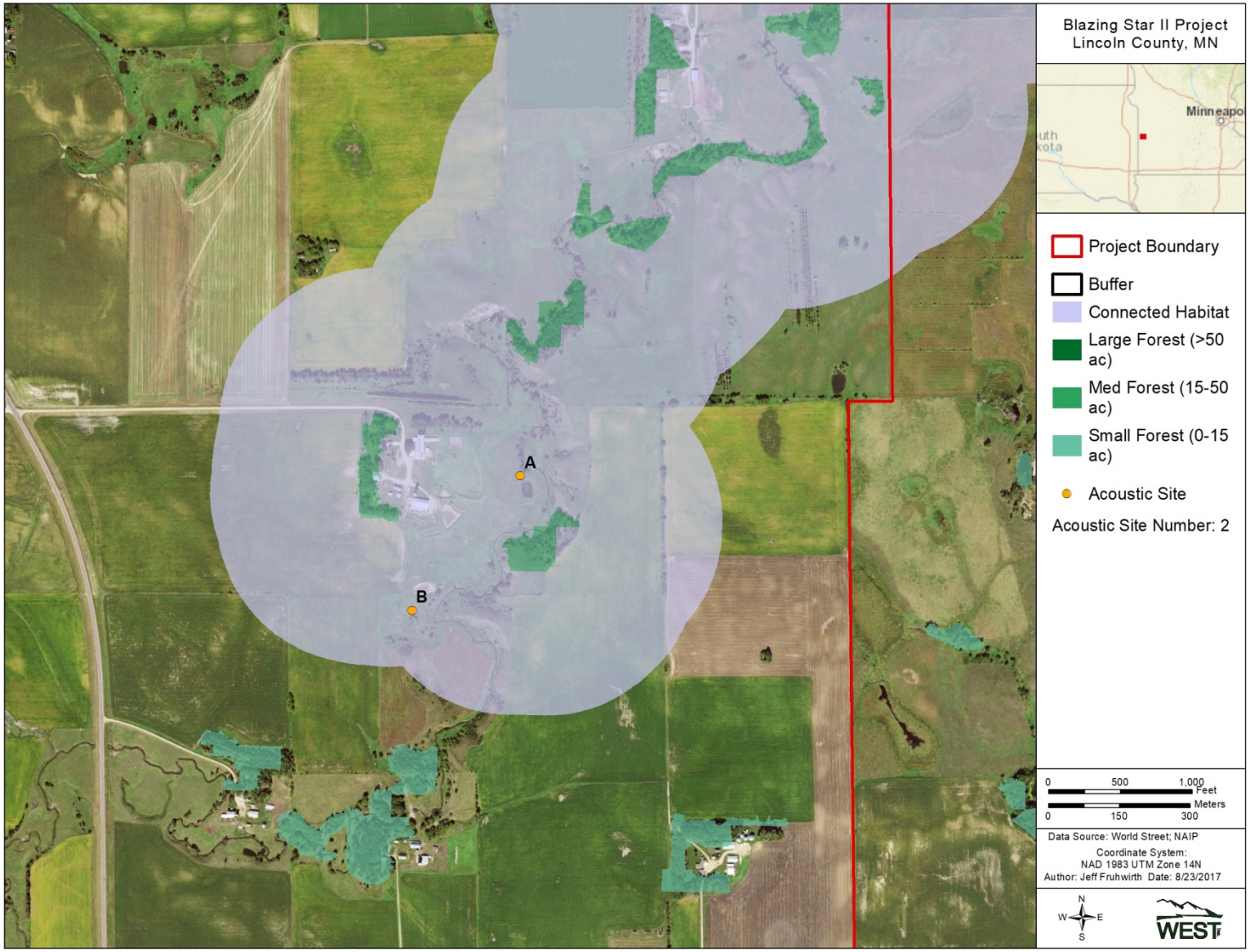


Figure 3b. Location of the Blazing Star II Wind Farm Acoustic Detector Stations 2A and 2B in Lincoln County, Minnesota.

Figure 4c. Location of the Blazing Star II Wind Farm Acoustic Detector Stations 3A and 3B in Lincoln County, Minnesota.

RESULTS

Acoustical Analysis

Acoustic surveys were completed at three survey sites (six stations) from June 16 – 20, 2017, for a total of 12 valid detector nights (met weather and other criteria); June 17 did not meet the criteria so was not considered a valid detector night. UTM coordinates and site descriptions for each survey station are listed in Table 1. Photographs and datasheets with site descriptions are found in Appendix A.

Table 1. Location and site description of acoustic survey stations at the Blazing Star II Wind Farm.

Site ID	Station ID	Easting†	Northing†	Site Description
1	A	717591	4930088	Field edge next to crops
1	B	717638	4929697	Field edge along small stand of trees
2	A	717629	4935740	Open field near riparian stream and pond
2	B	717406	4935449	Open field with sparse trees
3	A	708851	4923208	Forested corridor near open field
3	B	708969	4923049	Open field surrounded by forest

† = NAD 1983, Zone 14

To assess study conditions for compliance with USFWS Guidelines (USFWS 2017), weather was monitored using the Ivanhoe weather station (KMNIVANH2) on Weather Underground's online weather system (http://www.wunderground.com). Five of the six stations (Stations 1A, 1B, 2A, 3A and 3B were deployed on June 16 and retrieved June 19. Weather conditions did not meet the criteria for these stations on the night of June 17, so the stations were left out for an additional night (June 18). Station 2B was deployed on June 17 and retrieved on June 20. Weather conditions did not meet the criteria for this station on the night of June 17, so the station was left out for an additional night (June 19). Together, these six stations collected twelve nights of valid data, meeting the requirement of at least four detector nights per site.

Kaleidoscope identified a total of 612 bat call files and identified 542 files (88.5%) to species. Data collected on the invalid night of June 17 was included in the analysis to be conservative, and calculation of total bat calls recorded and total bat calls identified during the time of this study includes all data collected during the total survey effort (Table 2). Table 2 summarizes the number of valid detector nights, number of bat call files, and number of bat calls identified to species at each survey station. Table 3 provides information on species identifications for each survey station.

Table 2. Number of bat calls recorded at each acoustic survey station determined by Kaleidoscope for the Blazing Star II Wind Farm.

Acoustic Survey Site	Acoustic Survey Station	ID program	Total Bat Calls*	Calls Identified*	Valid Detector Nights
1	A	Kaleidoscope	62	59 (95.2%)	2
	B	Kaleidoscope	146	129 (88.4%)	2
2	A	Kaleidoscope	194	171 (88.1%)	2
	B	Kaleidoscope	67	60 (89.6%)	2
3	A	Kaleidoscope	99	83 (83.8%)	2
	B	Kaleidoscope	44	40 (90.9%)	2
Total			**612***	**542 (88.5%)***	**12**

*Data collected during the invalid night of June 17 is included in the calculation of total calls recorded and identified.

Table 3. Summary of Kaleidoscope echolocation call identifications for the Blazing Star II Wind Farm.

Site ID	Station ID	EPFU*	LABO	LACI	LANO	MYLU	MYSE	UNK	Total
1	A	12	13	26	5	3	0	3	**62**
1	B	24	45	38	17	5	0	17	**146**
2	A	30	55	60	25	1	0	23	**194**
2	B	10	5	21	12	2	0	7	**67**
3	A	26	38	7	9	3	0	16	**99**
3	B	8	30	1	0	1	0	4	**44**
Total		**110**	**186**	**163**	**68**	**15**	**0**	**70**	**612**

*EPFU = Big Brown Bat; LABO = Eastern Red Bat; LACI = Hoary Bat; LANO = Silver-haired Bat; MYLU = Little Brown Bat; MYSE = Northern Long-eared Bat; UNK = Unknown.

Kaleidoscope did not identify any potential NLEB calls at any stations sampled during any night (including all data collected on both valid and invalid weather nights). Qualitative analysis was not needed to verify the presence of NLEB at any survey stations (Table 4).

Table 4. Summary of actions at each acoustic survey station for the Blazing Star II Wind Farm.

Site	Station ID	NLEB Calls	Probable NLEB Calls ($P < 0.05$)	NLEB Qualitatively Verified	Recommended Action
1	A	No	No	No	No further action
1	B	No	No	No	No further action
2	A	No	No	No	No further action
2	B	No	No	No	No further action
3	A	No	No	No	No further action
3	B	No	No	No	No further action

DISCUSSION

Limited information is available on NLEB movement patterns and behaviors in the Midwest region. While there is some information suggesting this species tends to occupy forested environments and avoid open areas if possible, these bats may occasionally move through non-forested areas to better access fragmented forest patches for foraging and roosting.

If these bats occur in the Project area during the summer months, they will likely occur within or near (within 1,000 ft [305 m]) suitable wooded habitat patches. WEST conducted acoustical surveys for NLEB at six detector locations within three sites in areas of suitable habitat within the Blazing Star II Wind Farm.

NLEB were not identified by acoustical software at any of the six acoustic stations on any of the surveyed nights. These results are similar to the results of the previous presence/probable absence surveys at the Project, where no NLEB calls were qualitatively verified at any of the four acoustic stations surveyed in 2016 (WEST 2016). Therefore, this species is considered likely absent from the proposed Project. Surveys are considered complete for all six survey stations at the three sites, and no further action is recommended to confirm NLEB bat absence pursuant to USFWS *Northern Long-eared Bat Interim Conference and Planning Guidance* (USFWS 2014) and *2017 Range-Wide Indiana Bat Summer Survey Guidelines* (USFWS 2017).

LITERATURE CITED

WEST, 2016. Northern Long-Eared Bat Presence/Absence Acoustic Surveys, Blazing Star II Wind Farm, Lincoln County, Minnesota. Draft Report: July 27 - 29, 2016. Prepared for Blazing Star II Wind Farm, LLC. Prepared by Western EcoSystems Technology, Inc. (WEST), Golden Valley, Minnesota.

U.S. Fish and Wildlife Service (USFWS). 2011. Indiana Bat Section 7 and Section 10 Guidance for Wind Energy Projects (Revised: 26 October 2011). Available online at: http://www.fws.gov/midwest/endangered/mammals/inba/pdf/inbaS7and10WindGuidanceFinal26Oct2011.pdf

U.S. Fish and Wildlife Service (USFWS). 2014. Northern Long-eared Bat Interim Conference and Planning Guidance. January 6, 2014. USFWS Regions 2, 3, 4, 5, & 6. Available online at: http://www.fws.gov/northeast/virginiafield/pdf/NLEBinterimGuidance6Jan2014.pdf

U.S. Fish and Wildlife Service (USFWS). 2017. 2017 Range-Wide Indiana Bat Summer Survey Guidelines (May 2017). USFWS Endangered Species Program: Midwest Region.

Appendix A. Blazing Star II Wind Farm Acoustic Survey Station Photographs and Datasheets

Acoustic Detector Station 1A

Station 1A Location

Station 1A Orientation

Station 1A Detection Cone

Acoustic Presence/Probable Absence 2016 Form

Project: Blazing Star II — **Station ID**: 2A

Start Date/Time (military): 1400 6/16/17 — End Date/Time: 1100 6/19/17

Observer(s): Brenna H + Marissa T

Station Information:

County: Lincoln State: MN

Datum: NAD27 (NAD83) Zone: 14 Easting: (6 digits) 0717591 Northing: (7 digits) 4930088

Detector Type: SM4 Detector Serial #: 00001516 Tablet Location*: NA

Detector Housing: Ammo Box Toolbox Plastic Tote Other: NA

Battery source: (Internal) External If External: _____volts _____ amp/hrs

Microphone

Mic Serial#* MV104302 Mic Ht (m): (from ground) 3 Mic Channel* – Audio Div* – Data Div* –

Mic Horizontal Orientation: 325 Mic Vertical Orientation: 0 Sound Reception: None Horn Bat Hat (RVC Elbow)

All Detector Checklist						Anabat Only				
Date/Time	Battery Voltage	Mic Check Good? Y/N	Cables; detector housing; mic holder Good?	Data Card(s) Replaced?	Battery Changed?	Sensitivity Setting (normally 6)	Test Indicators (checkmark)	Volume (lowest setting) Yes/No	LED Lights (circle) *(should be Standby, unless between 1800 and 0800hrs)*	Comments *I.e., detector set, detector picked up, moved, knocked over, vandalized, etc.*
1737 → 6/16/17	5.6	Y	✓	✓	✓		"Data" lit Static Heard		Record Status Data Standby Error	
1100 6/19/17	5.4	Y	✓	✓	✓		"Data" lit Static Heard		Record Status Data Standby Error	
							"Data" lit Static Heard		Record Status Data Standby Error	
							"Data" lit Static Heard		Record Status Data Standby Error	

Habitat Description *(within 100m)*

% Forested: 40 %Open/Ag: 60 %Water: 0 **Dominant Tree Spp**: cherry/oak/maple

Stand Age: Young (Mature) Old

Detector Sampling (*circle 1 or more*):

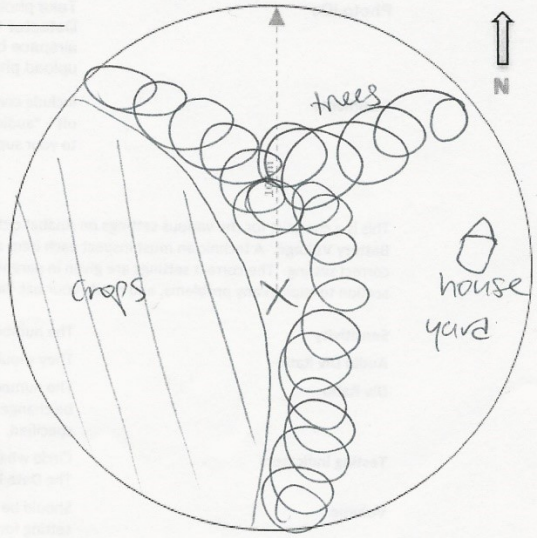
(Creek Riparian) Pond Bottomland Forest Upland Forest (Field Edge) Open Field

