

ACOUSTIC SURVEY FINAL REPORT

Northern Long-eared Bat Presence/Absence Surveys Grande Prairie Wind Farm June 11 –23, 2014



Prepared for:

Grande Prairie Wind, LLC
7650 Edinborough Way, Suite 725
Edina, MN 55435

Prepared by:

Todd Mattson, Sandra Simon, and Kevin Lager Murray
Western EcoSystems Technology, Inc.
1710 Douglas Drive, Suite 283
Golden Valley, Minnesota 55422

August 7, 2014



STUDY PARTICIPANTS
Western EcoSystems Technology

Todd Mattson
Sandra Simon
Kevin Murray
Grant Gardner
Beth Arens
Randall Scheiner

Project Manager/Senior Ecologist
Research Biologist
Acoustic Analyst; Senior Bat Biologist
GIS Specialist
Field Technician
Field Technician

REPORT REFERENCE

Mattson, T., S. Simon, and K. Murray. 2014. Northern Long-eared Bat Presence/Absence Surveys, Grande Prairie Wind Farm. June 11 – 21, 2014. Prepared for Grande Prairie Wind, LLC, Edina, Minnesota. Prepared by Western EcoSystems Technology, Inc. (WEST), Minneapolis, Minnesota.

Table of Contents

INTRODUCTION	1
TECHNICAL APPROACH.....	1
RESULTS	2
Literature Cited	4

APPENDIX A. PICTURES OF ACOUSTIC SURVEY SITES

APPENDIX B. DATASHEETS FROM SURVEY SITES

INTRODUCTION

Grande Prairie Wind, LLC (Grande Prairie), a wholly owned subsidiary of Geronimo Wind Energy, LLC d/b/a/ Geronimo Energy, LLC (Geronimo), is considering the development of a utility scale wind energy facility in Holt County, Nebraska (Figure 1), known as the Grande Prairie Wind Farm (Project). Grande Prairie has contracted Western Ecosystems Technology, Inc. (WEST) to conduct pre-construction acoustic presence/absence surveys for the federal-proposed endangered northern-long eared bat (*Myotis septentrionalis*; [NLEB]) within the Project. The objective of the surveys was to determine presence or probable absence of the proposed endangered NLEB within the Project. This report summarizes the results of acoustic surveys within the Project.

TECHNICAL APPROACH

Northern Long-eared Bat Presence/Absence Summer Acoustic Surveys

Acoustic surveys followed the U.S. Fish and Wildlife Service (USFWS) 2014 Revised Range-Wide Indiana Bat Summer Survey Guidelines issued on January 13, 2014 (USFWS 2014a), per the *Northern Long-Eared Bat Interim Conference and Planning Guidance* (USFWS 2014b). On April 9, 2014, Stantec Consulting Services, Inc. (Stantec) provided Grande Prairie a report for the Project titled *Northern Long-eared Bat (Myotis septentrionalis) Screening Analysis* prepared for the Project. WEST used information from this report to refine the assessment of potential NLEB habitat and develop an acoustical study plan for the project. The USFWS guidelines' minimum survey efforts require one survey site for every 123 acres of suitable habitat (USFWS 2014a). Two sampling locations at each survey site should then be surveyed for a minimum of two detector/nights. Stantec estimated that there are about 692 acres of woodland habitat within 1,000 feet of turbine locations. As such, this equates to six survey sites for a total of 24 detector nights. To ensure adequate survey coverage, WEST surveyed seven sites, with two detectors (i.e., stations) each per site for a total of 42 detector nights. WEST biologists deployed four detectors (two detectors/stations per site) at suitable sites throughout the Project area and moved the detectors between the seven sites so that each site had at least four detector nights. This report summarizes the results of acoustic surveys at seven sites conducted from June 11 – 23, 2014.

Acoustic surveys were conducted from June 11 – 23, 2014 consistent with USFWS guidelines (USFWS 2014a). Bats were surveyed using SD1 and SD2 AnaBat™ ultrasonic detectors (Titley Electronics Pty Ltd., NSW, Australia). Acoustic monitoring began before sunset and continued for the entire night. Survey duration at each site was for a minimum of two nights. If weather conditions such as persistent rain (> 30 minutes), strong winds (> 9 mph for > 30 minutes), or persistent cold temperatures (below 10°C [50°F] for > 30 minutes) occurred during the first five hours of a survey night, then that site was surveyed for an additional night (USFWS 2014). To maximize the quality of recorded echolocation calls, detectors were positioned at least one meter off the ground, at ≥ 45° angle, and with PVC tube weatherproofing (Britzke et al. 2010, USFWS 2014). Sensitivity was set to 6 on all detectors.

Bat calls were identified to species using two 'candidate' acoustic bat ID programs, Bat Call Identification (BCID; Allen 2012) and EchoClass version 2.0 (Dr. Eric Britzke, U.S. Army Research and Development Center). If either bat ID 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. Although the Project is outside of the Indiana bat (*Myotis sodalis*; federal listed endangered) range, qualitative analysis was also conducted on any calls that either of the bat ID programs identified with a high degree of probability as Indiana bat calls. 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 2014a). The default BCID Analook filter was used to screen calls for qualitative analysis, i.e. only calls that passed the BCID filter were examined during the qualitative analysis. Each call file was examined and echolocation calls produced by *Myotis* species were identified to species whenever possible. If probable NLEB or Indiana bat echolocation call sequences identified by BCID or EchoClass were not characteristic of NLEB or Indiana bats, contained distinct calls produced by species other than NLEB or Indiana bats or were of insufficient quality, they were reclassified. Per USFWS guidelines, NLEB and Indiana bats were considered present at sites with probable calls verified by qualitative analysis. NLEB and Indiana bats were considered absent from sites with no probable NLEB or Indiana bat calls or from sites with probable NLEB or Indiana bat calls that were not verified by qualitative analysis.

