Northern Long-Eared Bat Presence/Absence Acoustic Surveys Crocker Wind Farm Clark County, South Dakota

Report
July 22 – 27, 2016

Prepared for:

Crocker Wind Farm, LLC

7650 Edinborough Say, Suite 725
Edina, South Dakota 55425

Prepared by:

Joyce Pickle, Kevin Murray, Adam Kreger, and Rebecca Schmitt

Western EcoSystems Technology, Inc.
1710 Douglas Drive, Suite 283
Golden Valley, South Dakota 55422

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STUDY PARTICIPANTS

Western EcoSystems Technology, Inc.

Joyce Pickle	Project Manager
Kevin Murray	Acoustic Analyst, Senior Bat Biologist
Adam Kreger	Report Writer
Rebecca Schmitt	Technical Editor
Tim Sichmeller	Bat Biologist
Emily Griffiths	Acoustic Lead
Rebecca Kolstrom	Acoustic Technician
Kent Irwin	Acoustic Analyst

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BACKGROUND AND PROJECT OVERVIEW

Crocker Wind Farm, LLC, a wholly owned subsidiary of Geronimo Energy, LLC (Geronimo) is considering the development of the Crocker Wind Farm (Project) located in Clark County, South Dakota (Figure 1). Geronimo contracted Western EcoSystems Technology, Inc. (WEST) to conduct bat 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 objectives of the summer bat surveys were to: 1) collect site-specific information on bat use of the Project that will be useful in evaluating potential impacts to bats from the Project, and 2) 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 South Dakota Department of Game Fish & Parks (SDGFP) and US Fish and Wildlife Service (USFWS) regarding these species. This report summarizes the results of the NLEB acoustic surveys completed for the Project during summer 2016.