Cave Entrance Mine Portal Bridge Structure Other: _____

Topography: (Flat) Slope High Point Low Point Other: _____

Habitat Description: *Map out habitat features within 100 m radius of Song Meter (x). Indicate direction of microphone using an arrow. Include any features of interest (water, buildings, rocky outcrops, etc.). Provide a written description in the space below, including details on width of the road/trail/cutline, size of pond/lake, distance to nearest water, etc.).*

next to crop field near residential field/yard. stream about 500m away



Photos (check)

Detector Location ✓ *(detector + main habitat surveyed)*

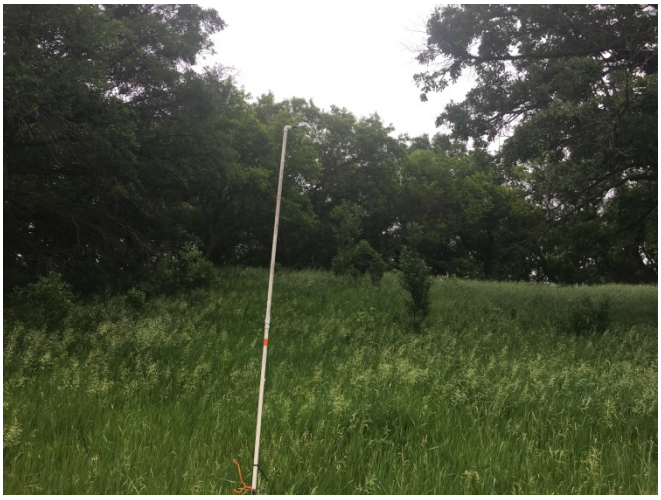
Detector Orientation ✓ *(detector + surrounding habitat)*

Detection Cone ✓ *(air space sampled)*

Station 1A Datasheet

Acoustic Detector Station 1B

Station 1B Location



Station 1B Orientation

Station 1B Detection Cone

Acoustic Presence/Probable Absence 2016 Form

Project: Blazing Star II — **Station ID**: 2B

Start Date/Time (military): 1400 6/16/17 — End Date/Time: 1125 6/19/17

Observer(s): Brenna H + Marissa T

Station Information:

County: Lincoln State: MN

Datum: NAD27 (NAD83) Zone: 14 Easting: (6 digits) 0717638 Northing: (7 digits) 4929697

Detector Type: SM4 Detector Serial #: 00001523 Tablet Location*: NA

Detector Housing: Ammo Box Toolbox Plastic Tote Other: NA

Battery source: (Internal) External If External: _____volts _____ amp/hrs

Microphone

Mic Serial#* MV100533 Mic Ht (m): (from ground) 3 Mic Channel* — Audio Div* — Data Div* —

Mic Horizontal Orientation: 215 Mic Vertical Orientation: 0 Sound Reception: None Horn Bat Hat (PVC Elbow)

All Detector Checklist						Anabat Only				
Date/Time	Battery Voltage	Mic Check Good? Y/N	Cables; detector housing; mic holder Good?	Data Card(s) Replaced?	Battery Changed?	Sensitivity Setting (normally 6)	Test Indicators (checkmark)	Volume (lowest setting) Yes/No	LED Lights (circle) *(should be Standby, unless between 1800 and 0800hrs)*	Comments *I.e., detector set, detector picked up, moved, knocked over, vandalized, etc.*
1700 6/16/17	5.7	Y	✓	✓	✓		"Data" lit Static Heard		Record Status Data Standby Error	
1125 6/19/17	5.3	Y	✓	✓	✓		"Data" lit Static Heard		Record Status Data Standby Error	
							"Data" lit Static Heard		Record Status Data Standby Error	
							"Data" lit Static Heard		Record Status Data Standby Error	

Habitat Description *(within 100m)*

% Forested: 15 %Open/Ag: 85 %Water: 0 **Dominant Tree Spp**: Cherry/Oak

Stand Age: Young (Mature) Old

Detector Sampling (*circle 1 or more*):

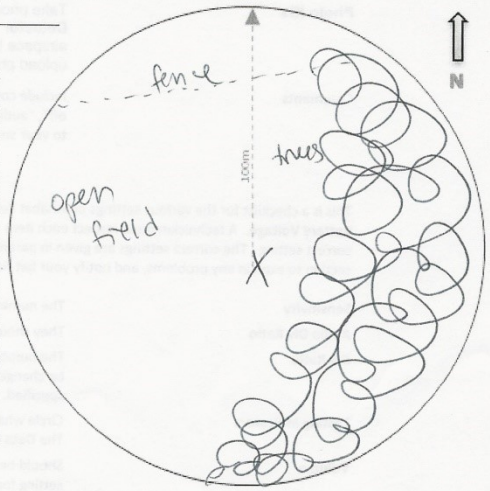
(Creek Riparian) Pond Bottomland Forest Upland Forest (Field Edge) Open Field

Cave Entrance Mine Portal Bridge Structure Other: _____

Topography: (Flat) Slope High Point Low Point Other: _____

Habitat Description: *Map out habitat features within 100 m radius of Song Meter (x). Indicate direction of microphone using an arrow. Include any features of interest (water, buildings, rocky outcrops, etc.). Provide a written description in the space below, including details on width of the road/trail/cutline, size of pond/lake, distance to nearest water, etc.).*

field edge off of road
next to trees



Photos (check)

Detector Location ✓ *(detector + main habitat surveyed)*

Detector Orientation ✓ *(detector + surrounding habitat)*

Detection Cone ✓ *(air space sampled)*

Station 1B Datasheet

Acoustic Detector Station 2A

Station 2A Location

Station 2A Orientation

Station 2A Detection Cone

WEST

Acoustic Presence/Probable Absence 2016 Form

Project: Blazing Star II — **Station ID:** 3A

Start Date/Time (military): 1900 6/16/17 — End Date/Time: 6/29/17

Observer(s): BL, MT

Station Information:

County: Lincoln State: MN

Datum: NAD27 NAD83 Zone: 14 Easting: (6 digits) 717629 Northing: (7 digits) 4935740

Detector Type: SM4 Detector Serial #: 10001629 (on back) Tablet Location*: —

Detector Housing: Ammo Box Toolbox Plastic Tote Other: NA

Battery source: Internal External If External: ____volts ____amp/hrs

Microphone

Mic Serial#* MU102903 Mic Ht (m): (from ground) 3 Mic Channel* — Audio Div* — Data Div* —

Mic Horizontal Orientation: 340 Mic Vertical Orientation: 0 Sound Reception: None Horn Bat Hat PVC Elbow

All Detector Checklist						Anabat Only				
Date/Time	Battery Voltage	Mic Check Good? Y/N	Cables; detector housing; mic holder Good?	Data Card(s) Replaced?	Battery Changed?	Sensitivity Setting (normally 6)	Test Indicators (checkmark)	Volume (lowest setting) Yes/No	LED Lights (circle) (should be Standby, unless between 1800 and 0800hrs)	Comments i.e., detector set; detector picked up, moved, knocked over, vandalized, etc.
6/16/17 ↓	5.4	Y	✓	✓	✓		"Data" lit Static Heard		Record Standby Status Error Data	
6/20/17	5.3	Y	✓	✓	✓		"Data" lit Static Heard		Record Standby Status Error Data	
							"Data" lit Static Heard		Record Standby Status Error Data	
							"Data" lit Static Heard		Record Standby Status Error Data	

Habitat Description *(within 100m)*

% Forested: 20 %Open/Ag: 60 %Water: 20 **Dominant Tree Spp:** chery/oak spp

Stand Age: Young Mature Old

Detector Sampling ***(circle 1 or more):***

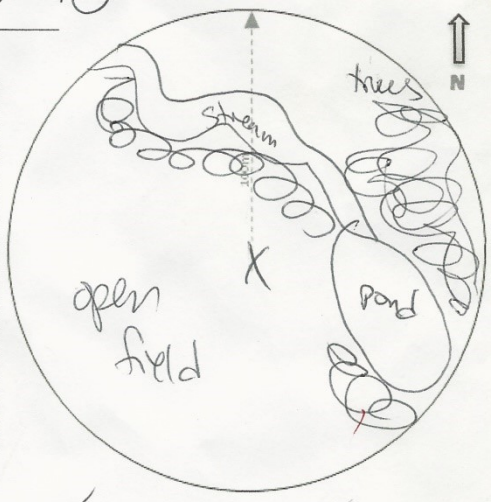
Creek Riparian Pond Bottomland Forest Upland Forest Field Edge Open Field

Cave Entrance Mine Portal Bridge Structure Other: ____

Topography: Flat Slope High Point Low Point Other: ____

Habitat Description: *Map out habitat features within 100 m radius of Song Meter (x). Indicate direction of microphone using an arrow. Include any features of interest (water, buildings, rocky outcrops, etc.). Provide a written description in the space below, including details on width of the road/trail/cutline, size of pond/lake, distance to nearest water, etc.).*

next to riparian stream and pond in open hay ag field



Photos (check)

Detector Location ✓ *(detector + main habitat surveyed)*

Detector Orientation ✓ *(detector + surrounding habitat)*

Detection Cone ✓ *(air space sampled)*

Station 2A Datasheet

Acoustic Detector Station 2B

Station 2B Location

Station 2B Orientation

Station 2B Detection Cone

WEST

Acoustic Presence/Probable Absence 2016 Form

Project: Blazing Star II — **Station ID**: 3B

Start Date/Time (military): 6/17/17 — End Date/Time: 6/20/17

Observer(s): Bat, MT

Station Information:

County: Lincoln State: MN

Datum: NAD27 (NAD83) Zone: 14 Easting: (6 digits) 071706 Northing: (7 digits) 4935449

Detector Type: SMM Detector Serial #: 00001521 Tablet Location*: —

Detector Housing: Ammo Box Toolbox Plastic Tote Other: none

Battery source: (Internal) External If External: _____volts _____ amp/hrs

Microphone

Mic Serial#* MU103089 Mic Ht (m): (from ground) 3 Mic Channel* ___ Audio Div*_____ Data Div*___

Mic Horizontal Orientation: 90 Mic Vertical Orientation: 0 Sound Reception: (None) Horn Bat Hat PVC Elbow

All Detector Checklist						**Anabat Only**			
Date/Time	Battery Voltage	Mic Check Good? Y/N	Cables; detector housing; mic holder Good?	Data Card(s) Replaced?	Battery Changed?	Sensitivity Setting (normally 6)	Test Indicators (checkmark)	Volume (lowest setting) Yes/No	LED Lights (circle) *(should be Standby, unless between 1800 and 0800hrs)*	Comments *I.e., detector set, detector picked up, moved, knocked over, vandalized, etc.*
730 6/17/17	5.4	Y	✓	✓	✓		"Data" lit Static Heard		Record Status Data Standby Error	
6/20/17	5.3	Y	✓	✓	✓	✓	"Data" lit Static Heard		Record Status Data Standby Error	
							"Data" lit Static Heard		Record Status Data Standby Error	
							"Data" lit Static Heard		Record Status Data Standby Error	

Habitat Description *(within 100m)*

% Forested 10 %Open/Ag 90 %Water: 10 **Dominant Tree Spp**: cherry

Stand Age: (Young) Mature Old

Detector Sampling (*circle 1 or more*):

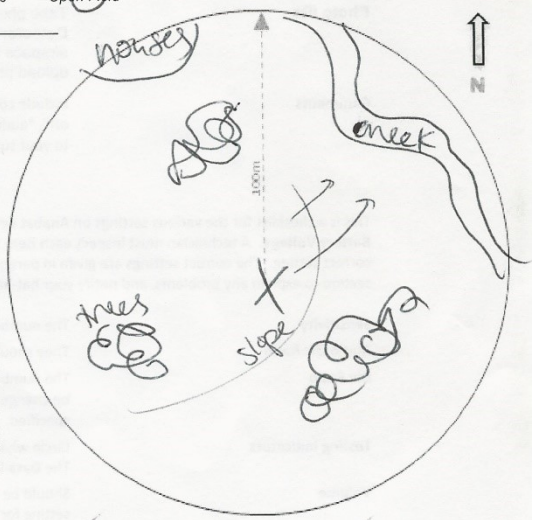
Creek Riparian Pond Bottomland Forest Upland Forest Field Edge (Open Field)

Cave Entrance Mine Portal Bridge Structure Other:_____

Topography: Flat (Slope) (High Point) Low Point Other:_____

Habitat Description: *Map out habitat features within 100 m radius of Song Meter (x). Indicate direction of microphone using an arrow. Include any features of interest (water, buildings, rocky outcrops, etc.). Provide a written description in the space below, including details on width of the road/trail/cutline, size of pond/lake, distance to nearest water, etc.).*

in open field spotted with trees on slight slope going down towards creek



Photos (check)

Detector Location ✓ *(detector + main habitat surveyed)*

Detector Orientation ✓ *(detector + surrounding habitat)*

Detection Cone ✓ *(air space sampled)*

Station 2B Datasheet

Acoustic Detector Station 3A

Station 3A Location

Station 3A Orientation

Station 3A Detection Cone

Acoustic Presence/Probable Absence 2016 Form

Project: Blazing Star II — **Station ID**: 5A

Start Date/Time (military): 1500 6/16/17 — End Date/Time: 1030 6/19/17

Observer(s): Brenna H + Marissa T

Station Information:

County: Lincoln State: MN

Datum: NAD27 NAD83 Zone: 14 Easting: (6 digits) 0708851 Northing: (7 digits) 4923208

Detector Type: SM4 Detector Serial #: 00001525 Tablet Location*: NA

Detector Housing: Ammo Box Toolbox Plastic Tote Other: NA

Battery source: Internal External If External: _____volts _____ amp/hrs

Microphone

Mic Serial#* MU101004 Mic Ht (m): (from ground) 3 Mic Channel* — Audio Div* — Data Div* —