RESULTS

AnaBat detectors surveyed seven acoustic survey sites, consisting of two detector stations per site (i.e., 14 stations), from June 11 – 23, 2014. UTM coordinates and brief site descriptions for each site are listed in Table 1. Pictures and datasheets with site descriptions are found in Appendices A and B. We checked weather at the O'Neill Municipal-Baker (KONL) weather station, which can be found on Weather Underground's Wundermap (<http://www.wunderground.com/wundermap/>). Weather at each survey site on all survey nights met the standards for acoustic monitoring set by USFWS (2014a).

Acoustic surveys were completed at seven sites (14 stations) for a total of 42 detector nights (Tables 1 and 2). BCID identified a total of 1,945 bat call files and identified 1,435 files (74%) to species. EchoClass identified 3,919 bat call files and identified 893 files (23%) to species (Table 2). Average number of bat calls per detector-night ranged from 46.3 for BCID to 93.3 for EchoClass. Table 2 summarizes the number of detector nights, number of bat call files, and number of bat calls identified to species at each site.

Four of the stations (GP5, GP9, GP13 and GP15) recorded Indiana bat calls (Table 4). However, qualitative analysis resulted in all of these calls being reclassified, and therefore the Indiana bat is considered absent from all of the stations.

Out of 14 stations (in seven sites), five stations recorded no NLEB bat calls: GP7, GP8, GP10, GP14, and GP15. All the remaining stations that did record NLEB bat calls had a p-value less than 0.05 for the maximum-likelihood estimation and were therefore included in qualitative analysis (USFWS 2014a). Nine stations recorded probable NLEB calls including stations GP1,

GP2, GP5, GP6, GP9, GP11, GP12, GP13, and GP16. However, qualitative identification did not verify the presence of NLEB at stations GP1, GP2, GP6, and GP11.

NLEB bat calls were verified by qualitative analysis at five of the 14 stations (35.7%; Tables 4 and 5): GP5, GP9, GP12, GP13 and GP16. These five stations were located in five of the seven sites (Sites 3, 5, 6, 7, and 8; Figure 1). NLEB bat calls were verified on a single night only for all five stations (i.e., no stations had multiple nights of calls verified by qualitative analysis).

Literature Cited

- Allen, C.R. 2012. BCID East 2012 Manual: Bat Call Identification, Inc. Version 2.4p.
- Britzke, E.R., B.A. Slack, M.P. Armstrong, and S.C. Loeb. 2010. Effects of orientation and weatherproofing on the detection of bat echolocation calls. *Journal of Fish and Wildlife Management* 1: 136-141.
- Stantec Consulting Services, Inc. 2014. Northern Long-Eared Bat (*Myotis septentrionalis*) Screening Analysis: Grande Prairie Wind Farm, Holt County, Nebraska. Unpublished report prepared for Grande Prairie Wind, LLC. April 9, 2014
- U.S. Fish and Wildlife Service (USFWS). 2014a. 2014 Revised Range-Wide Indiana Bat Summer Survey Guidelines (January 2014). USFWS Endangered Species Program: Midwest Region.
- U.S. Fish and Wildlife Service (USFWS). 2014b. 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>

Table 1. Location and site description of 14 acoustic survey stations at the Grande Prairie Wind Farm.

Station ID	Site ID	Zone	Easting	Northing	Site Description
GP1	1	14	0539454	4725624	Forest edge and pond
GP2	1	14	0539494	4725607	Forest edge and pond
GP5	3	14	0536984	4712922	Forest edge
GP6	3	14	0536987	4712969	Forest edge
GP7	4	14	0544786	4707270	Forest edge
GP8	4	14	0544786	4707269	Forest edge
GP9	5	14	0549087	4712818	Forest edge
GP10	5	14	0549116	4712853	Forest edge
GP11	6	14	0555142	4717098	Forest edge
GP12	6	14	0555147	4717148	Forest edge
GP13	7	14	0555334	4721571	Forest edge and shelterbelt
GP14	7	14	0555332	4721522	Forest edge and shelterbelt
GP15	8	14	0545721	4724548	Forested riparian corridor
GP16	8	14	0545722	472598	Forested riparian corridor

† = NAD 1983

Table 2. Number of bat calls recorded at each acoustic survey station determined by BCID and EchoClass for the Grande Prairie Wind Farm.

Acoustic Survey Station	Acoustic Site ID	ID program	Total Bat Calls	Calls Identified	Detector Nights	Bat Calls/ Detector Night
GP1	1	BCID	300	242(81%)	3	100.0
		EchoClass	752	133 (18%)	3	251.0
GP2	1	BCID	651	395 (61%)	3	217.2
		EchoClass	928	261 (28%)	3	309.3
GP5	3	BCID	99	86 (87%)	2	49.5
		EchoClass	216	54 (25%)	2	108.0
GP6	3	BCID	78	63 (81%)	2	39.0
		EchoClass	179	32 (18%)	2	89.5
GP7	4	BCID	2	1 (50%)	2	1.0
		EchoClass	5	0 (0%)	2	2.5
GP8	4	BCID	11	11 (100%)	2	5.5
		EchoClass	21	3 (14%)	2	10.5
GP9	5	BCID	235	203 (86%)	5	47.0
		EchoClass	507	95 (19%)	5	101.4
GP10	5	BCID	33	29 (88%)	5	6.6
		EchoClass	137	6 (4%)	5	27.4
GP11	6	BCID	98	85 (87%)	5	19.6
		EchoClass	235	85 (36%)	5	47.0
GP12	6	BCID	80	66 (83%)	5	16.0
		EchoClass	182	58 (32%)	5	36.4
GP13	7	BCID	54	47 (87%)	2	27.0
		EchoClass	112	21 (19%)	2	56.0
GP14	7	BCID	50	46 (92%)	2	25.0
		EchoClass	118	20 (17%)	2	59.0
GP15	8	BCID	142	86 (61%)	2	71.0
		EchoClass	298	77 (26%)	2	149.0
GP16	8	BCID	112	75 (67%)	2	56.0
		EchoClass	229	48 (21%)	2	114.5
Total		BCID	1,945	1,435 (74%)	42	46.3
		EchoClass	3,919	893 (23%)	42	93.3