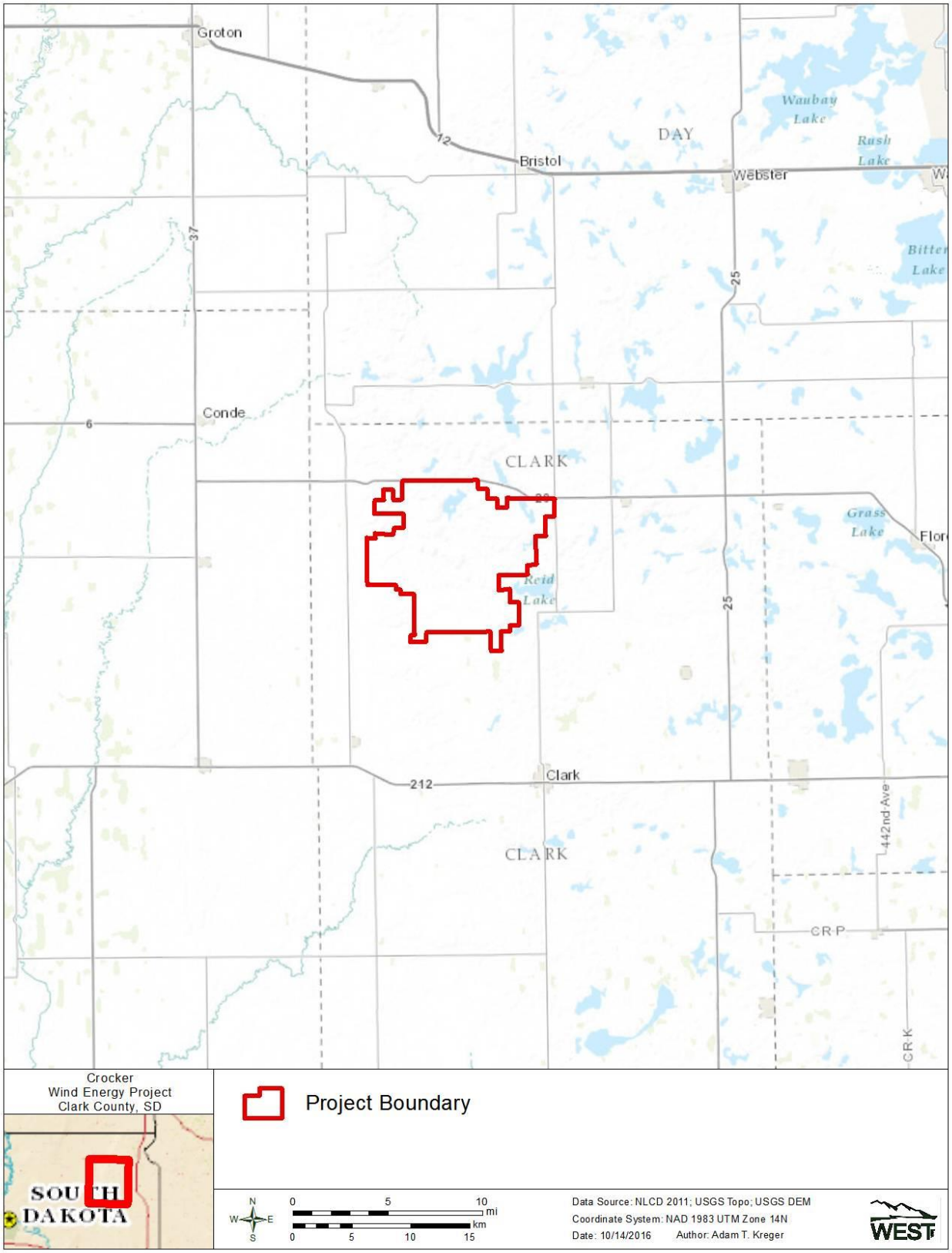


Figure 1. Location of the Crocker Wind Farm in Clark County, South Dakota.

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. Overall, there are only 389 acres of wooded habitat throughout the Project, all of which are small (less than 15 acres) isolated patches associated with small wood lots or wind breaks. Connected NLEB foraging or roosting habitat within the Project is limited to the eastern margin of the Project (Figure 1), where shelterbelts and larger forested patches are separated by less than 1,000 feet (ft; 305 meters [m]). This connected habitat totals approximately 32.4 acres within the Project boundary, which are made up patches of less than 15 acres but within 1,000 ft of larger patches outside of the Project. In total, 2 acoustic survey sites with potential NLEB habitat were selected within the Project on leased lands (Figure 2).

