Joyce Pickle Rebuttal Testimony, Ex.

Exhibit 4 Part 1 of 2 Page 1 of 12

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

Report July 22 – 27, 2016



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TABLE OF CONTENTS

BACKGROUND and project overview	1
METHODS	3
Desktop Habitat Assessment Acoustic Surveys	
RESULTS	6
Acoustical Analysis	6
DISCUSSION	8
LITERATURE CITED	9

LIST OF FIGURES

Figure 1. Location of the Crocker Wind Farm in Clark County, South Dakota	2
Figure 2. Crocker Wind Farm Acoustic Sampling Sites in Clark County, South Dakota	4
Figure 3. Location of the Crocker Wind Farm Acoustic Detector Locations in Clark County,	
South Dakota	5

LIST OF TABLES

Table 1. Location and site description of acoustic survey stations at the Crocker Wind Farm 7
Table 2. Number of bat calls recorded at each acoustic survey station determined by Kaleidoscope for the Crocker Wind Farm. 7
Table 3. Summary of Kaleidoscope echolocation call identifications for the Crocker Wind Farm
Table 4. Summary of NLEB call identifications by Kaleidoscope and qualitative analysis1 forstations with potential northern long-eared bat calls at the Crocker Wind Farm
Table 5. Summary of actions at each acoustic survey station for the Crocker Wind Farm

LIST OF APPENDICES

Appendix A. Crocker Wind Farm Acoustic Survey Station Photographs and Datasheets

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.

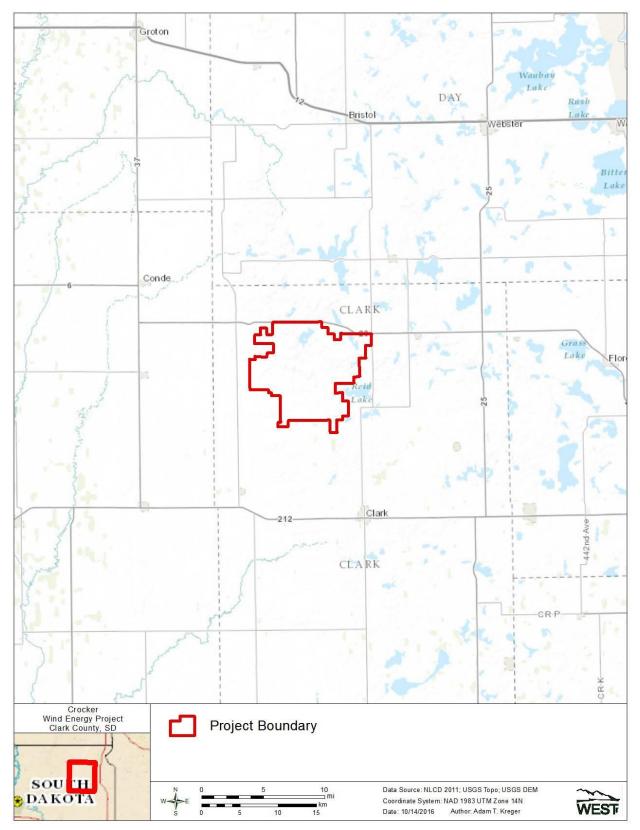


Figure 1. Location of the Crocker Wind Farm in Clark County, South Dakota.

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 [km²]) 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).