Table 3. Summary of BCID and EchoClass echolocation call identifications for the Grande Prairie Wind Farm¹.

Station ID	Site ID	ID Program	EPFU	LABO	LACI	LANO	MYLE	MYLU	MYSE	MYSO	NYHU	PESU	UNK	Total
GP1	1	BCID	36	42	53	82	0	12	6	0	11	0	58	300
		EchoClass	11	48	56	4	0	0	0	0	7	7	619	752
GP2	1	BCID	28	96	76	63	0	85	18	0	27	2	256	651
		EchoClass	6	188	38	10	0	2	0	0	4	13	667	928
GP5	3	BCID	3	25	13	7	0	3	21	0	14	0	13	99
		EchoClass	3	40	7	1	0	0	1	2	0	0	162	216
GP6	3	BCID	4	27	8	4	0	4	2	0	9	5	15	78
		EchoClass	1	23	8	0	0	0	0	0	0	0	147	179
GP7	4	BCID	0	0	0	1	0	0	0	0	0	0	1	2
		EchoClass	0	0	0	0	0	0	0	0	0	0	5	5
GP8	4	BCID	4	0	6	1	0	0	0	0	0	0	0	11
		EchoClass	1	0	2	0	0	0	0	0	0	0	18	21
GP9	5	BCID	50	22	59	63	0	1	2	0	2	4	32	235
		EchoClass	12	28	45	8	0	0	0	1	0	1	412	507
GP10	5	BCID	12	0	3	14	0	0	0	0	0	0	4	33
		EchoClass	4	0	0	2	0	0	0	0	0	0	131	137
GP11	6	BCID	8	27	29	7	0	1	1	0	10	2	13	98
		EchoClass	2	43	38	1	0	0	0	0	0	1	150	235
GP12	6	BCID	5	14	30	11	0	0	2	0	4	0	14	80
		EchoClass	2	25	31	0	0	0	0	0	0	0	124	182
GP13	7	BCID	9	17	4	0	0	7	5	0	5	0	7	54
		EchoClass	1	17	0	0	0	0	0	1	0	2	91	112
GP14	7	BCID	5	2	24	14	0	0	0	0	1	0	4	50
		EchoClass	5	2	10	3	0	0	0	0	0	0	98	118
GP15	8	BCID	8	34	13	13	0	1	0	0	14	3	56	142
		EchoClass	0	58	13	0	1	0	0	1	0	3	221	298
GP16	8	BCID	14	25	3	7	0	3	4	0	19	0	37	112
		EchoClass	3	40	2	2	0	0	0	0	0	1	181	229

¹ EPFU = Big Brown Bat; LABO = Eastern Red Bat; LACI = Hoary Bat; LANO = Silver-haired Bat; MYLE = Myotis lebeii; MYLU = Little Brown Bat; MYSE = Northern Long-eared Bat; MYSO = Indiana Bat; NYHU = Evening Bat; PESU = Eastern Pipstrelle (aka Tri-colored bat); UNK = Unknown