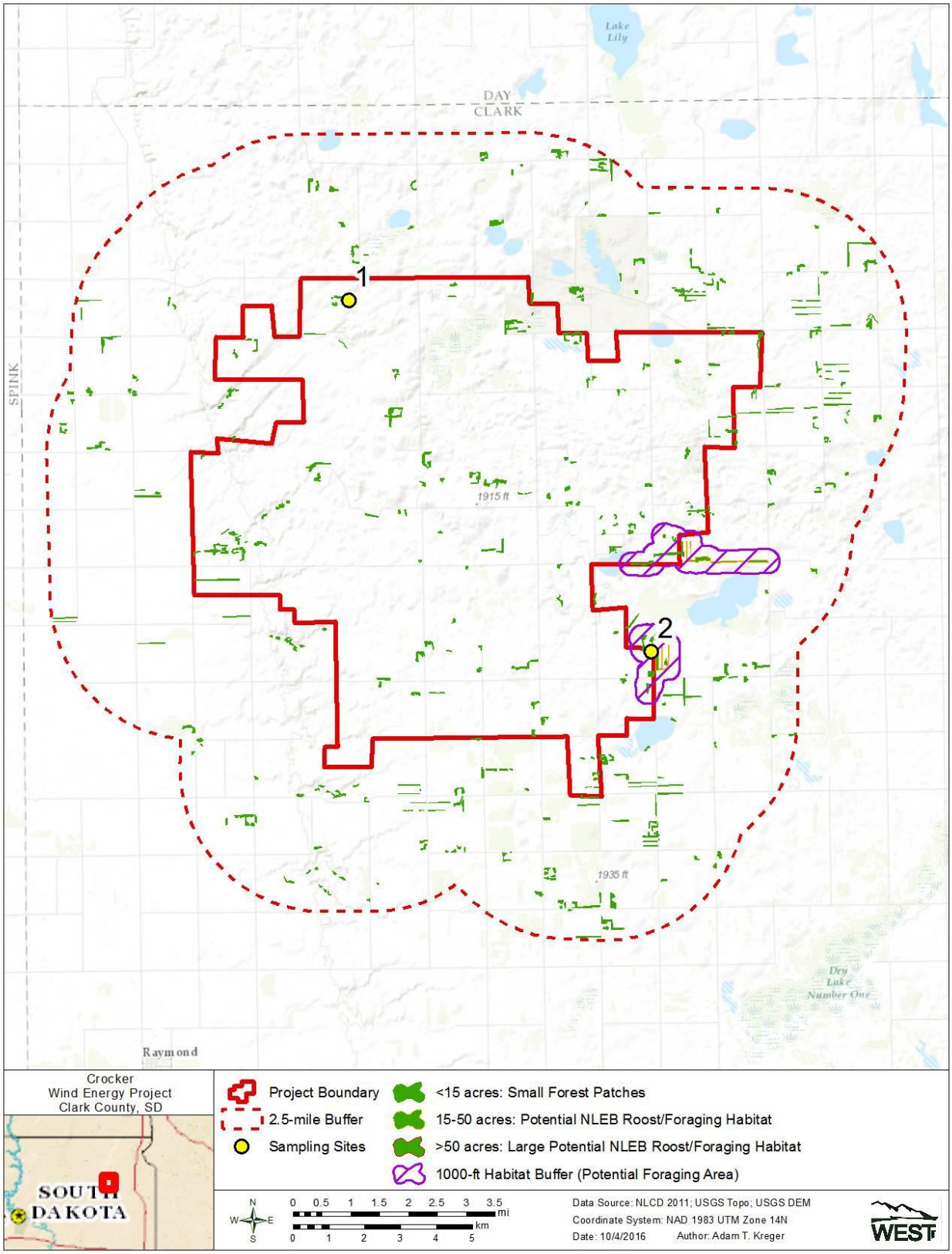


Figure 2. Crocker Wind Farm Acoustic Sampling Sites in Clark County, South Dakota.