Mic Horizontal Orientation: 50 Mic Vertical Orientation: 0 Sound Reception: None Horn Bat Hat PVC Elbow

All Detector Checklist | **Anabat Only**

Date/Time	Battery Voltage	Mic Check Good? Y/N	Cables; detector housing; mic holder Good?	Data Card(s) Replaced?	Battery Changed?	Sensitivity Setting (normally 6)	Test Indicators (checkmark)	Volume (lowest setting) Yes/No	LED Lights (circle) *(should be Standby, unless between 1800 and 0800hrs)*	Comments *I.e., detector set, detector picked up, moved, knocked over, vandalized, etc.*
2052 6/16/17	5.7	Y	✓	✓	✓		"Data" lit Static Heard		Record Standby Status Error Data	
1030 6/19/17	5.4	Y	✓	✓	✓		"Data" lit Static Heard		Record Standby Status Error Data	
							"Data" lit Static Heard		Record Standby Status Error Data	
							"Data" lit Static Heard		Record Standby Status Error Data	

Habitat Description *(within 100m)*

% Forested: 40 %Open/Ag: 60 %Water: 0 **Dominant Tree Spp**: aspen/maple

Stand Age: Young Mature Old

Detector Sampling (*circle 1 or more*):

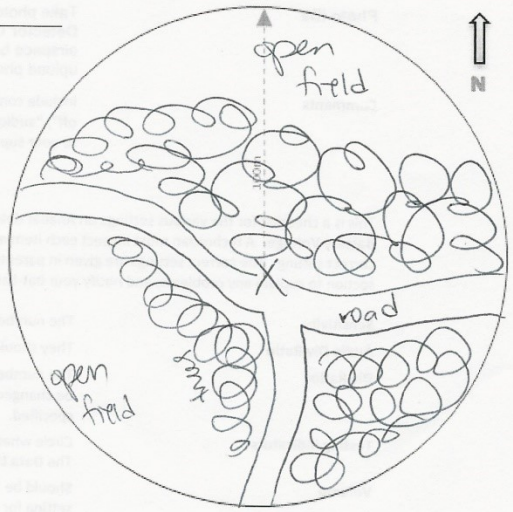
Creek Riparian Pond Bottomland Forest Upland Forest Field Edge Open Field

Cave Entrance Mine Portal Bridge Structure Other: _____

Topography: Flat Slope High Point Low Point Other: _____

Habitat Description: *Map out habitat features within 100 m radius of Song Meter (x). Indicate direction of microphone using an arrow. Include any features of interest (water, buildings, rocky outcrops, etc.). Provide a written description in the space below, including details on width of the road/trail/cutline, size of pond/lake, distance to nearest water, etc.).*

in forest corridor next to open field



Photos (check)

Detector Location ✓ *(detector + main habitat surveyed)*

Detector Orientation ✓ *(detector + surrounding habitat)*

Detection Cone ✓ *(air space sampled)*

Station 3A Datasheet

Acoustic Detector Station 3B

Station 3B Location

Station 3B Orientation

Station 3B Detection Cone

Acoustic Presence/Probable Absence 2016 Form

WEST

Project: Bearing Star II — **Station ID**: 5B

Start Date/Time (military): 1900 6/16/17 — End Date/Time: 1050 6/19/17

Observer(s): Brenna H + Marissa T

Station Information:

County: Lincoln State: MN

Datum: NAD27 (NAD83) Zone: 14 Easting: (6 digits) 070869 Northing: (7 digits) 4923049

Detector Type: SM4 Detector Serial #: 00001518 Tablet Location*: NA

Detector Housing: Ammo Box Toolbox Plastic Tote Other: NA

Battery source: (Internal) External If External: _____volts _____amp/hrs

Microphone

Mic Serial#* MU103090 Mic Ht (m): (from ground) 3 Mic Channel* — Audio Div* — Data Div* —

Mic Horizontal Orientation: 48 Mic Vertical Orientation: 0 Sound Reception: None Horn Bat Hat (PVC Elbow)

All Detector Checklist						Anabat Only				
Date/Time	Battery Voltage	Mic Check Good? Y/N	Cables; detector housing; mic holder Good?	Data Card(s) Replaced?	Battery Changed?	Sensitivity Setting (normally 6)	Test Indicators (checkmark)	Volume (lowest setting) Yes/No	LED Lights (circle) *(should be Standby, unless between 1800 and 0800hrs)*	Comments *I.e., detector set, detector picked up, moved, knocked over, vandalized, etc.*
2036 6/16/17	5.5	Y	✓	✓	✓		"Data" lit Static Heard		Record Status Data Standby Error	
1050 6/19/17	5.4	Y	✓	✓	✓		"Data" lit Static Heard		Record Status Data Standby Error	
							"Data" lit Static Heard		Record Status Data Standby Error	
							"Data" lit Static Heard		Record Status Data Standby Error	

Habitat Description *(within 100m)*

% Forested: 20 %Open/Ag: 70 %Water: 0 **Dominant Tree Spp**: cherry/aspen

Stand Age: Young (Mature) Old

Detector Sampling ***(circle 1 or more)***:

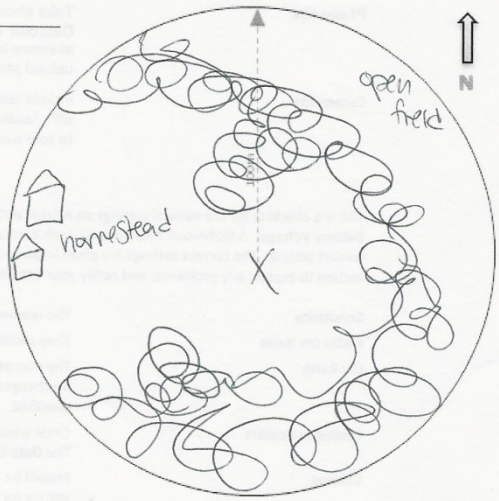
Creek Riparian Pond Bottomland Forest (Upland Forest) (Field Edge) Open Field

Cave Entrance Mine Portal Bridge Structure Other: _____

Topography: (Flat) Slope High Point Low Point Other: _____

Habitat Description: *Map out habitat features within 100 m radius of Song Meter (x). Indicate direction of microphone using an arrow. Include any features of interest (water, buildings, rocky outcrops, etc.). Provide a written description in the space below, including details on width of the road/trail/cutline, size of pond/lake, distance to nearest water, etc.).*

In small opening within trees around homestead next to open field



Photos (check)

Detector Location ✓ *(detector + main habitat surveyed)*

Detector Orientation ✓ *(detector + surrounding habitat)*

Detection Cone ✓ *(air space sampled)*

Station 3B Datasheet

2017 Raptor Nest Survey Report

Blazing Star II Wind Farm

Lincoln County, Minnesota

Prepared for:

Blazing Star II Wind Farm, LLC

7650 Edinborough Way, Suite 725
Edina, Minnesota 55425

Prepared by:

Western EcoSystems Technology, Inc.

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

August 30, 2017

Privileged and Confidential – Not For Distribution

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REPORT REFERENCE

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INTRODUCTION

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

SURVEY AREA

The survey area for all raptor stick-nests consisted of a 1-mile (mi; 1.6-kilometer [km]) buffer of the Project boundary, and the survey area for bald eagle nests consisted of a 10-mi (16.1-km) buffer of the Project boundary (Figure 1). The Project boundary currently encompasses approximately 48,652 acres (19,689 hectares) and is located in southwestern Minnesota in Lincoln County, east of the South Dakota border. The Project is in the Northern Glaciated Plains level III Ecoregion and the Prairie Coteau Level IV Ecoregion (US Environmental Protection Agency [USEPA] 2016). The Northern Glaciated Plains Ecoregion is characterized by a flat to gently rolling landscape of glacial drift. The region is transitional between tallgrass and shortgrass prairie and high concentrations of temporary and seasonal wetlands offer suitable habitat for waterfowl nesting and migration. The Prairie Coteau Ecoregion is generally a higher elevation plateau with poorly defined drainage. Many lakes and a mix of row crops and pasture are present in this region and within the Project itself (USEPA 2013, USEPA 2015).

METHODS

Aerial Raptor Nest Survey

An aerial survey was conducted from a helicopter on April 4-8, 2017, a period before leaf out when raptors would be actively tending to a nest or incubating eggs. The aerial survey was conducted in accordance with the guidance provided in the ECPG (USFWS 2013) and the USFWS *Interim Golden Eagle Technical Guidance* (Pagel et al. 2010). An experienced raptor ecologist and a skilled helicopter pilot conducted the survey. Raptors are defined here as kites, accipiters, buteos, harriers, eagles, falcons, and owls (Buehler 2000). However, the main focus of the survey was to identify bald eagle nests. Bald eagle nest surveys focused on locating eyries (large, stick nest structures) in suitable eagle nesting substrate (trees, transmission lines, cliff faces, etc.) within and around the proposed Project (Figure 1), considering a 1-mi (1.6-km) and a 10-mi (16.1-km) buffer (Figure 1). Pre-flight planning included the creation of field maps and mobile Geographic Information System (GIS) files and review of relevant background information, such as previously recorded nest locations, topographic maps, and aerial photographs.

Surveys within the Project boundary and 1-mi (1.6-km) buffer documented all potential raptor nests, including bald eagles, while the surveys out to the 10-mi (16.1-km) buffer focused only on identifying potential bald eagle nests. Efforts were made to minimize disturbance to breeding raptors; the greatest possible distance at which the species could be identified was maintained, with distances varying, depending upon nest location and wind conditions.

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

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

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

Nest Activity Monitoring

WEST conducted follow-up surveys of the bald eagle nests detected within 2-mi (3.2 km) of the Project boundary, and if activity was confirmed additional ground-based nest activity monitoring surveys were conducted. The principal objective of follow-up surveys was to document nest status and record the direction of flights to and from the nest.

Terminology

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

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

Species – A species was assigned to each nest when possible, otherwise, it was classified as an unknown raptor nest. Nests documented as unknown raptor species were defined as any stick nest not having an occupant associated with it at the time of the survey. Many times nests become abandoned or are no longer used, and over time, may become a historic nest site. Unknown raptor nests, including old nests or nests that could become suitable for raptors, were

documented in order to populate a nest database to ensure future surveys include all potentially suitable nest sites.

Nest Condition – Nest condition was categorized as either good or in disrepair. Although the determination of nest condition can be subjective and may vary between observers, it gives a general sense of when a nest or nest site was last used. Nests in good condition appeared well maintained, had a well-defined bowl shape, were not sagging or sloughing, and appeared suitable for nesting. Nests in disrepair were sloughing or sagging heavily, and required effort to restore for successful nesting.

Substrate – Nest substrate was observed and recorded providing observers a visual reference. Substrates included manmade structures such as power lines, nest platforms, and dock hoists, and biological and physical structures included conifer and deciduous tree species or cliff faces.

Nest Status – Nest status was categorized using definitions consistent with the USFWS ECPG. Nests were classified as occupied if any of the following were observed at the nest structure: (1) an adult in an incubating position; (2) eggs; (3) nestlings or fledglings; (4) a pair of adults (sometimes sub-adults); (5) a newly constructed or refurbished stick nest in the area where territorial behavior of a raptor had been observed earlier in the breeding season; or (6) a recently repaired nest with fresh sticks (clean breaks) or fresh boughs on top, and/or droppings and/or molted feathers on its rim or underneath. Occupied nests were further classified as active if (1) an adult was present on the nest in incubating position, (2) an egg or eggs were present, or (3) nestlings observed. Nests were classified as inactive if no eggs or chicks were present. Nests not meeting the above criteria for “Occupied” were classified as “Unoccupied”.

RESULTS

Aerial Raptor Surveys

A total of 92 raptor nests representing three raptor species were detected during the aerial survey on April 4-8, 2017 (Table 1). Nine occupied and active bald eagle nests were documented. Additional raptor nests documented during the survey included eleven occupied and active great horned owl (*Bubo virginianus*) nests, fourteen occupied and active red-tailed hawk (*Buteo jamaicensis*) nests, five occupied and active nests of unknown species, ten occupied and inactive nests of unknown species, and forty-three unoccupied and inactive nests of unknown species. The mean inter-nest distance for active bald eagle nests observed during the 2017 aerial survey was approximately 7.1 mi (11.4 km), with a half-mean inter-nest distance of 3.55 mi (5.7 km).

The following section provides more details on each eagle nest documented during the aerial survey are provided below and a photo of each eagle nest is provided in Appendix A:

Nest 1744 – This nest was located approximately 0.6 mi (1.0 km) west of the Project boundary. The nest was in good condition. One adult bald eagle was present on the nest and in incubating

position. The nest is therefore considered occupied and active in 2017 (Figure 1; Appendix A1). Follow up nest-monitoring occurred at this nest, as discussed below.

Nest 1554 – This nest was located approximately 0.63 mi (1.01 km) south of the Project boundary on the north shore of Lake Shaokatan. The nest was in good condition. Two adult bald eagles were observed in the tree; one was on the nest in incubating position. The nest is therefore considered occupied and active in 2017 (Figure 1; Appendix A2). Follow up nest-monitoring occurred at this nest, as discussed below.

Nest 1510 – This nest was located approximately 3.16 mi (5.06 km) east of the Project boundary. The nest was in good condition. One adult bald eagle was present on the nest and in incubating position. The nest is therefore considered occupied and active in 2017 (Figure 1; Appendix A3).

Nest 1329 – This nest was located approximately 3.52 mi (5.63 km) southeast of the Project boundary. The nest was in good condition. One adult bald eagle was present on the nest and in incubating position. The nest is therefore considered occupied and active in 2017 (Figure 1; Appendix A4).