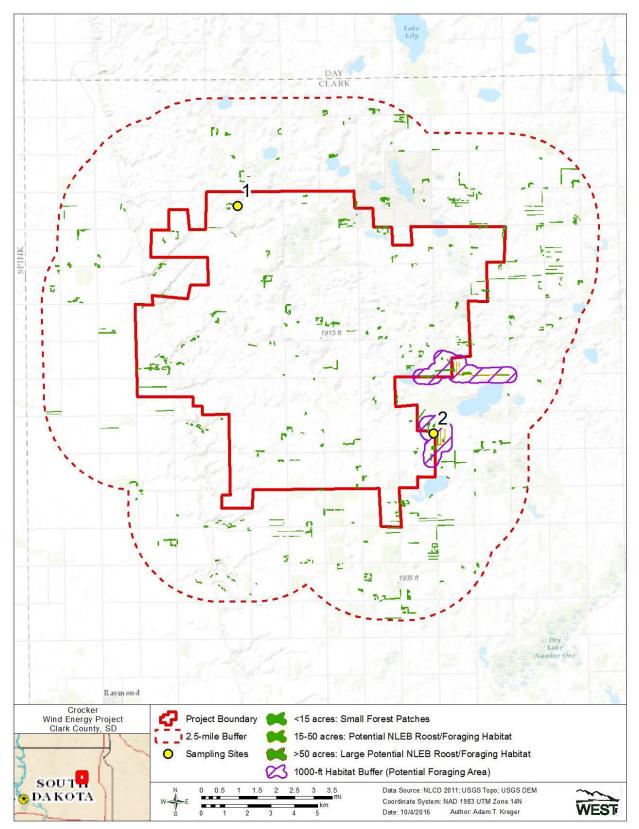


Figure 2. Crocker Wind Farm Acoustic Sampling Sites in Clark County, South Dakota.

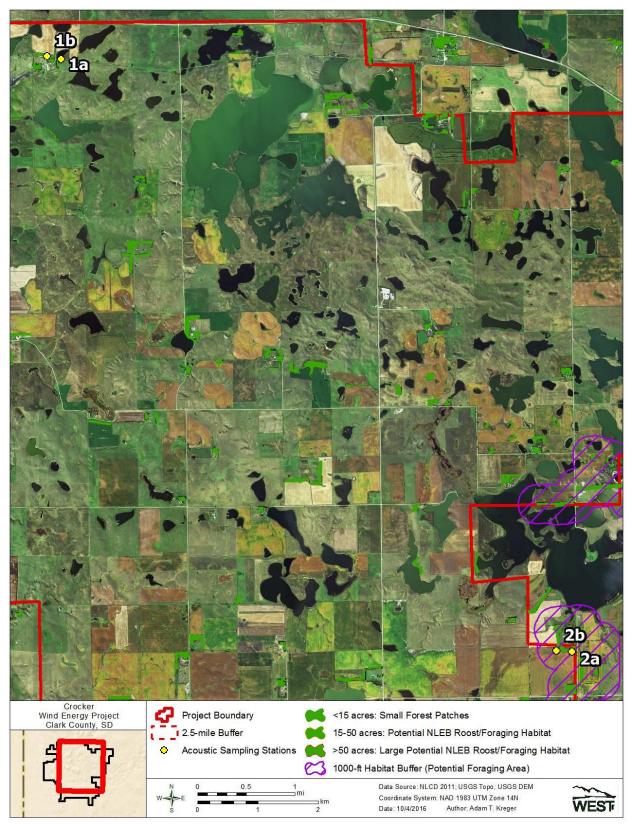


Figure 3. Location of the Crocker Wind Farm Acoustic Detector Locations in Clark County, South Dakota.

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.

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

Table 1. Location and site description of acoustic survey stations at the Crocker Wind Farm.

† = 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.

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

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

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

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

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 analysis¹ for stations with potential northern long-eared bat calls at the Crocker Wind Farm.

Site ID	Station ID	Date	Identification Method	MYSE (NLEB)
2	P	July 26, 2016	Kaleidoscope	2
۷	D	July 20, 2010	Qualitative	0

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

Site	Station ID	NLEB Calls	Probable NLEB Calls (P < 0.05)	NLEB Qualitatively Verified	Recommended Action
1	А	0	No	No	no further action
1	В	0	No	No	no further action
2	А	0	No	No	no further action
2	В	2	Yes	No	no further action

Table 5. Summary of actions at each acoustic survey station for the Crocker Wind Farm.

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

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Station Cro-1a Datasheet

Acoustic Detector Station Cro-1b



Station Cro-1b Location



Station Cro-1b Orientation



Station Cro-1b Detection Cone

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Station Cro-1b Datasheet

Acoustic Detector Station Cro-2a



Station Cro-2a Location



Station Cro-2a Orientation

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	and.	an	other	- cor	- J		1 100	$\left \right \in ($	70	Jer /	St 1	10 11	16/
	Food	tra	vols	$\nu - 1$	>.]	04	Le		YN	A	-	1/ _ 1	· \\/
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l									1	1	1	1 181	
				1					/			X	
	Photos (check)		/				/				<u> </u>	
	Detector L				C	Detector	Orientat	ion		Detect	ion Co	ne	
			habitat surv	veyed)	(detector +	surroundin	g habitat)	77			ce sampled)	

.