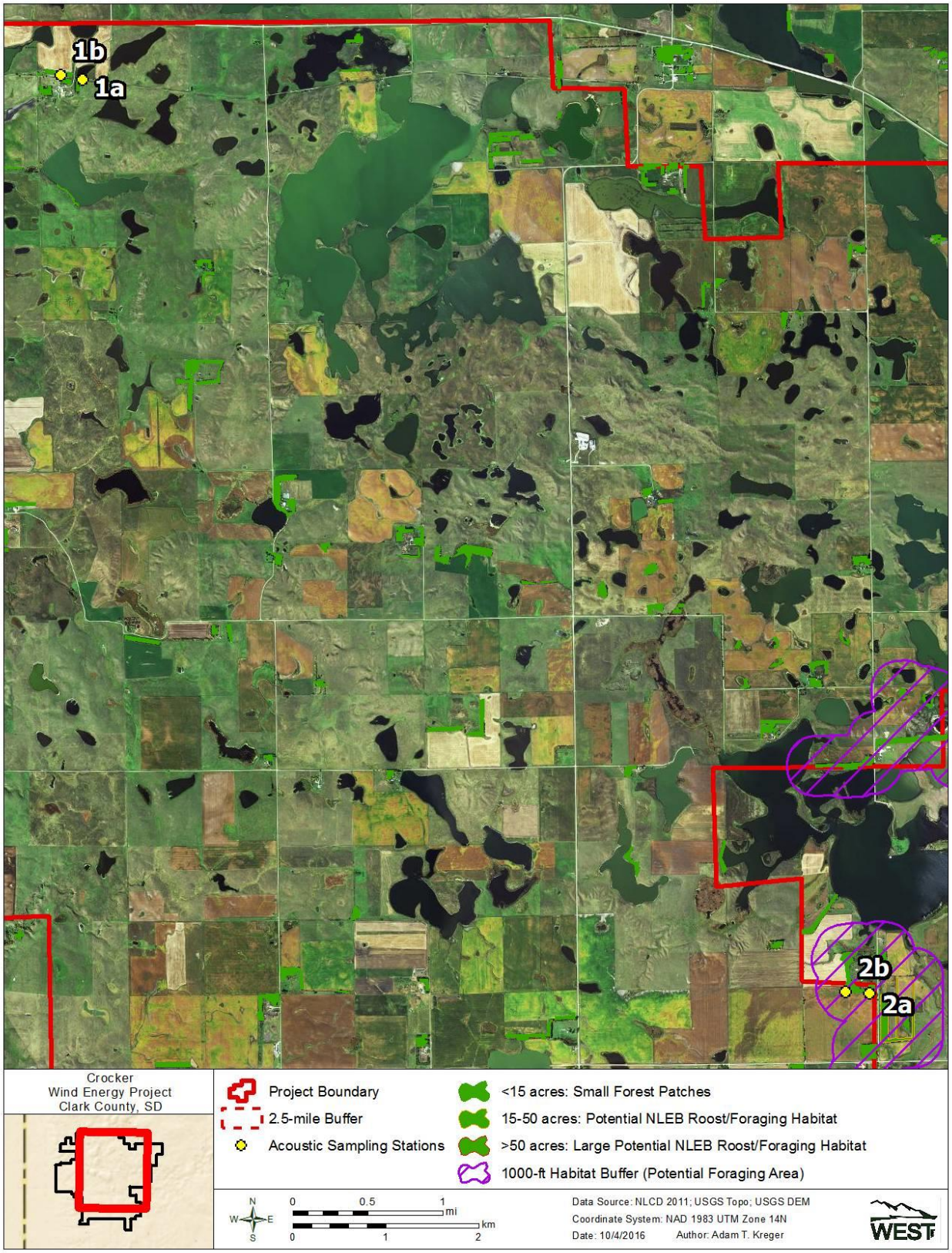


Figure 3. Location of the Crocker Wind Farm Acoustic Detector Locations in Clark County, South Dakota.

Acoustic Surveys

Acoustic surveys were conducted from July 22 – 27, 2016, following USFWS Guidelines (USFWS 2016). Surveys were conducted at 2 sites with two detector locations (stations) at each site for a total of 4 acoustic survey stations. Each station was surveyed for at least two nights for a total of at 10 valid detector nights. Bats were surveyed using full spectrum Song Meter SM3 acoustic recorders (Wildlife Acoustics, Inc.). Acoustic survey sites were reviewed and approved by the USFWS prior to conducting surveys. WEST placed detectors in suitable habitat for NLEB, including forest edges, small clearings and forest-canopy openings, near water sources, and 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 that were not verified by qualitative analysis.

RESULTS

Acoustical Analysis

Acoustic surveys were completed at 2 survey sites (4 survey stations) from July 22 – 27, 2016, for a total of 10 valid detector nights. 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 Crocker Wind Farm.

Site ID	Station ID	Easting†	Northing†	Site Description
1	A	589247	4995068	Open field with dirt road to the west and treed area to the south
1	B	589010	4995109	Grassy strip with tree-line to the north and drainage ditch to the south
2	A	597763	4985260	Grassy strip with corn field to south and east. Treed area to the north and west
2	B	597419	4985326	Grassy area at edge of corn fields lined with elm trees

† = NAD 1983, Zone 14

To assess study conditions for compliance with USFWS Guidelines (USFWS 2016), weather was monitored using the Kent weather station (KSDCLARK2) on Weather Underground's Wundermap (http://www.wunderground.com/wundermap/). Stations Cro-1a and Cro-1b were deployed on July 22 and retrieved on July 25. Weather conditions met USFWS criteria for these stations on the nights of July 22, July 23, and July 24. Stations Cro-2a and Cro-2b were deployed on July 25 and retrieved July 27. Weather conditions met USFWS criteria for these stations on the nights of July 25 and July 26. All data was included in the analysis from all deployments. Together, these 4 stations collected 10 nights of valid data, meeting the requirement of at least four detector nights per site.

Kaleidoscope identified a total of 736 bat call files and identified 722 files (98.1%) to species. Average number of bat calls per detector night was 72.2. 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 Crocker Wind Farm.

Acoustic Survey Site	Survey Station	ID program	Total Bat Calls	Calls Identified	Detector Nights	Bat Calls/ Detector Night
1	A	Kaleidoscope	37	36	3	12
	B	Kaleidoscope	61	61	3	20.3
2	A	Kaleidoscope	232	229	2	114.5
	B	Kaleidoscope	38	35	2	17.5
Total			**736**	**722**	**10**	**72.2**

Table 3. Summary of Kaleidoscope echolocation call identifications for the Crocker Wind Farm.