Nest 1616 – This nest was located approximately 3.79 mi (6.06 km) north of the Project boundary. The nest was in good condition. One adult bald eagle was present on the nest and in incubating position. The nest is therefore considered occupied and active in 2017 (Figure 1; Appendix A5).

Nest 1604 – This nest was located approximately 4.46 mi (7.12 km) east of the Project boundary. The nest was in good condition. One adult bald eagle was present on the nest and in incubating position. The nest is therefore considered occupied and active in 2017 (Figure 1; Appendix A6).

Nest 1619 – This nest was located approximately 4.95 mi (7.92 km) west of the Project boundary. The nest was in good condition. One adult bald eagle was present on the nest and in incubating position. The nest is therefore considered occupied and active in 2017 (Figure 1; Appendix A7).

Nest 1618 – This nest was located approximately 6.46 mi (10.40 km) northwest of the Project boundary. The nest was in good condition. Two adult bald eagles were present; one was on the nest in incubating position. The nest is therefore considered occupied and active in 2017 (Figure 1; Appendix A8).

Nest 1506 – This nest was located approximately 9.33 mi (14.93 km) east of the Project boundary. The nest was in good condition. One adult bald eagle was present on the nest and in incubating position. The nest is therefore considered occupied and active in 2017 (Figure 1; Appendix A9).

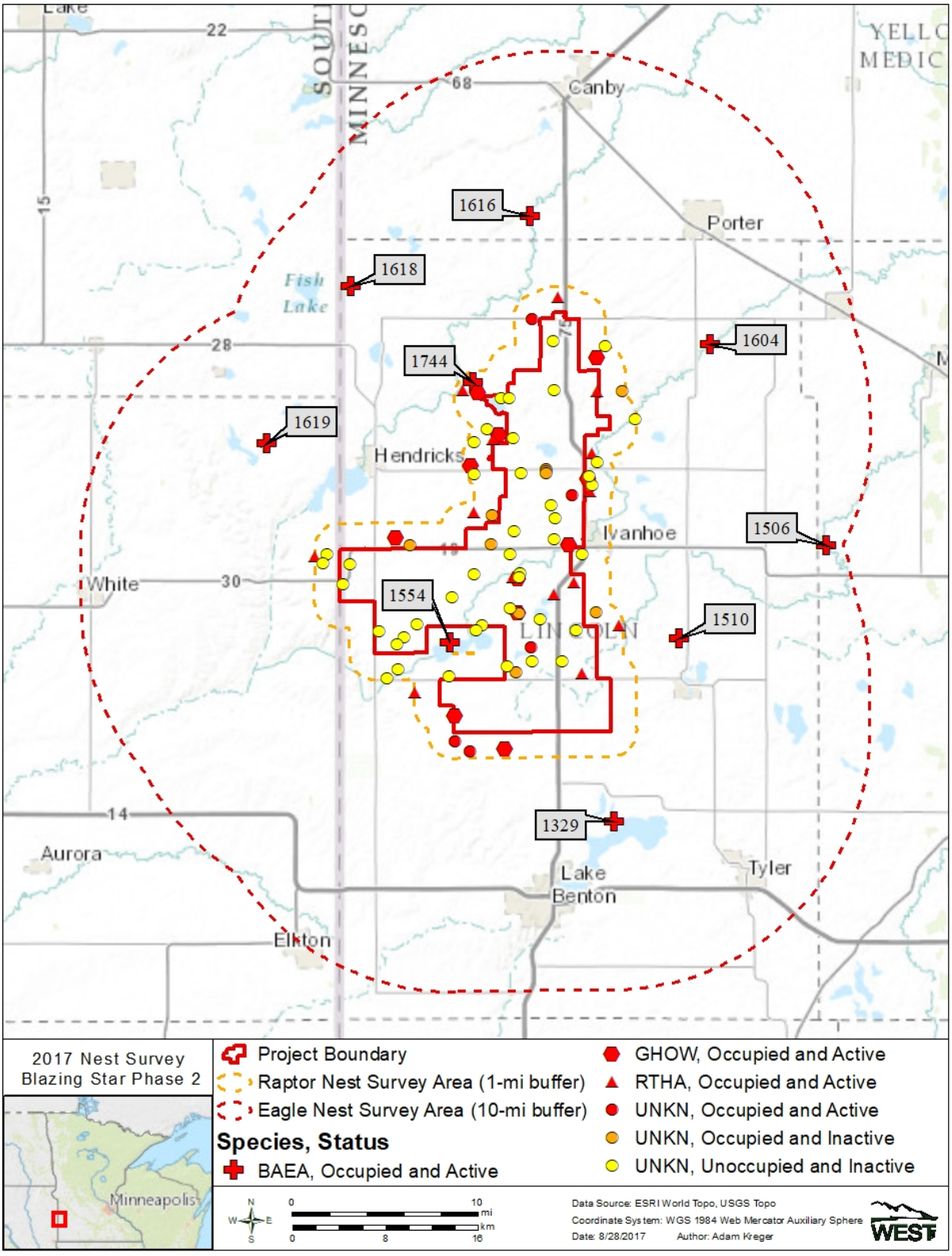

Figure 1. Location of raptor nests observed near the Blazing Star II Wind Farm, Lincoln County, Minnesota (BAEA = bald eagle, RTHA = red-tailed hawk, GHOW = great-horned owl, UNKN = unknown species).

Table 1. Nest ID, location, species, status, substrate, and condition of nests recorded during the April 4-8, 2017 raptor nest survey for the Blazing Star II Wind Farm, Lincoln County, MN.

Nest ID	Latitude	Longitude	Species[1]	Status at time of survey	Nest Substrate	Condition
1329	44.3068	-96.2386	BAEA	Occupied and Active	Tree	Good
1506	44.4609	-96.0736	BAEA	Occupied and Active	Tree	Good
1510	44.4092	-96.1878	BAEA	Occupied and Active	Tree	Good
1554	44.4067	-96.3669	BAEA	Occupied and Active	Tree	Good
1604	44.5725	-96.1638	BAEA	Occupied and Active	Tree	Good
1616	44.6437	-96.3045	BAEA	Occupied and Active	Tree	Good
1619	44.5177	-96.5090	BAEA	Occupied and Active	Tree	Good
1744	44.5516	-96.3486	BAEA	Occupied and Active	Tree	Good
1618	44.6048	-96.4439	BAEA	Occupied and Active	Tree	Good
1514	44.4982	-96.2587	GHOW	Occupied and Active	Tree	Good
1523	44.4611	-96.2738	GHOW	Occupied and Active	Tree	Good
1548	44.4654	-96.4088	GHOW	Occupied and Active	Tree	Good
1557	44.5053	-96.3498	GHOW	Occupied and Active	Tree	Good
1562	44.5460	-96.3444	GHOW	Occupied and Active	Tree	Good
1568	44.3662	-96.3626	GHOW	Occupied and Active	Tree	Good
1575	44.5224	-96.3287	GHOW	Occupied and Active	Tree	Good
1582	44.4422	-96.3133	GHOW	Occupied and Active	Tree	Good
1585	44.3479	-96.3239	GHOW	Occupied and Active	Tree	Good
1587	44.4232	-96.3134	GHOW	Occupied and Active	Tree	Good
1609	44.5652	-96.2520	GHOW	Occupied and Active	Tree	Good
1419	44.3788	-96.3940	RTHA	Occupied and Active	Tree	Good
1511	44.4162	-96.2346	RTHA	Occupied and Active	Tree	Good
1512	44.4907	-96.2575	RTHA	Occupied and Active	Tree	Good
1516	44.5121	-96.2558	RTHA	Occupied and Active	Tree	Good
1519	44.3895	-96.2634	RTHA	Occupied and Active	Tree	Good
1520	44.4402	-96.2701	RTHA	Occupied and Active	Tree	Good
1526	44.4335	-96.2851	RTHA	Occupied and Active	Tree	Good
1542	44.4548	-96.4721	RTHA	Occupied and Active	Tree	Good
1555	44.4790	-96.3478	RTHA	Occupied and Active	Tree	Good
1559	44.5471	-96.3561	RTHA	Occupied and Active	Tree	Good
1560	44.5988	-96.2825	RTHA	Occupied and Active	Tree	Good
1564	44.5199	-96.3327	RTHA	Occupied and Active	Tree	Good
1581	44.4427	-96.3176	RTHA	Occupied and Active	Tree	Good
1608	44.5465	-96.2517	RTHA	Occupied and Active	Tree	Good
1591	44.4038	-96.3036	UNKN	Occupied and Active	Tree	Good
1600	44.5862	-96.3027	UNKN	Occupied and Active	Tree	Good
1522	44.4886	-96.2715	UNKN	Occupied and Active	Tree	Good
1569	44.3518	-96.3628	UNKN	Occupied and Active	Tree	Good
1570	44.3462	-96.3513	UNKN	Occupied and Active	Tree	Good
1518	44.4237	-96.2527	UNKN	Occupied and Inactive	Tree	Good
1553	44.4607	-96.3975	UNKN	Occupied and Inactive	Tree	Good
1565	44.4773	-96.3336	UNKN	Occupied and Inactive	Tree	Good
1574	44.4612	-96.3345	UNKN	Occupied and Inactive	Tree	Good
1586	44.3903	-96.3153	UNKN	Occupied and Inactive	Tree	Good
1588	44.4228	-96.3129	UNKN	Occupied and Inactive	Tree	Good
1596	44.5028	-96.2918	UNKN	Occupied and Inactive	Tree	Good

Table 1. Nest ID, location, species, status, substrate, and condition of nests recorded during the April 4-8, 2017 raptor nest survey for the Blazing Star II Wind Farm, Lincoln County, MN.

Nest ID	Latitude	Longitude	Species[1]	Status at time of survey	Nest Substrate	Condition
1597	44.5017	-96.2918	UNKN	Occupied and Inactive	Tree	Good
1598	44.5011	-96.2917	UNKN	Occupied and Inactive	Tree	Good
1606	44.5465	-96.2323	UNKN	Occupied and Inactive	Tree	Good
1421	44.3869	-96.4160	UNKN	Unoccupied and Inactive	Tree	Disrepair
1513	44.4942	-96.2558	UNKN	Unoccupied and Inactive	Tree	Good
1515	44.4994	-96.2584	UNKN	Unoccupied and Inactive	Tree	Disrepair
1517	44.5069	-96.2517	UNKN	Unoccupied and Inactive	Tree	Disrepair
1521	44.4560	-96.2632	UNKN	Unoccupied and Inactive	Tree	Good
1524	44.4134	-96.2684	UNKN	Unoccupied and Inactive	Tree	Disrepair
1525	44.3964	-96.2792	UNKN	Unoccupied and Inactive	Tree	Disrepair
1527	44.4757	-96.2850	UNKN	Unoccupied and Inactive	Tree	Good
1543	44.4557	-96.4628	UNKN	Unoccupied and Inactive	Tree	Disrepair
1544	44.4506	-96.4655	UNKN	Unoccupied and Inactive	Tree	Disrepair
1545	44.4501	-96.4444	UNKN	Unoccupied and Inactive	Tree	Good
1546	44.4393	-96.4498	UNKN	Unoccupied and Inactive	Tree	Disrepair
1547	44.4127	-96.4216	UNKN	Unoccupied and Inactive	Tree	Good
1549	44.4097	-96.4028	UNKN	Unoccupied and Inactive	Tree	Disrepair
1550	44.4056	-96.4077	UNKN	Unoccupied and Inactive	Tree	Good
1551	44.3917	-96.4072	UNKN	Unoccupied and Inactive	Tree	Disrepair
1552	44.4168	-96.3922	UNKN	Unoccupied and Inactive	Tree	Disrepair
1556	44.5002	-96.3481	UNKN	Unoccupied and Inactive	Tree	Good
1558	44.5183	-96.3479	UNKN	Unoccupied and Inactive	Tree	Disrepair
1563	44.5255	-96.3374	UNKN	Unoccupied and Inactive	Tree	Disrepair
1566	44.4317	-96.3651	UNKN	Unoccupied and Inactive	Tree	Disrepair
1567	44.3880	-96.3677	UNKN	Unoccupied and Inactive	Tree	Disrepair
1571	44.4449	-96.3480	UNKN	Unoccupied and Inactive	Tree	Good
1572	44.4165	-96.3417	UNKN	Unoccupied and Inactive	Tree	Disrepair
1573	44.4132	-96.3461	UNKN	Unoccupied and Inactive	Tree	Good
1576	44.5428	-96.3270	UNKN	Unoccupied and Inactive	Tree	Good
1577	44.5202	-96.3173	UNKN	Unoccupied and Inactive	Tree	Disrepair
1578	44.5008	-96.3109	UNKN	Unoccupied and Inactive	Tree	Disrepair
1579	44.4686	-96.3163	UNKN	Unoccupied and Inactive	Tree	Good
1580	44.4555	-96.3196	UNKN	Unoccupied and Inactive	Tree	Good
1583	44.4258	-96.3196	UNKN	Unoccupied and Inactive	Tree	Disrepair
1584	44.3935	-96.3223	UNKN	Unoccupied and Inactive	Tree	Good
1589	44.4450	-96.3121	UNKN	Unoccupied and Inactive	Tree	Good
1590	44.4429	-96.3126	UNKN	Unoccupied and Inactive	Tree	Good
1592	44.3964	-96.3022	UNKN	Unoccupied and Inactive	Tree	Disrepair
1593	44.4194	-96.2961	UNKN	Unoccupied and Inactive	Tree	Good
1594	44.4639	-96.2854	UNKN	Unoccupied and Inactive	Tree	Disrepair
1595	44.4830	-96.2877	UNKN	Unoccupied and Inactive	Tree	Good
1599	44.5742	-96.2864	UNKN	Unoccupied and Inactive	Tree	Disrepair
1605	44.5308	-96.2222	UNKN	Unoccupied and Inactive	Tree	Disrepair
1607	44.5716	-96.2455	UNKN	Unoccupied and Inactive	Tree	Good
1610	44.5472	-96.2851	UNKN	Unoccupied and Inactive	Tree	Disrepair
1743	44.5427	-96.3204	UNKN	Unoccupied and Inactive	Tree	Good

[1]. BAEA = bald eagle, RTHA = red-tailed hawk, GHOW = great-horned owl, UNKWN = unknown species

Nest Activity Monitoring

Nest 1744

After a follow up nest check in May was conducted to confirm the nest was active, five four-hour nest activity monitoring sessions were conducted at Nest 1744: twice a month in June and July, and once in August. In the June 21 visit, adult eagles were documented flying to the north and northwest, primarily associated with the wetlands and lakes south of Dorer State Wildlife Management Area (WMA); one adult eagle was also observed flying from the just south of the WMA, past the nest and towards Steep Bank Lake to the southeast of the nest. In the June 29 visit, two juveniles were observed perched on or near the nest and two adults were observed flying to the north-northwest of the nest. In both of the July visits (July 5 and 11), adult and juvenile eagles were observed flying near the nest and to the southeast of the nest towards Steep Bank Lake; an adult eagle was also observed flying to the north-northeast of the nest on July 11. No eagles were observed during the nest activity monitoring session conducted on August 4, 2017. Overall the flight paths documented in June – July indicated that most of the flights to and from the nest are either associated with Steep Bank Lake to the southeast or the chain of lakes and emails south of Dorer WMA to the north and northwest, although several flights also occurred to the north-northeast of the nest (Figure 2). Overall, the activity patterns documented with this nest indicate that the eagles are primarily using Steep Bank Lake and the lakes south of Dorer WMA for foraging, both of which are within approximately one mile of the nest. Eagles associated with this nest may periodically use areas outside of these lakes (including both the lakes in the WMA itself as well as in private lands elsewhere), but it appears that these features, especially areas within one mile of the nest, are the higher use areas related to the eagle nest activity.