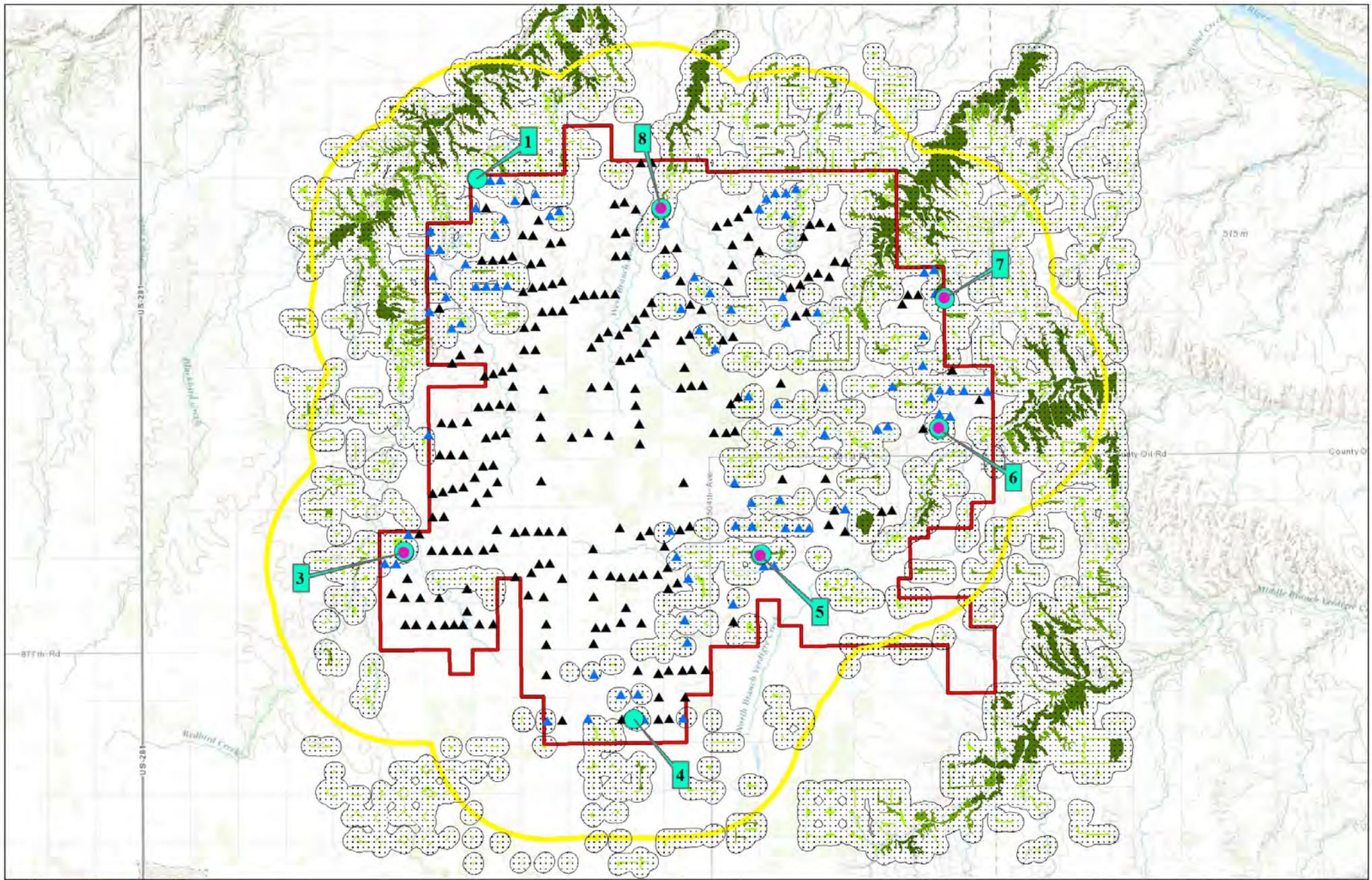
Table 4. Summary of Myotis call identifications by BCID, EchoClass and qualitative analysis for stations with potential Northern long-eared bat and Indiana bat calls at the Grande Prairie Wind Farm.

Station ID	Site ID	Date	Identification Method	MYSE (NLEB)	MYSO (Indiana Bat)
GP1	1	June 11	BCID	4	0
			EchoClass	0	0
			Qualitative	0	0
GP1	1	June 12	BCID	2	0
			EchoClass	0	0
			Qualitative	0	0
GP2	1	June 11	BCID	16	0
			EchoClass	0	0
			Qualitative	0	0
GP2	1	June 12	BCID	2	0
			Echoclass	0	0
			Qualitative	0	0
GP5	3	June 14	BCID	21	0
			EchoClass	0	2
			Qualitative	25	0
GP6	3	June 14	BCID	2	0
			EchoClass	0	0
			Qualitative	0	0
GP9	5	June 17	BCID	1	0
			EchoClass	0	0
			Qualitative	0	0
GP9	5	June 19	BCID	2	0
			EchoClass	0	1
			Qualitative	1	0
GP11	6	June 18	BCID	1	0
			EchoClass	0	0
			Qualitative	0	0
GP12	6	June 16	BCID	1	0
			EchoClass	0	0
			Qualitative	1	0

Station ID	Site ID	Date	Identification Method	MYSE (NLEB)	MYSO (Indiana Bat)
GP12	6	June 19	BCID	1	0
			EchoClass	0	0
			Qualitative	0	0
GP13	7	June 22	BCID	5	0
			EchoClass	0	1
			Qualitative	1	0
GP15	8	June 22	BCID	0	0
			EchoClass	0	1
			Qualitative	0	0
GP16	8	June 21	BCID	3	0
			EchoClass	0	0
			Qualitative	1	0
GP16	8	June 22	BCID	1	0
			EchoClass	0	0
			Qualitative	0	0

Table 5. NLEB summary at each acoustic survey site for the Grande Prairie Wind Farm.

Station ID	Site ID	NLEB Calls	Probable NLEB Calls (P < 0.05)	Qualitatively Verified
GP1	1	Yes	Yes	No
GP2	1	Yes	Yes	No
GP5	3	Yes	Yes	Yes
GP6	3	Yes	Yes	No
GP7	4	No	No	No
GP8	4	No	No	No
GP9	5	Yes	Yes	Yes
GP10	5	No	No	No
GP11	6	Yes	Yes	No
GP12	6	Yes	Yes	Yes
GP13	7	Yes	Yes	Yes
GP14	7	No	No	No
GP15	8	No	No	No
GP16	8	Yes	Yes	Yes



-  Project Boundary
-  Acoustic Survey Sites
-  Sites with Positive NLEB Acoustical Detections
-  Wind Turbine Locations 4/29/2014 (including alternates)
-  Wind Turbine Locations within 1,000 ft of NLEB Habitat
-  1,000-foot habitat buffers
-  2.5 mile project buffer
- NLEB Forest Habitats**
-  0-14 acres: Commuting/Travel Habitats
-  15-49 acres: Small Roost/Foraging Habitats
-  50+ acres: Medium-large Roost/Foraging Habitats

Grande Prairie Wind Farm
Holt County, Nebraska

0 1 2 3 4 5 6 Miles

Data Source: ESRI, USDA
Projection: Universal Transverse Mercator
Datum: North American Datum 1983
Author: K. Klaphake Date: 29 Jul 2014



Appendix A. Pictures of Acoustic Survey Sites



Photo 1. Bat habitat surveyed by AnaBat detector at site GP1.