Site ID	Station ID	EPFU[1]	LABO	LACI	LANO	MYLU	MYSE	UNK	Total
1	A	10	22	0	4	0	0	1	37
1	B	13	24	8	14	2	0	0	61
2	A	12	200	4	10	3	0	3	232
2	B	3	21	6	2	1	2	3	38
Total		**76**	**534**	**36**	**60**	**12**	**4**	**14**	**736**

[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, station Cro-2b recorded potential NLEB calls with a p-value < 0.05 for the maximum-likelihood estimation (Table 4). 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 Crocker Wind Farm.

Site ID	Station ID	Date	Identification Method	MYSE (NLEB)
2	B	July 26, 2016	Kaleidoscope	2
			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 Crocker Wind Farm.

Site	Station ID	NLEB Calls	Probable NLEB Calls (P < 0.05)	NLEB Qualitatively Verified	Recommended Action
1	A	0	No	No	no further action
1	B	0	No	No	no further action
2	A	0	No	No	no further action
2	B	2	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 two sites in areas of suitable habitat within the Crocker Wind Farm.

NLEB was not qualitatively verified at any of the four acoustic stations at the two 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. Crocker Wind Farm Acoustic Survey Station Photographs and Datasheets

Acoustic Detector Station Cro-1a

Station Cro-1a Location

Station Cro-1a Orientation

Station Cro-1a Detection Cone

Acoustic Presence/Probable Absence 2016 Form

Project: Crocker **Station ID:** 1a

Start Date/Time (military): 20160722 1425 End Date/Time: 20160725 1734

Observer(s): ETG RLK

Station Information:

County: Clark State: SD

Datum: NAD27 (NAD83) Zone: 14T Easting: (6 digits) 589247 Northing: (7 digits) 4995068

Detector Type: SM2+ Detector Serial #: 65531 Tablet Location*: \

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

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

Microphone

Mic Serial#* 2699 Mic Ht (m): (from ground) 3.048 Mic Channel* R Audio Div* \ Data Div* \

Mic Horizontal Orientation: 263 Mic Vertical Orientation: 22 Sound Reception: (None) Horn Bat Hat PVC Elbow

SD
A → 001
B → 806

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.
20160722 1427	6.52	✓	✓	✓	✓		"Data" lit Static Heard		Record Status Data / Standby Error	
20160726 0539	5.46						"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: 0 **Dominant Tree Spp:** E. Cotton Wood + Siberian Elm

Stand Age: Young (Mature) Old

Detector Sampling (circle 1 or more):

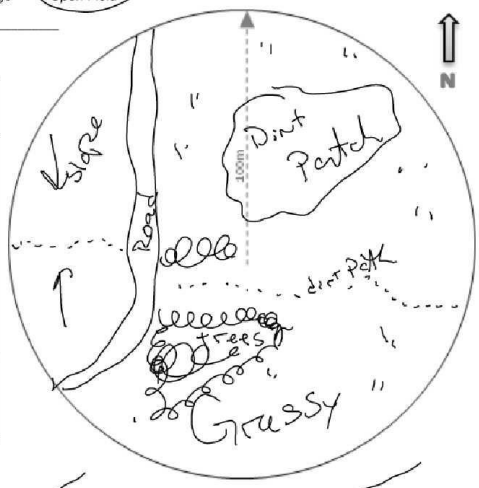
Creek Riparian Pond Bottomland Forest (Upland Forest) Field Edge (Open Field)

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 north side of a dirt road leading to open grassy fields. Directly to the North is a dried dirt patch, perhaps an old pond. To the west is a corridor created by trees lining the dirt road. The Trees extend a bit to the south. Mostly open field. To the far west is an across road which leads to farm houses.