Nest 1554

After a follow up nest check in May was conducted to confirm the nest was active, five four-hour nest activity monitoring surveys were conducted at Nest 1554: twice a month in June and July, and once in August. On June 23, 2017, only one juvenile was observed perched in the nest. On July 26, 2017 a juvenile eagle was observed perched in a snag tree near the nest, and an adult was observed flying in from the middle of Lake Shaokatan carrying a fish to the nest; a second adult who was perched in a tree near the nest was observed flying to the north away from the lake. On July 6, 2017, two adults and one juvenile were observed perched on the nest and flying. On July 21, 2017, a juvenile eagle was observed flying in to the nest from the north, and was subsequently observed perched and flying around the western shore of the lake. One adult eagle was observed arriving at the nest from the south, and adult eagles were also observed flying along the southern and northern shores of the lake. No eagles were observed at the nest during the nest activity monitoring session on August 8, 2017. Overall the flight paths documented in June – July were primarily associated with Lake Shaokatan, with flights along the shore or above the open water portion of the lake; however some flights did occur with the eagles either leaving or arriving from both the north and south of the lake (Figure 3). Eagles associated with this nest may periodically use areas outside of the Lake, including the wetland complexes approximately 0.5 to 1 mile to the north of the nest. In general, it is anticipated that the higher use areas related to this nest's activity would primarily be within one mile or less of Lake Shaokatan.

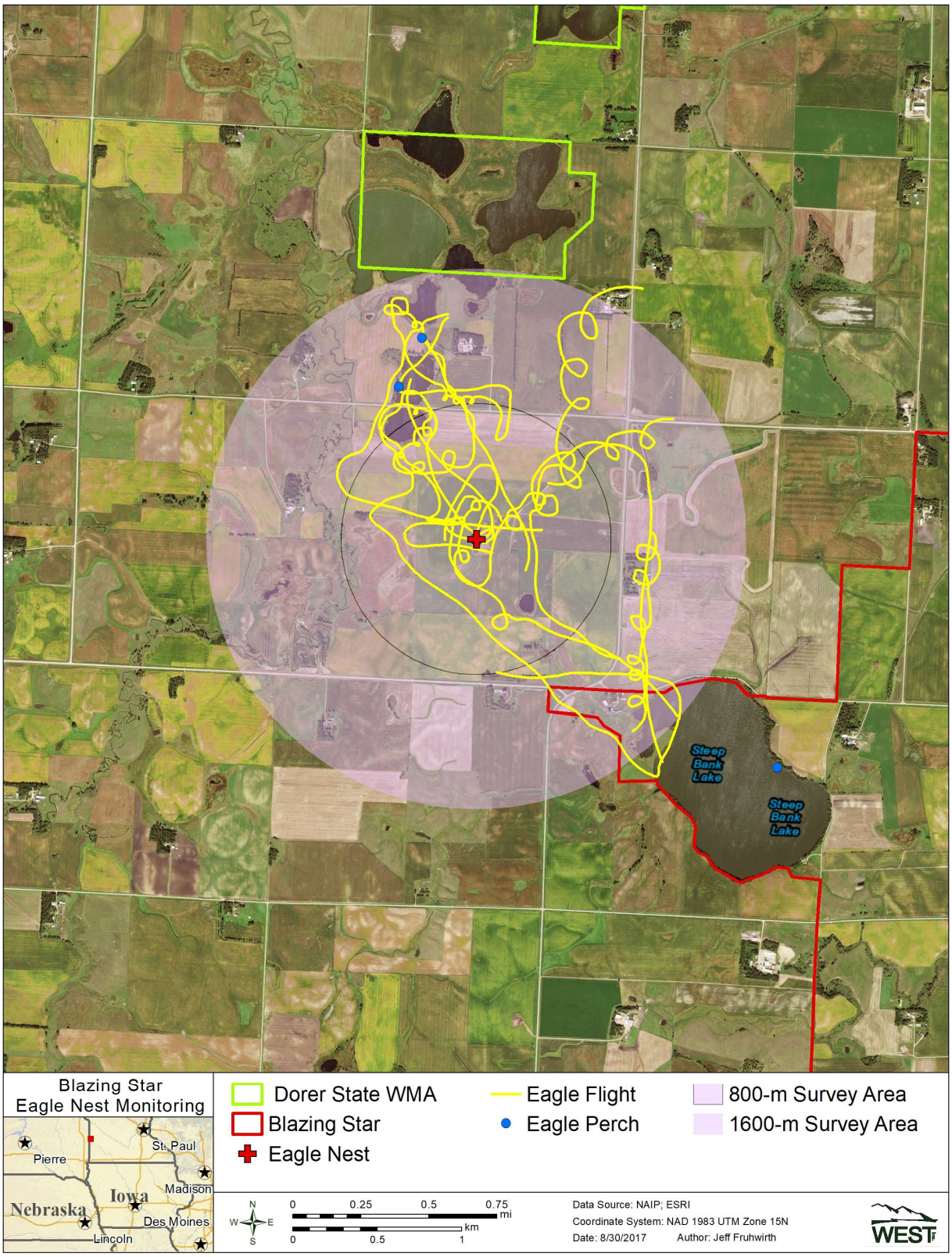

Figure 2. Flight paths associated with nest activity monitoring surveys at Nest 1744.

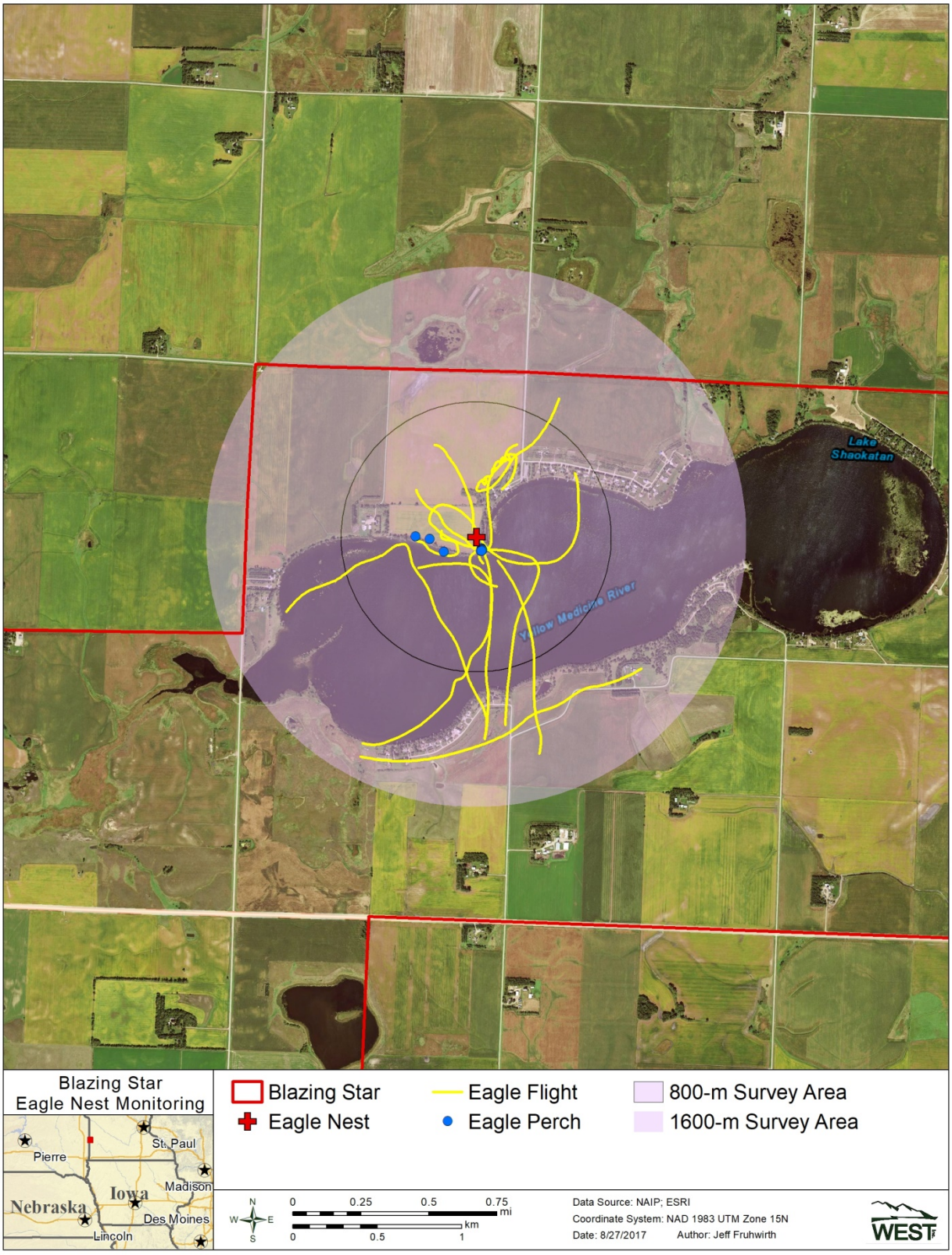

Figure 3. Flight paths associated with nest activity monitoring surveys at Nest 1554.

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Appendix A. Images of Active and Occupied Eagle Nests Found April 4-8, 2017 within the 10-mile Buffer of the Blazing Star II Wind Farm, Lincoln County, Minnesota

Appendix A1. Nest 1744 was located approximately 0.6 miles (1.0 kilometers) west of the Blazing Star II Wind Energy Project boundary. The nest was in good condition. An adult was present and in incubating position on April 6, 2017.

Appendix A2. Nest 1554 was located approximately 0.63 miles (1.01 kilometers) south of the Blazing Star II Wind Energy Project boundary. The nest was in good condition. Two adult bald eagles were observed, one was on the nest in incubating position on April 7, 2017.

Appendix A3. Nest 1510 was located approximately 3.16 miles (5.06 kilometers) east of the Blazing Star II Wind Energy Project boundary. The nest was in good condition. An adult was present and in incubating position on April 6, 2017.

Appendix A4. Nest 1329 was located approximately 3.52 miles (5.63 kilometers) southeast of the Blazing Star II Wind Energy Project boundary. The nest was in good condition. An adult bald eagle was present and in incubating position on April 4, 2017.

Appendix A5. Nest 1616 was located approximately 3.79 miles (6.06 kilometers) north of the Blazing Star II Wind Energy Project boundary. The nest was in good condition. An adult was present and in incubating position on April 6, 2017.

Appendix A6. Nest 1604 was located approximately 4.46 miles (7.12 kilometers) east of the Blazing Star II Wind Energy Project boundary. The nest was in good condition. An adult was present and in incubating position on April 7, 2017.

Appendix A7. Nest 1619 was located approximately 4.95 miles (7.92 kilometers) west of the Blazing Star II Wind Energy Project boundary. The nest was in good condition. An adult was present and in incubating position on April 8, 2017.

Appendix A8. Nest 1618 was located approximately 6.46 miles (10.4 kilometers) northwest of the Blazing Star II Wind Energy Project boundary. The nest was in good condition. Two adult bald eagles were observed, one was on the nest in incubating position on April 6, 2017.

Appendix A9. Nest 1506 was located approximately 9.33 miles (14.93 kilometers) east of the Blazing Star II Wind Energy Project boundary. The nest was in good condition. An adult was present and in incubating position on April 6, 2017.

Avian Wetland Use Studies for the Blazing Star II Wind Farm Lincoln County, Minnesota

Final Report

March 28, 2017 – June 28, 2017

Prepared for:

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August 2017

Draft Pre-Decisional Document – Privileged and Confidential – Not For Distribution

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REPORT REFERENCE

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INTRODUCTION

Blazing Star II Wind Farm, LLC is considering the development of the Blazing Star II Wind Farm (Project) in Lincoln County, Minnesota. Blazing Star II Wind Farm, LLC has contracted Western Ecosystems Technology, Inc. (WEST) to conduct pre-construction baseline surveys within the Project to provide information regarding wetland use by birds. This final report contains results from avian wetland use surveys, and incidental observations conducted between March 28, 2017 and June 28, 2017.