Photo 2. Bat habitat surveyed by AnaBat detector at site GP2.



Photo 3. Bat habitat surveyed by AnaBat detector at site GP5.



Photo 4. Bat habitat surveyed by AnaBat detector at site GP6.



Photo 5. Bat habitat surveyed by AnaBat detector at site GP7.



Photo 6. Bat habitat surveyed by AnaBat detector at site GP8.



Photo 7. Bat habitat surveyed by AnaBat detector at site GP9.



Photo 8. Bat habitat surveyed by AnaBat detector at site GP10.



Photo 9. Bat habitat surveyed by AnaBat detector at site GP11.



Photo 10. Bat habitat surveyed by AnaBat detector at site GP12.



Photo 11. Bat habitat surveyed by AnaBat detector at site GP13.



Photo 12. Bat habitat surveyed by AnaBat detector at site GP14.



Photo 13. Bat habitat surveyed by AnaBat detector at site GP15.



Photo 14. Bat habitat surveyed by AnaBat detector at site GP16.

Appendix B. Datasheets from Survey Sites

Acoustic Monitoring STATION

2011 Data Form

Station #: GPI-AB

Observer: B.A. R.S.

Date: 6-11-14

Project: Grass Prairie

Station Information

Datum: NAD27 or NAD83 Zone: 14T Easting: 47 25624 Northing: 053 9454

Detector Type: SD2 SD1 Anabat II Serial Number(s): 74059 (microphone)
SM2 Pettersson B.A.T. (recorder, if applicable)

Placement: Ground Raised Raised System: N/A Pulley Fixed

Station Type: Fixed Temporary Microphone Protection: Plastic Bin Bat Hat None

Met Tower Present? Yes No Sound Reception: PVC Elbow Reflector Plate None

Microphone Ht (m): 1 M Aspect: E Power Supply: 12V 12amp hrs
(Height from ground to detector/microphone) (bearing or Cardinal Direction of mik) (e.g., voltage and Amp-hours of battery, solar panel, etc.)

Habitat Information

Habitat:
Rank by abundance within 100 m of detector. 1 = most abundant, etc.

Shrub/Steppe		Deciduous Forest		Grassland	<u>1</u>	Other (describe)	
Crop/Agriculture		Coniferous Forest		Desert		<u>PASTURE</u>	<u>3</u>
Riparian/Wetland	<u>2</u>	Pinyon-Juniper		Water (lake, etc.)			

Topography: Flat Slope High Point Low Point Other: _____

Was this station chosen to sample a bat feature? Yes No

Photos: Take photos of the area from each cardinal direction (facing away from the detector), as well as from the direction the microphone is pointing, and one of the detector set up itself. Also take photos of any bat features present and anything else of interest (e.g., sage grouse pellets, etc.). Label and mail to your bat liaison on your thumb drive.

General Remarks: _____

Habitat Map

Codes	Bat Features	Description
AS=	anthropogenic structure	_____
CV=	cave	_____
MN=	mine	_____
RO=	rocky outcrop	_____
CF=	coniferous forest stand	_____
DF=	deciduous forest stand	_____
WA=	water	_____
Other=		_____

Map out bat and habitat features within 100 m radius of detector (x). Label using codes provided, and write in any other features of interest (cist, road, etc.). Provide descriptions for bat features in spaces provided.

Acoustic Monitoring STATION

2011 Data Form

Station #: GPZ-AB

Observer: Brian R Schener Date: 6-11-14

Project: Grande Prairie

Station Information

Datum: NAD27 or NAD83 Zone: 14 Easting: 4725207 Northing: 0539494

Detector Type: SD2 SD1 Anabat II Serial Number(s): 80451 (microphone)
SM2 Pettersson B.A.T. (recorder, if applicable)

Placement: Ground Raised Raised System: N/A Pulley Fixed

Station Type: Fixed Temporary Microphone Protection: Plastic Bin Bat Hat None

Met Tower Present? Yes No Sound Reception: PVC Elbow Reflector Plate None

Microphone Ht (m): 1m Aspect: E Power Supply: 12v 12ah
(Height from ground to detector/microphone) (Bearing or Cardinal Direction of mik) (e.g., voltage and Amp-hours of battery, solar panel, etc.)

Habitat Information

Habitat:	Shrub/Steppe	Deciduous Forest	Grassland	1	Other (describe)	
<small>Rank by abundance within 100 m of detector. 1 = most abundant, etc.</small>	Crop/Agriculture	Coniferous Forest	Desert		<u>Pasture</u>	<u>3</u>
	Riparian/Wetland	Pinyon-Juniper	Water (lake, etc.)			

Topography: Flat Slope High Point Low Point Other: _____

Was this station chosen to sample a bat feature? Yes No

SENW Unit [First pass]

Photos: Take photos of the area from each cardinal direction (facing away from the detector), as well as from the direction the microphone is pointing, and one of the detector set up itself. Also take photos of any bat features present and anything else of interest (e.g., sage grouse pellets, etc.). Label and mail to your bat liaison on your thumb drive.