Photos (check)

Detector Location_____ ✓ Detector Orientation_____ ✓ Detection Cone_____ ✓

(detector + main habitat surveyed) *(detector + surrounding habitat)* *(air space sampled)*

Station Cro-1a Datasheet

Acoustic Detector Station Cro-1b

Station Cro-1b Location

Station Cro-1b Orientation

Station Cro-1b Detection Cone

Acoustic Presence/Probable Absence 2016 Form

Project: Crocker **Station ID:** 1b

Start Date/Time (military): 20160722 1503 End Date/Time: 20160725 1726

Observer(s): ETG RLK

Station Information:

County: Clark State: SD

Datum: NAD27 (NAD83) Zone: 14T Easting: (6 digits) 589010 Northing: (7 digits) 4995109

Detector Type: SM2+ Detector Serial #: 11584 Tablet Location*: \

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

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

Microphone

Mic Serial#* 2736 Mic Ht (m): (from ground) 3.048 Mic Channel* R Audio Div* \ Data Div* \

Mic Horizontal Orientation: 270 Mic Vertical Orientation: 24 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.
20160722 1504	6.46	✓	✓	✓	✓		"Data" lit Static Heard		Record Standby Status Error Data	
20160725 1733	5.44						"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: 25 %Open/Ag: 75 %Water: 0 **Dominant Tree Spp:** Ponderosa Pine (Best guess w/ VTree app)

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:_____

SD

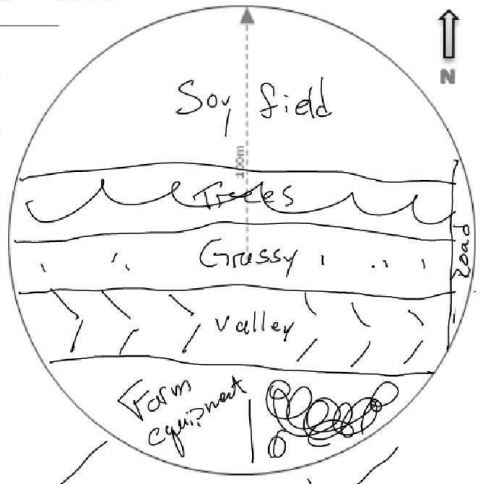
A → 008

B → ENE

2D

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 between a line of pine trees to the north and a man-made valley to the south (~20m deep). To the far north is a soy bean field. To the far south is a farm. To the far east is an access road. Detector is facing west along the tree line.



Photos (check)

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

Detector Orientation ✓ *(detector + surrounding habitat)*

Detection Cone ✓ *(air space sampled)*

Station Cro-1b Datasheet

Acoustic Detector Station Cro-2a

Station Cro-2a Location

Station Cro-2a Orientation

Acoustic Presence/Probable Absence 2016 Form

Project: Crocker **Station ID:** 2a

Start Date/Time (military): 20160725 1611 End Date/Time: 20160727 0931

Observer(s): ETG RLK

Station Information:

County: Clark State: SD

Datum: NAD27 (NAD83) Zone: 14T Easting: (6 digits) 597763 Northing: (7 digits) 4985260

Detector Type: SM3 Detector Serial #: 302518 Tablet Location*: \

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

Battery source: (Internal) External If External: volts amp/hrs

SD

A → 18

B → WC2c

Microphone

Mic Serial#* 0532 Mic Ht (m): (from ground) 3.048 Mic Channel* R Audio Div* \ Data Div* \

Mic Horizontal Orientation: 255 Mic Vertical Orientation: 23 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.
20160725 1616	6.5	✓	✓	✓	✓		"Data" lit Static Heard		Record Standby Status Error Data	
20160727 0931	5.6						"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:** Elm

Stand Age: Young (Mature) Old

Detector Sampling (*circle 1 or more*):

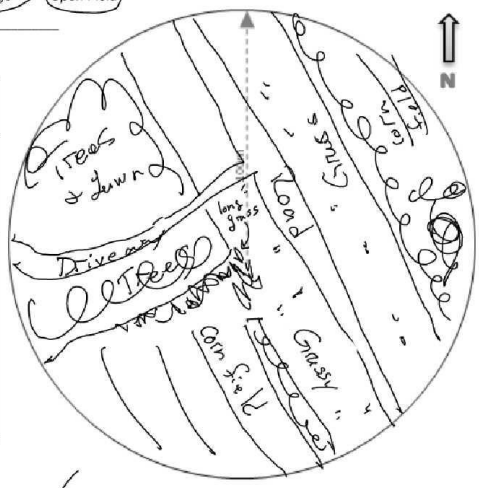
Creek Riparian Pond Bottomland Forest Upland Forest (Field Edge) (Open Field)

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 at the edge of a corn field, to the west & southwest. Directly east is a road, trees, and another corn field. The road travels N-S. To the NW is a driveway leading to a home.