The wetland use surveys at the Project were designed to help address the questions posed under Tier 3 of the US Fish and Wildlife Service (USFWS) final *Land-Based Wind Energy Guidelines* (USFWS 2012) and the avian wetland use survey protocol as described in the Minnesota Department of Natural Resources (DNR) *Avian and Bat Survey Protocols for Large Wind Energy Conversion Systems in Minnesota* document (Mixon et al. 2014).

PROJECT AREA

The Project currently encompasses approximately 48,652 acres and is located in southwestern Minnesota in Lincoln County, east of the South Dakota border (Figure 1). The Blazing Star II Wind Farm is in the Northern Glaciated Plains Level III ecoregion and the Prairie Coteau (46k) Level IV ecoregion (USEPA 2015). The Northern Glaciated Plains ecoregion is flat to gently rolling landscape of glacial drift. The region is transitional between tallgrass and shortgrass prairie and high concentrations of temporary and seasonal wetlands offer suitable habitat for waterfowl nesting and migration. The Prairie Coteau is generally a higher elevation plateau with poorly defined drainage. Many lakes and a mix of row crops and pasture are present in this region, including within the Project boundary (USEPA 2013).

According to 2011 U.S. Geological Survey (USGS) National Land Cover Database (NLCD), land cover within the Project is primarily a mosaic of cultivated crops (65.7%), herbaceous grassland (11%), and hay/pasture (10.5%). Together these three land cover types account for approximately 87% of the Project area (Table 1, Figure 1). Other substantial land cover types within the Project include developed open space, mostly in the form of roads, which accounts for approximately 5.2% of the Project, emergent herbaceous wetlands (4.5%), and open water (2.5%). The remaining land cover types within the Project (deciduous forest, woody wetlands, shrub/scrub, and barren land) each comprise less than 1% of the Project (Table 1).

Formal wetland delineations within the Project have not been completed. However, based on the National Wetland Inventory (NWI) data from the USFWS, there are approximately 6,826 total acres of wetlands within the Project (14% of the Project area; Table 2), about two times the acreage of the NLCD estimate of emergent wetlands plus open water land cover types. Based on information available from the NWI, wetland resources within the Project appear to be typical of Minnesota agricultural landscapes in this part of the state. Water features in the vicinity of the

Project include freshwater emergent wetland, lakes, freshwater ponds, and freshwater forested/shrub wetlands (Table 2, Figure 1).

Table 1. The land cover types, coverage, and composition within the Blazing Star II Wind Farm.

Habitat Type	Acres	Percent Composition
Cultivated Crops	24,948.3	67.1
Herbaceous	4,742.1	12.8
Hay/Pasture	3,958.4	10.7
Developed, Open Space	1,517.6	4.1
Emergent Herbaceous Wetlands	1,177.3	3.2
Open Water	488.1	1.3
Deciduous Forest	220.1	0.6
Woody Wetlands	67.0	0.2
Developed, Low Intensity	26.60	0.1
Barren Land	13.1	<0.1
Developed, Medium Intensity	7.9	<0.1
Shrub/Scrub	7.8	<0.1
Developed, High Intensity	0.1	<0.1
Total	**37,174.4**	**100**

Data from USGS NLCD 2011.

Table 1. National Wetlands Inventory (NWI) mapped wetlands within the Blazing Star II Wind Farm.

Wetland Type	Project Acres	% Total
Freshwater Emergent Wetland	5,236.5	76.7%
Freshwater Forested/Shrub Wetland	125.3	1.8%
Freshwater Pond	228.7	3.4%
Lake	1,049.8	15.4%
Riverine	185.2	2.7%
Total	**6,825.5**	**100%**

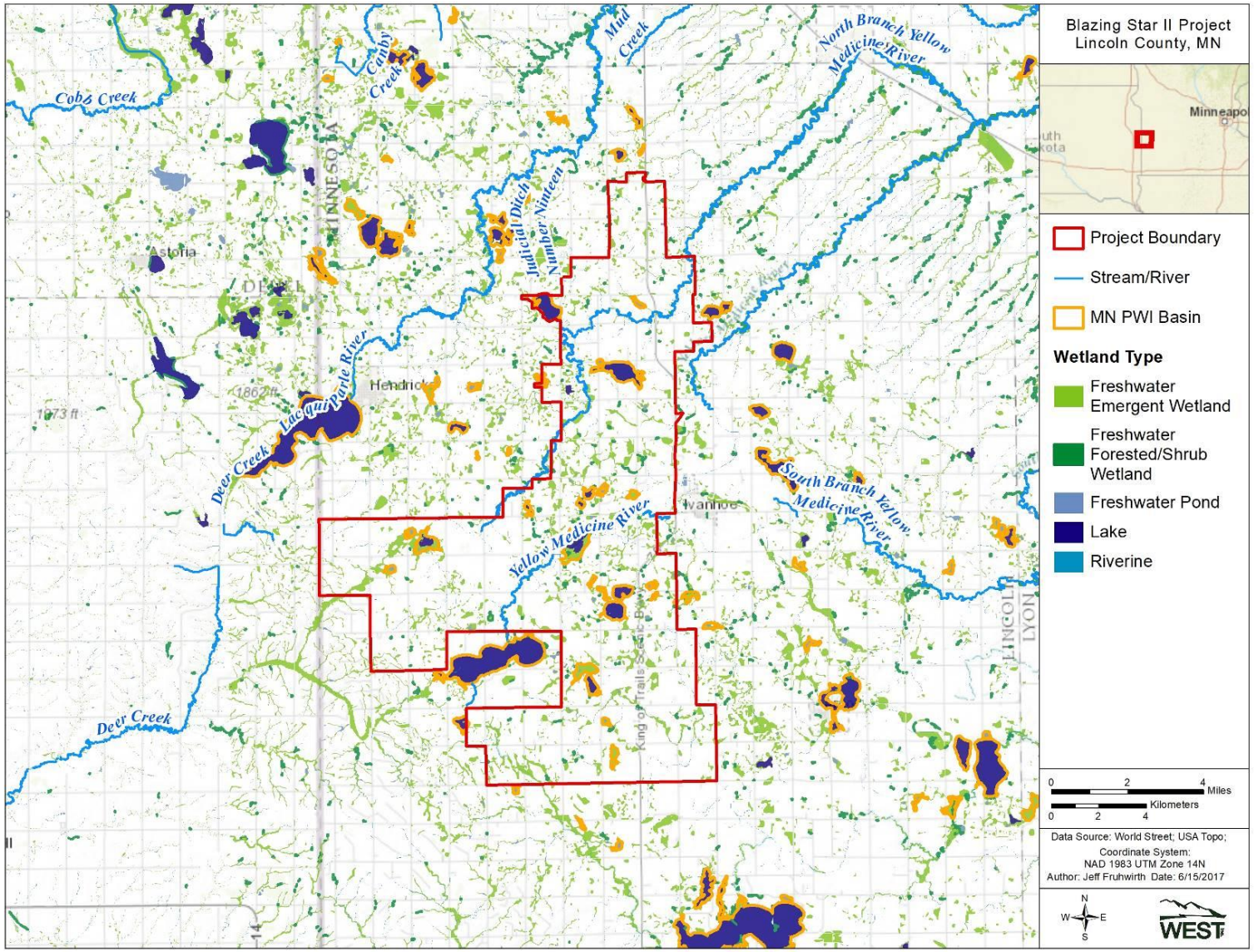

Figure 1. Project boundary and surface waters within the Blazing Star II Wind Farm, Minnesota.

METHODS

Avian Wetland Use Surveys

The objective of the avian wetland use survey was to document the types of bird species dependent on wetlands and waterbodies that occur in the Project area and to estimate their temporal and overall rate of use of the Project area in the spring migration and early nesting period, as outlined in the DNR's *Avian and Bat Survey Protocols* (Mixon et al. 2014). Nine observation points consisting of 800-meter (m) radius circular plots adjacent to or within close proximity to larger wetlands and/or open waterbodies were established within the Project (Figure 2).

Avian wetland use surveys were conducted four times at all points (except for one site, II-10, which was surveyed three times) at intervals approximately one month apart during spring and early summer (March 28 to June 28, 2017). Biologists conducted avian wetland use surveys during daylight hours, between approximately dawn and 10:00 a.m. Each plot was visited once during a set of surveys.

All large birds were recorded during avian wetland use surveys, with an emphasis on wetland/waterbody dependent species, during 60-minute observation periods. Observations of large birds beyond the 800-m radius plots were recorded but not included in statistical analyses.

The date, start and end time of the survey period, and weather information (e.g., temperature, wind speed, wind direction, precipitation, and cloud cover) were recorded during each survey. The following data were recorded for each bird observation: species (or best possible identification), number of individuals, sex and age class (if possible), distance from plot center when first observed, closest distance observed, altitude above ground, activity (behavior: soaring, flapping-gliding, hunting, kiting-hovering, stooping, perched, being mobbed, territorial flight or auditory [flying compared to not flying]), and habitat.

Bird behavior, distance from observer and habitat type were recorded based on the point of first observation, and flight direction of observed birds was mapped. Other information recorded about the observation included whether or not the observation was auditory only and the 10-minute interval of the 60-minute survey in which it was first observed. The perch locations and flight paths of all wetland birds and other species of interest (e.g., raptors) were mapped to identify areas of concentrated use and/or consistent flight patterns within the Project. Aerial imagery was used to aid in recording locations of observations as accurately as possible.

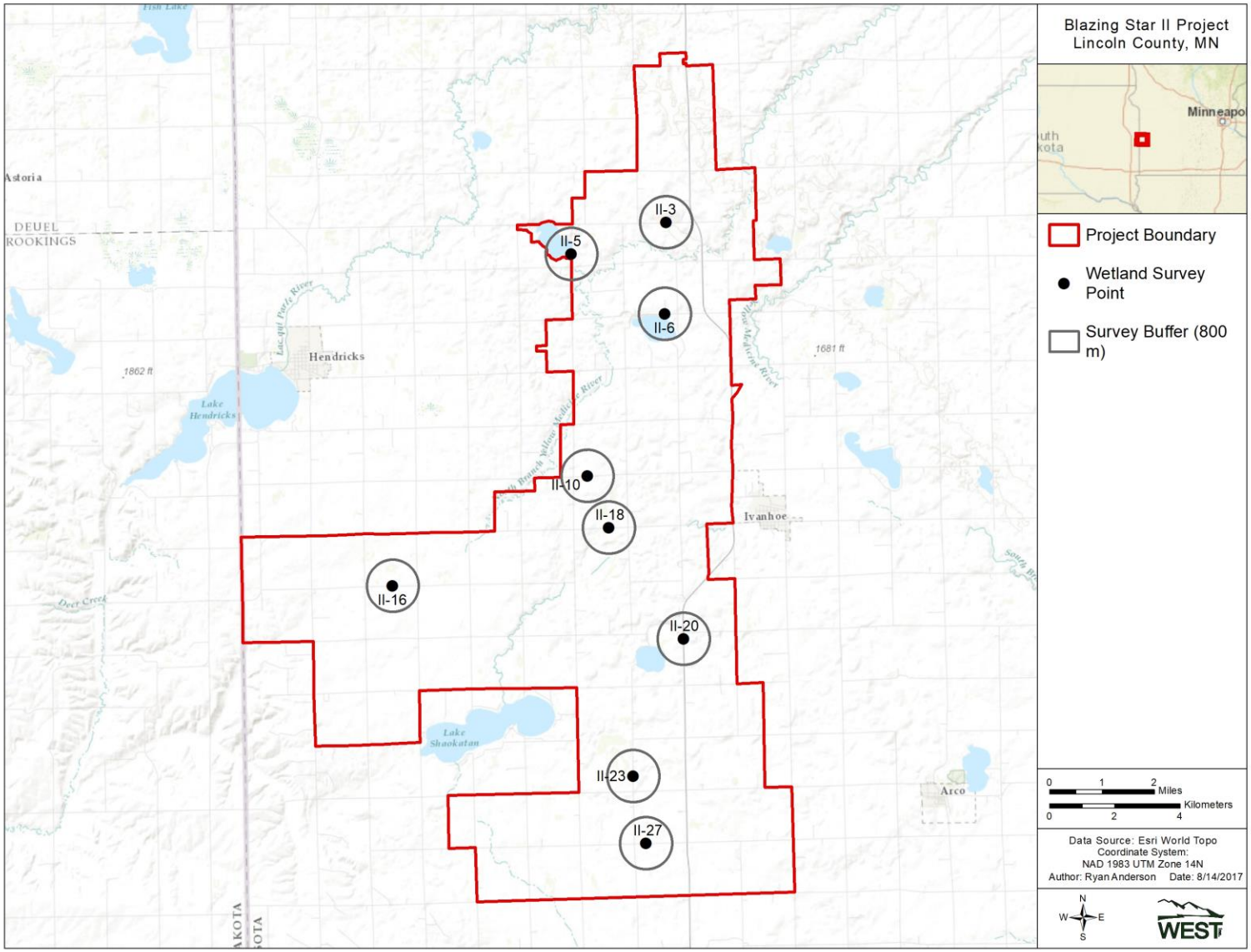

Figure 2. Fixed-points for avian wetland use surveys at the Blazing II Star Wind Farm.

Statistical Analysis

For analysis purposes, a visit was defined as the required length of time, in days, to survey all of the plots once within the Project. A visit could be spread across multiple dates, but a single date could not contain surveys from multiple visits. Under certain circumstances, such as extreme weather conditions, plots were not surveyed during some visits. In these cases, a visit might not have constituted a survey of all plots.

Quality Assurance and Quality Control

Quality assurance and quality control (QA/QC) measures were implemented at all stages of the study, including in the field, during data entry and analysis, and report writing. Following surveys, observers were responsible for inspecting data forms for completeness, accuracy, and legibility. Potentially erroneous data was identified using a series of database queries. Irregular codes or data suspected as being questionable were discussed with the observer and/or Project manager. Errors, omissions, or problems identified in later stages of analysis were traced back to the raw data forms, and appropriate changes in all steps were made.