General Remarks: _____

Habitat Map	Codes	Bat Features	Description
	AS=anthropogenic structure	:	_____
	CV=cave	:	_____
	MN=mine	:	_____
	RO=rocky outcrop	:	_____
	CF=coniferous forest stand	:	_____
	DF=deciduous forest stand	:	_____
	WA=water	:	_____
Other=:	:	_____	

Map out bat and habitat features within 100 m radius of detector (x). Label using codes provided, and write in any other features of interest (rill, road, etc.). Provide descriptions for bat features in spaces provided.

Acoustic Monitoring STATION

2011 Data Form

Station #: GP5-AB

Observer: B. ARENS

Date: 6-14-14

Project: Grande Prairie

Station Information

Datum: NAD27 or NAD83 Zone: 14 Easting: 4712922 Northing: 0536984

Detector Type: SD2 SD1 Anabat II Serial Number(s): 03846 (microphone)
 SM2 Pettersson B.A.T. (recorder, if applicable)

Placement: Ground Raised Raised System: N/A Pulley Fixed

Station Type: Fixed Temporary Microphone Protection: Plastic Bin Bat Hat None

Met Tower Present? Yes No Sound Reception: PVC Elbow Reflector Plate None

Microphone Ht (m): 1m Aspect: E Power Supply: 12.9 ah
 (Height from ground to detector/microphone) (Bearing or Cardinal Direction of mic) (e.g., voltage and Amp-hours of battery, solar panel, etc.)

Habitat Information

Habitat:
 Rank by abundance within 100 m of detector. 1 = most abundant, etc.

Shrub/Steppe		Deciduous Forest	<u>2</u>	Grassland	<u>1</u>	Other (describe)	
Crop/Agriculture		Coniferous Forest		Desert			
Riparian/Wetland		Pinyon-Juniper		Water (lake, etc.)			

Topography: Flat Slope High Point Low Point Other: _____

Was this station chosen to sample a bat feature? Yes No

Photos: Take photos of the area from each cardinal direction (facing away from the detector), as well as from the direction the microphone is pointing, and one of the detector set up itself. Also take photos of any bat features present and anything else of interest (e.g., sage grouse pellets, etc.). Label and mail to your bat liaison on your thumb drive.

General Remarks: _____

Habitat Map	Codes	Bat Features	Description
	AS=	anthropogenic structure	_____
	CV=	cave	_____
	MN=	mine	_____
	RO=	rocky outcrop	_____
	CF=	coniferous forest stand	_____
	DF=	deciduous forest stand	_____
	WA=	water	_____
Other=		_____	

Map our bat and habitat features within 100 m radius of detector (x). Label using codes provided, and write in any other features of interest (cave, road, etc.). Provide descriptions for bat features in spaces provided.

Acoustic Monitoring STATION

2011 Data Form

Station #: GP16-AB

Observer: B. ARENS

Date: 6-14-14

Project: Grande Prairie

Station Information

Datum: NAD27 or NAD83 Zone: 14 Easting: 4712969 Northing: 05316987

Detector Type: SD2 SD1 Anabat II Serial Number(s): 05563 (microphone)
SM2 Pettersson B.A.T. (recorder, if applicable)

Placement: Ground Raised Raised System: N/A Pulley Fixed

Station Type: Fixed Temporary Microphone Protection: Plastic Bin Bat Hat None

Met Tower Present? Yes No Sound Reception: PVC Elbow Reflector Plate None

Microphone Ht (m): 1m Aspect: E Power Supply: 12.9ah
(Height from ground to detector/microphone) (Bearing or Cardinal Direction of mic) (e.g., voltage and Amp-hours of battery, solar panel, etc.)

Habitat Information

Habitat:
Rank by abundance within 100 m of detector. 1 = most abundant, etc.

Shrub/Steppe		Deciduous Forest	<u>2</u>	Grassland	<u>1</u>	Other (describe)	
Crop/Agriculture		Coniferous Forest		Desert			
Riparian/Wetland		Pinyon-Juniper		Water (lake, etc.)			

Topography: Flat Slope High Point Low Point Other: _____

Was this station chosen to sample a bat feature? Yes No

Photos: Take photos of the area from each cardinal direction (facing away from the detector), as well as from the direction the microphone is pointing, and one of the detector set up itself. Also take photos of any bat features present and anything else of interest (e.g., sage grouse pellets, etc.). Label and mail to your bat liaison on your thumb drive.

General Remarks: _____

Habitat Map

Codes	Bat Features	Description
AS=anthropogenic structure	:	_____
CV=cave	:	_____
MN=mine	:	_____
RO=rocky outcrop	:	_____
CF=coniferous forest stand	:	_____
DF=deciduous forest stand	:	_____
WA=water	:	_____
Other=:	:	_____

Map out bat and habitat features within 100 m radius of detector (x). Label using codes provided, and write in any other features of interest (rill, road, etc.). Provide descriptions for bat features in spaces provided.

Acoustic Monitoring STATION

2011 Data Form

Station #: GP7-AB

Observer: B. Arens

Date: 6-14-11

Project: Grande Prairie

Station Information

Datum: NAD27 or NAD83 Zone: 14 Easting: 4707270 Northing: 0544786

Detector Type: SD2 SD1 Anabat II Serial Number(s): 80451 (microphone)
SM2 Pettersson B.A.T. (recorder, if applicable)

Placement: Ground Raised Raised System: N/A Pulley Fixed

Station Type: Fixed Temporary Microphone Protection: Plastic Bin Bat Hat None

Met Tower Present? Yes No Sound Reception: PVC Elbow Reflector Plate None

Microphone Ht (m): 1m Aspect: E Power Supply: 12.9ah
(Height from ground to detector/microphone) (Bearing or Cardinal Direction of mt) (e.g., voltage and Amp-hours of battery, solar panel, etc.)