Photos (check)

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

Detector Orientation ✓ *(detector + surrounding habitat)*

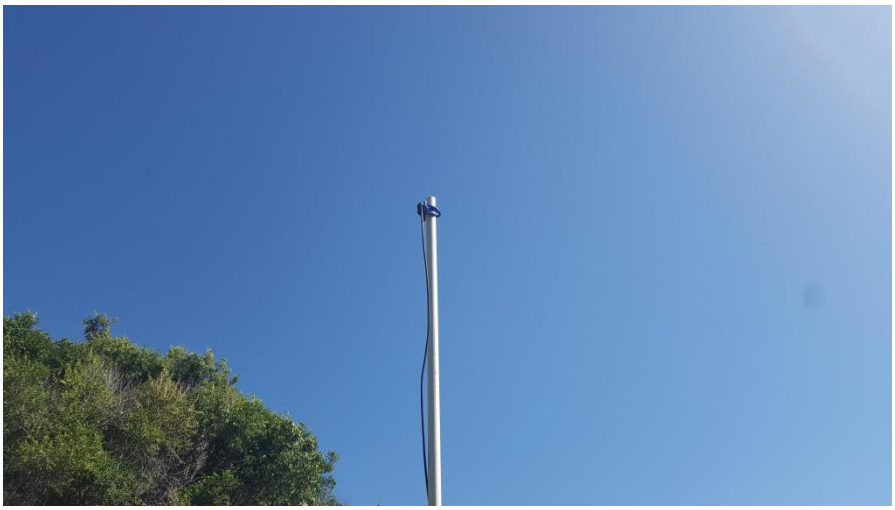
Detection Cone ✓ *(air space sampled)*

Station Cro-2a Datasheet

Acoustic Detector Station Cro-2b

Station Cro-2b Location

Station Cro-2b Orientation



Station Cro-2b Detection Cone

Acoustic Presence/Probable Absence 2016 Form

Project: Crocker **Station ID:** 2b

Start Date/Time (military): 20160725 1636 End Date/Time: 20160727 0918

Observer(s): ETG RLK

Station Information:

County: Clark State: SD

Datum: NAD27 (NAD83) Zone: 14T Easting: (6 digits) 597419 Northing: (7 digits) 4985326

Detector Type: SM2+ Detector Serial #: 168223 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: 162 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.
20160725 1639	6.44	✓	✓	✓	✓		"Data" lit Static Heard		Record Standby Status Error Data	
20160727 0928	5.61						"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	

SP

A → 32

B → 307

Habitat Description *(within 100m)*

% Forested: 20 *%Open/Ag:* 80 *%Water:*___ **Dominant Tree Spp:** Elm

Stand Age: Young (Mature) Old

Detector Sampling (*circle 1 or more*):

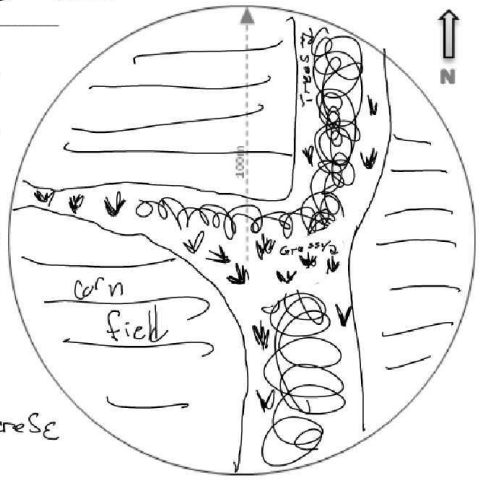
Creek Riparian Pond Bottomland Forest Upland Forest (Field Edge) Open Field

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 sandwiched between 3 corn fields lined by Elm trees. At the intersection the grass is waist height, and it borders all of the fields. One field is SW, one is N + NW, and the other is to the east. Trees also line these borders, but they are the most dense to the SE. Also dead trees are SE



Photos (check)

Detector Location ✓ *(detector + main habitat surveyed)* Detector Orientation ✓ *(detector + surrounding habitat)* Detection Cone ✓ *(air space sampled)*

Station Cro-2b Datasheet