Data Compilation and Storage

A Microsoft® ACCESS or Structured Query Language (SQL) Server database was developed to store, organize, and retrieve survey data. Data were keyed into the electronic database using a pre-defined protocol to facilitate subsequent QA/QC and data analysis. All data forms, field notebooks (if provided), and electronic data files were retained for reference.

Avian wetland use Surveys

Bird Diversity

Bird diversity was illustrated by the total number of unique species observed. Species lists (with the number of observations and the number of groups) were generated for the survey period and included all observations of birds detected, regardless of their distance from the observer. In some cases, the tally may represent repeated sightings of the same individual. For example, a sum of 50 observations of northern harrier (*Circus cyaneus*) may be 50 unique birds, or it may be one bird observed on 50 separate visits, or something in between.

Bird Use, Percent of Use, and Frequency of Occurrence

For generating standardized fixed-point bird use estimates, large birds detected within the 800-m radius plot at any time were used in the analysis. The metric used to measure mean bird use was the number of birds/plot/survey. These standardized estimates of mean bird use were used to compare differences between bird types, survey points, and other studies where similar methods were used. Mean use was calculated by summing the total number of birds seen within each plot during a visit, then averaging across plots within each visit within the overall survey period. Overall mean use was calculated as a weighted average of seasonal values by the number of days in each season.

Percent of use was calculated as the proportion of the overall mean use for a particular bird type or species, and the frequency of occurrence was calculated as the percent of surveys in which a particular bird type or species was observed. Frequency of occurrence and percent composition provide relative measures of species use of the proposed wind energy facility. For example, a particular species might have high use estimates for the study area based on just a few observations of large groups. However, the frequency of occurrence would indicate that the species only occurred during a few of the surveys; therefore the species may be less likely to be affected by the wind energy facility.

Spatial Use

Large bird use data were qualitatively compared to Project characteristics (e.g., topographic features), to identify potential areas of concentrated use by waterfowl, waterbirds, diurnal raptors and other large birds within the Project.

RESULTS

Avian Wetland Use Surveys

At eight of the nine survey points, four 60-minute surveys were conducted and at one point (II-10), three 60-minute surveys were conducted from March 28 through June 28, 2017, for a total of 35 hours of avian wetland use surveys at the Project.

Wetland Bird Diversity

Biologists observed 40 unique species, and a mean use of 109.09 large bird observation/800-m plot/60-minutes was recorded during avian wetland use surveys. A total of 3,898 bird observations within 357 separate groups were recorded (Table 3). The most commonly recorded wetland bird subtype was waterfowl, which composed 68.5% of all observations and included 18 unique species. Rails/coots (17.2% of observations and one species), gulls/terns (7.1% of observations and three species) and waterbirds (3.7% of observations and seven species) were the second, third and fourth mostly commonly recorded bird subtypes, respectively.

The most commonly recorded species was the American coot (*Fulica americana*; 671 observations, 17.2% of all observations); these observations were recorded within eight groups. Mallards (*Anas platyrhynchos*; 605 observations in 57 groups and 15.5% of all observations) and lesser scaup (*Aythya affinis*, 594 observations in 13 groups and 15.2% of all observations) were the second and third most commonly recorded species, respectively.

Mallards made up 22.6% of waterfowl observations, although several other waterfowl species were observed in relatively high proportions including lesser scaup (22.2%), Canada goose (*Branta canadensis,* 12.6%), and blue-winged teal (*Anas discors,* 11.8%) (Table 3).

Biologists observed three unique raptor species during avian wetland use surveys, which accounted for 0.5% of all bird observations (19 observations) during these surveys. Northern

harriers (*Circus cyaneus*) composed 68.4% of all raptor observations (thirteen observations) observed during avian wetland use surveys; red-tailed hawk (*Buteo jamaicensis*) and American kestrel (*Falco sparverius*) were also observed in low numbers (Table 3).

Loons/grebes were observed in low numbers (4 observations, 0.1% of all bird observations), indicating that this group does not use the wetlands/lakes in the Project area in high numbers.

Table 3. Summary of individuals and group observations by bird type and species for wetland bird use surveys at the Blazing Star II Wind Energy Project from March 28, 2017 to June 28, 2017

		Total	
Type / Species	**Scientific Name**	**# grps**	**# obs**
Loons/Grebes		**4**	**4**
common loon	*Gavia immer*	1	1
pied-billed grebe	*Podilymbus podiceps*	3	3
Waterbirds		**70**	**145**
American bittern	*Botaurus lentiginosus*	2	2
American white pelican	*Pelecanus erythrorhynchos*	16	69
cattle egret	*Bubulcus ibis*	1	1
double-crested cormorant	*Phalacrocorax auritus*	43	65
great blue heron	*Ardea herodias*	4	4
great egret	*Ardea alba*	3	3
least bittern	*Ixobrychus exilis*	1	1
Waterfowl		**193**	**2,670**
blue-winged teal	*Anas discors*	16	316
bufflehead	*Bucephala albeola*	3	49
Canada goose	*Branta canadensis*	44	336
canvasback	*Aythya valisineria*	2	68
common merganser	*Mergus merganser*	3	75
gadwall	*Anas strepera*	6	15
greater white-fronted goose	*Anser albifrons*	3	131
green-winged teal	*Anas crecca*	1	10
hooded merganser	*Lophodytes cucullatus*	2	6
lesser scaup	*Aythya affinis*	13	594
mallard	*Anas platyrhynchos*	57	605
northern pintail	*Anas acuta*	1	1
northern shoveler	*Anas clypeata*	4	97
redhead	*Aythya americana*	3	6
ring-necked duck	*Aythya collaris*	8	153
ruddy duck	*Oxyura jamaicensis*	1	2
snow goose	*Chen caerulescens*	1	28
unidentified duck	*NA*	15	60
unidentified goose	*NA*	1	1
unidentified scaup	*Aythya spp*	2	64
unidentified waterfowl	*NA*	1	4
wood duck	*Aix sponsa*	6	49

Type / Species	Scientific Name	Total # grps	Total # obs
Shorebirds		**20**	**49**
killdeer	*Charadrius vociferus*	19	38
white-rumped sandpiper	*Calidris fuscicollis*	1	11
Gulls/Terns		**14**	**280**
black tern	*Chlidonias niger*	3	40
Franklin's gull	*Leucophaeus pipixcan*	2	206
ring-billed gull	*Larus delawarensis*	9	34
Rails/Coots		**8**	**671**
American coot	*Fulica americana*	8	671
Diurnal Raptors		**15**	**19**
Buteos		*5*	*5*
red-tailed hawk	*Buteo jamaicensis*	5	5
Northern Harrier		*9*	*13*
northern harrier	*Circus cyaneus*	9	13
Falcons		*1*	*1*
American kestrel	*Falco sparverius*	1	1
Owls		**1**	**1**
great horned owl	*Bubo virginianus*	1	1
Vultures		**6**	**6**
turkey vulture	*Cathartes aura*	6	6
Upland Game Birds		**23**	**48**
ring-necked pheasant	*Phasianus colchicus*	23	48
Large Corvids		**3**	**5**
American crow	*Corvus brachyrhynchos*	3	5
Overall	***NA***	**357**	**3,898**

[a] Regardless of distance from observer.

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

Bird use estimates, percent of use, and frequency of occurrence were calculated for all large bird types observed during avian wetland use surveys (Table 4). Overall large bird use was 109.09 birds/800-m plot/60-minute survey (Table 4).

Table 4. Mean large bird use (number of birds/800-m plot/survey), percent of total use (%), and frequency of occurrence (%) for each bird type by season during the wetland bird use surveys at the Blazing Star II Wind Energy Project from March 28, 2017 to June 28, 2017.

Type / Species	Mean Use	% of Use	% Frequency
Loons/Grebes	0.12	0.1	11.8
Waterbirds	4.28	3.9	55.2
Waterfowl	74.62	68.4	97.2
Shorebirds	1.43	1.3	35.8
Gulls/Terns	7.78	7.1	39.6
Rails/Coots	18.64	17.1	22.2
Diurnal Raptors	0.53	0.5	25.0
Buteos	*0.14*	*0.1*	*11.1*
Northern Harrier	*0.36*	*0.3*	*22.2*
Falcons	*0.03*	*<0.1*	*2.8*
Owls	0.03	<0.1	2.8
Vultures	0.17	0.2	13.9
Upland Game Birds	1.34	1.2	47.6
Large Corvids	0.14	0.1	5.6
Overall Large Birds	**109.09**	**100**	

Waterfowl

Waterfowl use was higher (74.62 birds/800-m plot/60-minute survey) than any other large bird type recorded (Table 4). Waterfowl composed 68.4% of overall large bird use and waterfowl were observed during nearly all avian wetland use surveys (97.2% ; Table 4).

Rails/Coots

Rail/coot use was 18.64 birds/800-m plot/60-minute. Rails/coots accounted for 17.1% of overall large bird use. While this group had the second highest percentage of use (and the one species in the group had the highest number of observations of any species observed), rails/coots were observed relatively infrequently, recorded during 22.2% of avian wetland use (Table 3).

Gulls/Terns

Gull/tern use was 7.78 birds/800-m plot/60-minute survey. Gulls/terns accounted for 7.1% of overall large bird use; gulls/terns were observed during 39.6% of avian wetland use surveys.

Waterbirds

Waterbird use was 4.28 birds/800-m plot/60-minute survey. Waterbirds accounted for 3.9% of overall large bird use. Although this group had a relatively low percentage of use, it was the second most frequently observed subtype after waterfowl: waterbirds were observed during 55.2% of avian wetland use surveys.

Shorebirds

Shorebird use was 1.43 birds/800-m plot/60-minute survey. Shorebirds accounted for 1.3% of overall large bird use (Table 3). Shorebirds were observed during 35.8% of the avian wetland use surveys (Table 3).

Diurnal Raptors

Diurnal raptor use was 0.53 birds/800-m plots/60-minute survey, mostly composed of northern harriers (0.36 birds/800-m plot/60-min survey; Table 3), accounting for 0.5% of overall large bird use (Table 3). Diurnal raptors were observed during 25.0% of avian wetland use surveys.

Wetland Bird Spatial Use

Table 5 shows the mean use by survey point for all large birds observed during the avian wetland use surveys at the Project. Point II-16 had the highest mean bird use (435 large birds/800-m plot/60 minute survey), with Point II-3 (140.75 large birds/800-m plot/60 minute survey) and Point II-6 (117.25 large birds/800-m plot/60 minute survey) having the second and third highest mean uses, respectively (Table 5). The remaining six points all had mean uses levels that were below the overall average mean use of 109.9 large birds/800-m plot/60 minute survey.

The uses at Point II-16 and Point II-3 were primarily composed of waterfowl and rails/coots observations. Waterfowl and gulls/terns made up the majority of use observed at Point II-6. Point II-16 is located on the road just to the south of the large wetland complex associated with the Shaokatan State Wildlife Management Area (WMA), and flightpaths indicate that the majority of the waterfowl and waterbirds observed at this point were utilizing the state land area rather (see Figure 3). Point II-3 is located on the road just north of a relatively large wetland on private land; there was no obvious pattern to the flightpaths observed at this point, with movements recorded in multiple directions throughout the survey plot. Point II-6 is located on the road just north of Perch Lake, and while many of the observed flightpaths were associated with the lake south of the survey point, a portion of the recorded flight paths documented movements north of the survey point, heading to/from the northern portion of the Project.

Overall there was no obvious pattern to spatial use by large birds at the wetland use surveys in the Project. While the highest use point (II-16) was located adjacent to a WMA with large wetland complexes, two other points (II-18 and II-20) located adjacent to WMAs with similar wetland habitat had lower than average mean use. Additionally, Point II-6 recorded relatively high use mostly associated with the adjacent open water at Perch Lake; however, Point II-5 is located adjacent to a similarly sized open waterbody (Steep Bank Lake), and Point II-5 had the lowest mean use of all the surveyed points (Table 5).

Table 5. Mean use (number of birds/800-m plot/60-minute survey) by point for all large birds, major bird types, and diurnal raptor subtypes observed at the Blazing Star II Wind Energy Project during wetland bird use surveys from March 28, 2017 to June 28, 2017.