Habitat Information

Habitat:

Rank by abundance within 100 m of detector. 1 = most abundant, etc.

Shrub/Steppe		Deciduous Forest	<u>1</u>	Grassland		Other (describe)	
Crop/Agriculture	<u>2</u>	Coniferous Forest		Desert			
Riparian/Wetland		Pinyon-Juniper		Water (lake, etc.)			

Topography: Flat Slope High Point Low Point Other: _____

Was this station chosen to sample a bat feature? Yes No

PHOTOS: Take photos of the area from each cardinal direction (facing away from the detector), as well as from the direction the microphone is pointing, and one of the detector set up itself. Also take photos of any bat features present and anything else of interest (e.g., sage grouse pellets, etc.). Label and mail to your bat liaison on your thumb drive.

General Remarks: _____

Habitat Map

Codes Bat Features Description

AS=anthropogenic structure : _____

CV=cave : _____

MN=mine : _____

RO=rocky outcrop : _____

CF=coniferous forest stand : _____

DF=deciduous forest stand : _____

WA=water : _____

Other=: _____

Map out bat and habitat features within 100 m radius of detector (x). Label using codes provided, and write in any other features of interest (cliff, road, etc.). Provide descriptions for bat features in spaces provided.

Acoustic Monitoring STATION

2011 Data Form

Station #: GFB-AB

Observer: B. Arens

Date: 10-14-14

Project: Grande Prairie

Station Information

Datum: NAD27 or NAD83 Zone: 14 Easting: 4707269 Northing: 0544786

Detector Type: SD2 SD1 Anabat II Serial Number(s): 04059 (microphone)
 SM2 Pettersson B.A.T. (recorder, if applicable)

Placement: Ground Raised Raised System: N/A Pulley Fixed

Station Type: Fixed Temporary Microphone Protection: Plastic Bin Bat Hat None

Met Tower Present? Yes No Sound Reception: PVC Elbow Reflector Plate None

Microphone Ht (m): 1m Aspect: E Power Supply: 12.9v
 (Height from ground to detector/microphone) (Bearing or Cardinal Direction of mic) (e.g., voltage and Amp-hours of battery, solar panel, etc.)

Habitat Information

Habitat:
 Rank by abundance within 100 m of detector. 1 = most abundant, etc.

Shrub/Steppe		Deciduous Forest	<u>1</u>	Grassland		Other (describe)	
Crop/Agriculture	<u>2</u>	Coniferous Forest		Desert			
Riparian/Wetland		Pinyon-Juniper		Water (lake, etc.)			

Topography: Flat Slope High Point Low Point Other: _____

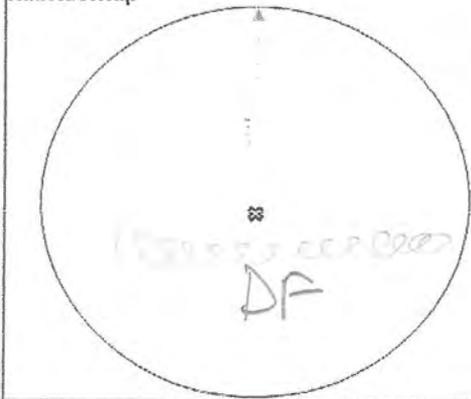
Was this station chosen to sample a bat feature? Yes No

NWSE PICTURES

Photos: Take photos of the area from each cardinal direction (facing away from the detector), as well as from the direction the microphone is pointing, and one of the detector set up itself. Also take photos of any bat features present and anything else of interest (e.g., sage grouse pellets, etc.). Label and mail to your bat liaison on your thumb drive.

General Remarks: _____

Habitat Map



Codes Bat Features

- AS=anthropogenic structure : _____
- CV=cave : _____
- MN=mine : _____
- RO=rocky outcrop : _____
- CF=coniferous forest stand : _____
- DF=deciduous forest stand : _____
- WA=water : _____
- Other: : _____

Map out bat and habitat features within 100 m radius of detector (x). Label using codes provided, and write in any other features of interest (rill, road, etc.). Provide descriptions for bat features in spaces provided.

Acoustic Monitoring STATION

2011 Data Form

Station #: GP9-AR

Observer: B. Arens

Date: 6-16-14

Project: Grande Prairie

Station Information

Datum: NAD27 or NAD83 Zone: 14 Easting: 4712818 Northing: 0549087

Detector Type: SD2 SD1 Anabat II Serial Number(s): 04059 (microphone)
 SM2 Pettersson B.A.T. (recorder, if applicable)

Placement: Ground Raised Raised System: N/A Pulley Fixed

Station Type: Fixed Temporary Microphone Protection: Plastic Bin Bat Hat None

Met Tower Present? Yes No Sound Reception: PVC Elbow Reflector Plate None

Microphone Ht (m): 1m Aspect: E Power Supply: 12ah
 (Height from ground to detector/microphone) (Bearing or Cardinal Direction of wk) (e.g., voltage and Amp-hours of battery, solar panel, etc.)

Habitat Information

Habitat:
 Rank by abundance within 100 m of detector. 1 = most abundant, etc.

Shrub/Steppe		Deciduous Forest	<u>1</u>	Grassland	<u>2</u>	Other (describe)	
Crop/Agriculture		Coniferous Forest		Desert			
Riparian/Wetland		Pinyon-Juniper		Water (lake, etc.)			