Station Cro-2a Datasheet

Acoustic Detector Station Cro-2b



Station Cro-2b Location



Station Cro-2b Orientation



Station Cro-2b Detection Cone

	A		(D		2016 5						$\widehat{\nabla}$	VEST	
	Acoustic Pres			e Absence	2016 F	orm		Station I	n	24			
	Start Date/Tim	e (mili	tary) 2	01607	25 11	36	End	Date/Time:		172-	1 F	5910	
	Observer(s):			Lk	<u> </u>	100	End	bate/ mile	000000	21 00 -	1	211.0	
	Station Information:												
	County: Clark State: SD												
	Datum: NAD27 (NAD83) Zone:)47 Easting: (6 digits) 597419 Northing: (7 digits) 4995326												
	Detector Type: <u>SM2+</u> Detector Serial #: <u>16 & 2 3</u> Tablet Loçation*: <u>S</u>												
	Detector Housing: Ammo Box Toolbox Plastic Tote Other: MA												
	Battery source	: (Inte	erna) Exte	rnal If	External:	volts	ar	np/hrs					
	Microphone	1244				11 2 410		10 17			ζ.		
	Mic Serial#* <u>2744</u> Mic Ht (m): (from ground) <u>3.048</u> Mic Channel* <u>A</u> Audio Div* Data Div* Mic Horizontal Orientation: (62 Mic Vertical Orientation: 22 Sound Reception: Arr Bat Hat PVCElbow												
				Z Mic ver	tical Orie	ntation			<u>n:</u> 2	ohe) H	lorn E	Bat Hat PVC Elbow	
	All Detector	Battery	Mic Check	Cables; detector	Data	Battery	Anapa Sensitivity	at Only Test Indicators	Volume	LED Lights	s (circle)	Comments	
		Voltage	Good? Y/N	housing; mic holder Good?	Card(s) Replaced?	Changed?	Setting (normally 6)	(checkmark)	(lowest setting) Yes/No	(should be unless bet and 0800P	e Standby, tween 1800 hrs)	Le., detector set, detector pic, over, vandalized, etc.	ced up, moved, knocked
	20160725	6.44		V	1	/		"Data" lit Static Heard		Record Status Data Record	Standby Error Standby	-	
	2016 02 27 0928	5.61	-					"Data" lit Static Heard		Status Data Record	Standby Error Standby		
								"Data" lit Static Heard		Status Data	Error		
								"Data" lit Static Heard		Record Status Data	Standby Error		
CP	Habitat Descri % Forested:20 %Op				it Tree Sp	op:	Ģ	Im					
)	Stand Age:	Young	Matury	Old									
12	Detector Sam			more):				\sim					
A7 50	- Creek Riparia Cave Entranc		ond B line Portal	ottomland Fore Bridge	est Up. Structur	land Fores e	t Field Other:	d Edge Oper	n Field	/		110	介
370	Topography:	Flat	Slope	High Point	Low Poin			_ /	/				
	Habitat Description: M microphone using an an written description in th distance to nearest wat	row. Include e space bel	e any features	of interest (water, L	buildings, rocky	outcrops, et	c.). Provide a						v /
	Detertur	ŝ	Sanc	lwiched	1 ban	le-la	3 car						
	Siebs line	,d k	y El.	n trees	. At	Le;	ntersect	ta W	p V	900	YER	To the party	/ -
	The Stass	i's	noll	bow hei	sht, a	n d:H	borte		w n	\geq	F &	W Grossys	
	all of the	2 £:0	, /Js. ,	One Sie	ld is	SW,	me is		<u>e.</u> vi	e.H.	>/	NON	
	NANW	, an	d yh	otta	is L	The	east				\sim		-/
	Siebs line The Stass all of the N& NW Treec also the most	line	these se to	yle S	-s, bri SÉ, Als	t Ko, ie dea	d trans	screse	2		2	(V)	
	_				/								
	Photos (check Detector Lo (detector	ocation	abitat surv	eyed)			Orientat surroundin		/		tion Co (air spac	ne ce sampled)	/

Station Cro-2b Datasheet