	Survey Point								
Bird Type	**II-3**	**II-5**	**II-6**	**II-10**	**II-16**	**II-18**	**II-20**	**II-23**	**II-27**
Loons/Grebes	0	0	0.25	0.33	0.25	0	0	0.25	0
Waterbirds	1.75	2.75	6.25	0	3.25	2.75	17.00	2.50	0
Waterfowl	104.00	18.75	95.75	23.33	294.25	35.25	16.5	57.75	27.75
Shorebirds	0.75	3.25	1.75	1.67	3.00	0.50	0	1.50	0.25
Gulls/Terns	0.25	0.75	12.75	0.67	2.50	1.25	0.25	0.25	51.50
Rails/Coots	30.00	0	0	3.67	130.00	3.00	0	0	2.00
Diurnal Raptors	1.25	0.25	0	2.67	0.25	0.50	0.50	0	0
Buteos	*0.25*	*0*	*0*	*0.33*	*0*	*0.25*	*0.50*	*0*	*0*
Northern Harrier	*1.00*	*0.25*	*0*	*2*	*0.25*	*0.25*	*0*	*0*	*0*
Falcons	*0*	*0*	*0*	*0.33*	*0*	*0*	*0*	*0*	*0*
Owls	0	0	0	0	0	0	0.25	0	0
Vultures	0	0	0	0.33	0	0.50	0.25	0.50	0
Upland Game Birds	2.75	0.50	0.50	2.67	2.00	2.25	0	1.00	1.00
Large Corvids	0	0	0	0	0	0.75	0	0	0.50
All Large Birds	**140.75**	**26.25**	**117.25**	**35.33**	**435.50**	**46.75**	**34.75**	**63.75**	**83.00**

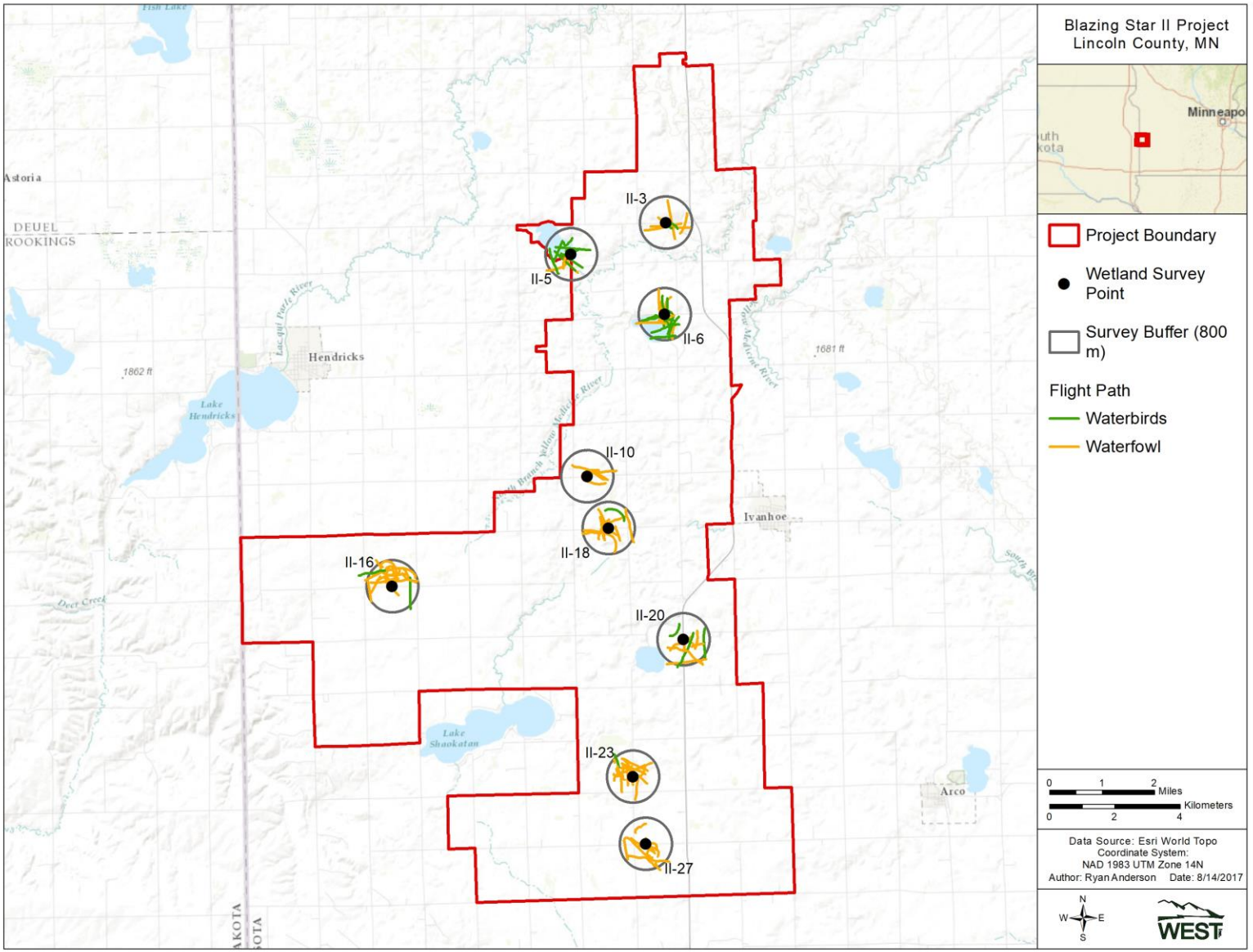

Figure 3. Waterfowl and waterbird flight paths recorded during avian wetland use surveys at the Blazing II Star Wind Farm.

Waterfowl

Waterfowl were observed at all nine observation points, with mean bird use highest at Point II-16 (294.25 birds/800-m plot/60-min survey) followed by Point II-3 (104.00 birds/800-m plot/60-min survey) and Point II-6 (95.75 birds/800-m plot/60-m survey (Table 5). The only points where waterfowl did not have the highest mean use among all bird groups recorded were Point II-20 (where waterbirds had slightly higher use than waterfowl) and Point II-27 (where gulls/terns had approximately twice as high mean use compared to waterfowl). Figure 3 shows the mapped waterfowl flight paths at all survey points.

It is important to note that flight paths represent the movements groups of birds which may have consisted of one or more individuals. Flight paths can be useful for showing flight directions and regions of use within a survey plot but should not be used as a proxy for use; for instance, the flight paths at Point II-3 on Figure 3 may suggest lower waterfowl use than Point II-27, but mean waterfowl use at Point II-3 is 104.00 birds/800-m plot/60-minute survey, compared to 27.75 birds/800-m plot/60-minute survey at Point II-27.

At Point II-16 (the point with the highest waterfowl use), flight paths are primarily in the northern half of the plot, which as discussed above is consistent with the location of the nearby wetlands associated with the WMA north of the survey point. Similarly, the waterfowl flight paths recorded at Point II-27 are primarily associated with the wetland located in the adjacent Emerald State WMA south of the survey point. At Point II-10, waterfowl flight paths are concentrated in the middle of the eastern side of the plot, where there are several small patches of wetlands. Most of the other survey points do not appear to have consistent waterfowl flight path patterns.

Waterbirds

Waterbird use was highest at point II-20 (17.00 birds/800-m plot/60-minute survey) located northeast of Ash Lake near the Ash Lake WMA (Table 4; Figure 3). Waterbirds were observed at all points except II-10 and II-27, which have relatively smaller patches of adjacent wetlands compared to some of the other points. The waterbird flight paths indicate that groups of waterbirds may be associated with larger open water bodies in the Project – Steep Bank Lake and Perch Lake adjacent to Point II-5 and Point II-6, respectively (Figure 3), although similar waterbird use levels are found at other points that are not adjacent to large open water lakes (Table 5) so no clear pattern is evident.

Shorebirds

Shorebirds use showed no obvious spatial pattern, with use levels relatively low at all survey points, ranging between 0 birds/800-m plot/60-minute survey at Point II-20 and 3 birds/800-m plot/60-minute survey at Point II-16 (Table 5).

Gulls/Terns

Gulls/terns were observed at all survey points and had similarly low levels of use as shorebirds, with the exception of Point II-6 and Point II-27, which had relatively higher use levels (12.75 and

51.50 birds/800-m plot/60-minute survey, respectively). The particularly high use at Point II-27 is due to one observed flock of 200 Franklin's gulls.

Rails/Coots

Rails/coots were observed at five of the nine survey points, with Point II-16 and Point II-3 having the highest use (130.00 and 30.00 birds/800-m plot/60-minute survey, respectively; Table 5). The use at these higher use points are attributed to a few observations of large groups of American coots.

Diurnal Raptors

Diurnal raptors were observed at all points except II-6, II-23, and II-27, with use highest at Point II-10 (2.67 birds/800-m plot/60-min survey) and ranging from 0.25 to 1.25 birds/800-m plot/60-min survey at all other points where use was observed (Table 4). Diurnal raptor flight paths are shown on Figure 4, and there are no obvious patterns of use in the flight paths recorded during the avian wetland use surveys. No eagles were observed during the avian wetland use surveys at the Project.

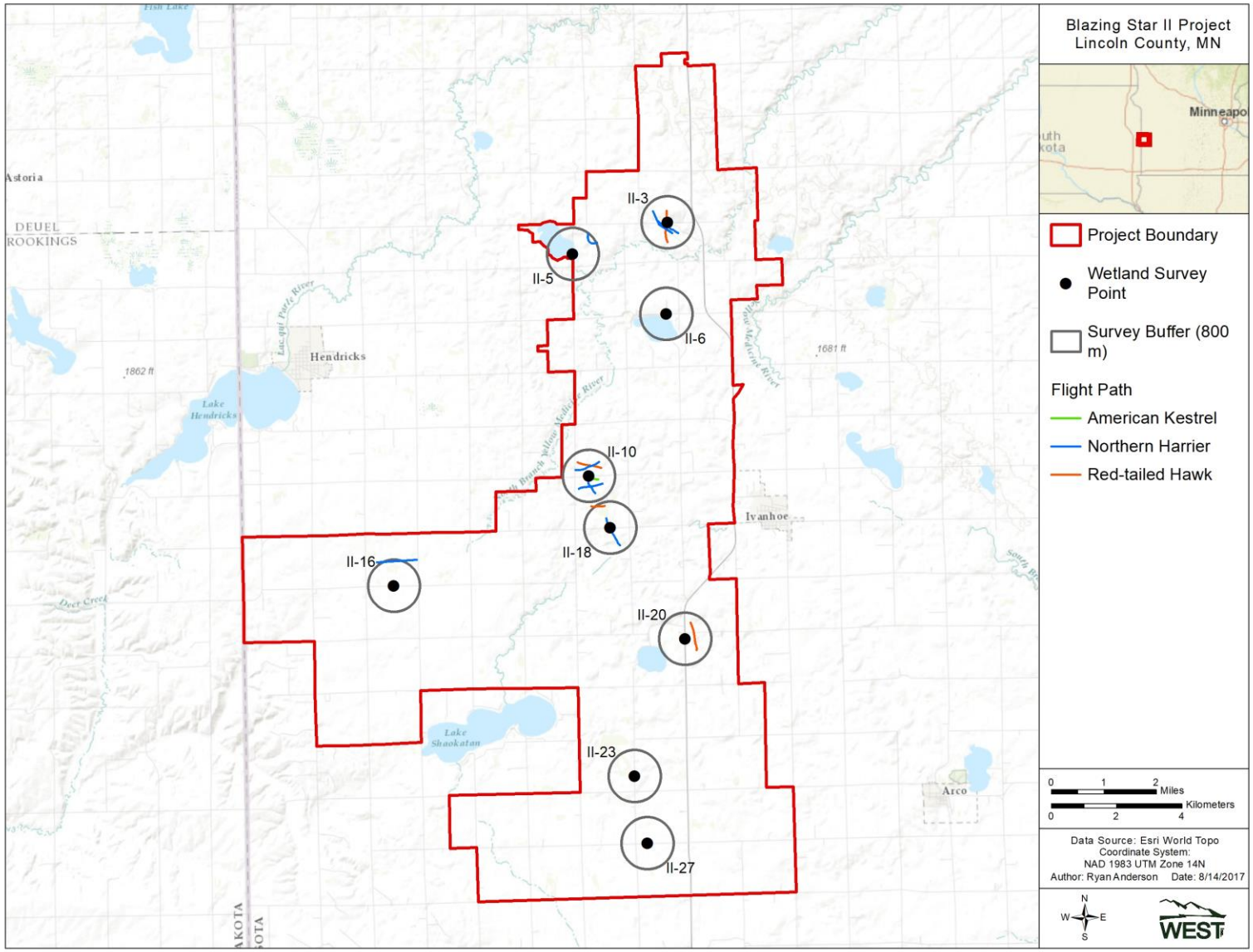

Figure 4. Diurnal raptor flight paths recorded during avian wetland use surveys at the Blazing II Star Wind Farm.

Species of Concern

Two species listed as species of special concern in Minnesota's List of Endangered, Threatened, and Special Concern Species (DNR 2017) were recorded during the 2017 wetland use surveys within the Project: Franklin's gull (*Leucophaeus pipixcan)* and American white pelican (*Pelecanus erythrorhynchos*).

Franklin's gull

A total of 206 Franklin's gulls in two groups were observed during surveys in 2017; one group of six individuals was seen at Point II-6 and one group of 200 individuals was seen at Point II-27. Only one publicly available record of a Franklin's gull has been documented as a fatality at a wind facility in the U.S., and it occurred in the mid-1990s. Given the rarity of Franklin's gulls reported in known studies of fatalities at wind energy, risk to this species at the Project is anticipated to be relatively low.

American White Pelican

American white pelicans were observed in the Project in 16 groups that included 69 individuals. They were observed at Points II-3, II-6, II-16, II-18, II-20, and II-23 in groups ranging from 1 to 30 individuals. Two publicly available records of American white pelican fatalities have been documented at wind facilities in the U.S. and occurred in 2010 and 2011. Based on the relatively low number of known fatalities for the species at wind facilities in the U.S., risk to this species at the Project is anticipated to be relatively low.

SUMMARY

The avian wetland use surveys were a snapshot of large bird species that utilize wetlands and open water in the spring and early breeding season. Two-thirds of the 3,898 observations at the Project were of waterfowl, with that group's use split among 18 species; this group was documented at all survey points and had the highest percent frequency of occurrence at 97.2%. Waterbirds were the second-most frequently observed group, being recorded during 55.2% of avian wetland use surveys. While nearly 20% of the large bird observations were of American coots, this number was attributed to just eight groups of relatively large flocks, and this group's frequency of occurrence was therefore relatively low (22.2%). Diurnal raptors made up less than one percent of observations. No state or federally listed species were observed, and no eagles were observed during the avian wetland use surveys. Two species listed as special concern by the DNR were observed: the Franklin's gull and American white pelican.

Overall there was no obvious pattern to spatial use by large birds at the wetland use surveys in the Project. While the highest use point (II-16) was located adjacent to the Shaokatan WMA with large wetland complexes, two other points (II-18 and II-20) located adjacent to WMAs with similar wetland habitat had lower than average mean use. Additionally, Point II-6 recorded relatively high use mostly associated with the adjacent open water at Perch Lake; however,

Point II-5 is located adjacent to a similarly sized open waterbody (Steep Bank Lake), and Point II-5 had the lowest mean use of all the surveyed points.

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