Topography: Flat Slope High Point Low Point Other: _____

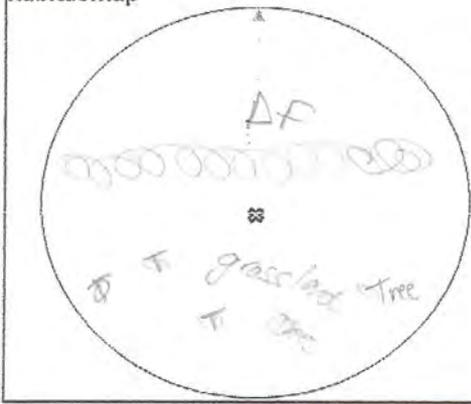
Was this station chosen to sample a bat feature? Yes No

PICTURE

Photos: Take photos of the area from each cardinal direction (facing away from the detector), as well as from the direction the microphone is pointing, and one of the detector set up itself. Also take photos of any bat features present and anything else of interest (e.g., sage grouse pellets, etc.). Label and mail to your bat liaison on your thumb drive.

General Remarks: _____

Habitat Map



Codes	Bat Features	Description
AS=anthropogenic structure	:	_____
CV=cave	:	_____
MN=mine	:	_____
RO=rocky outcrop	:	_____
CF=coniferous forest stand	:	_____
DF=deciduous forest stand	:	_____
WA=water	:	_____
Other=:	:	_____

Map out bat and habitat features within 100 m radius of detector (x). Label using codes provided, and write in any other features of interest (sign, road, etc.). Provide descriptions for bat features in spaces provided.

Acoustic Monitoring STATION

2011 Data Form

Station #: GPI0-AB

Observer: B. Arens

Date: 10-16-14

Project: Grade Prairie

Station Information

Datum: NAD27 or NAD83 Zone: 14 Easting: 4712853 Northing: 0549116

Detector Type: SD2 SD1 Anabat II Serial Number(s): 80451 (microphone)
 SM2 Pettersson B.A.T. (recorder, if applicable)

Placement: Ground Raised Raised System: N/A Pulley Fixed

Station Type: Fixed Temporary Microphone Protection: Plastic Bin Bat Hat None

Met Tower Present? Yes No Sound Reception: PVC Elbow Reflector Plate None

Microphone Ht (m): 1m Aspect: E Power Supply: _____
 (Height from ground to detector/microphone) (Bearing or Cardinal Direction of m/k) (e.g., voltage and Amp-hours of battery, solar panel, etc.)

Habitat Information

Habitat:
 Rank by abundance within 100 m of detector. 1 = most abundant, etc.

Shrub/Steppe		Deciduous Forest	<u>1</u>	Grassland	<u>2</u>	Other (describe)	
Crop/Agriculture		Coniferous Forest		Desert			
Riparian/Wetland		Pinyon-Juniper		Water (lake, etc.)			

Topography: Flat Slope High Point Low Point Other: _____

Was this station chosen to sample a bat feature? Yes No None
PIC SENW 53

Photos: Take photos of the area from each cardinal direction (facing away from the detector), as well as from the direction the microphone is pointing, and one of the detector set up itself. Also take photos of any bat features present and anything else of interest (e.g., sage grouse pellets, etc.). Label and mail to your bat liaison on your thumb drive.

General Remarks: _____

Habitat Map

Codes Bat Features

AS=anthropogenic structure	:	_____
CV=cave	:	_____
MN=mine	:	_____
RO=rocky outcrop	:	_____
CF=coniferous forest stand	:	_____
DF=deciduous forest stand	:	_____
WA=water	:	_____
Other=	:	_____

Description

Map out bat and habitat features within 100 m radius of detector (x). Label using codes provided, and write in any other features of interest (cave, road, etc.). Provide descriptions for bat features in spaces provided.

Acoustic Monitoring STATION

2011 Data Form

Station #: GP11-ARB

Observer: B. Arens

Date: 6-16-14

Project: Grande Prairie

Station Information

Datum: NAD27 or NAD83 Zone: 14 Easting: 4717098 Northing: 055542

Detector Type: SD2 SD1 Anabat II Serial Number(s): 03846 (microphone)
 SM2 Pettersson B.A.T. (recorder, if applicable)

Placement: Ground Raised Raised System: N/A Pulley Fixed

Station Type: Fixed Temporary Microphone Protection: Plastic Bin Bat Hat None

Met Tower Present? Yes No Sound Reception: PVC Elbow Reflector Plate None

Microphone Ht (m): 1m Aspect: E Power Supply: 12 ah
 (Height from ground to detector/microphone) (Bearing or Cardinal Direction of mic) (e.g., voltage and Amp-hours of battery, solar panel, etc.)

Habitat Information

Habitat:
 Rank by abundance within 100 m of detector. 1 = most abundant, etc.

Shrub/Steppe		Deciduous Forest		Grassland		Other (describe)	
Crop/Agriculture		Coniferous Forest		Desert			
Riparian/Wetland		Pinyon-Juniper		Water (lake, etc.)			

Topography: Flat Slope High Point Low Point Other: _____

Was this station chosen to sample a bat feature? Yes No

Photos: Take photos of the area from each cardinal direction (facing away from the detector), as well as from the direction the microphone is pointing, and one of the detector set up itself. Also take photos of any bat features present and anything else of interest (e.g., sage grouse pellets, etc.). Label and mail to your bat liaison on your thumb drive.

General Remarks: _____

Habitat Map

Codes	Bat Features	Description
AS	anthropogenic structure	_____
CV	cave	_____
MN	mine	_____
RO	rocky outcrop	_____
CF	coniferous forest stand	_____
DF	deciduous forest stand	_____
WA	water	_____
Other		_____

Map out bat and habitat features within 100 m radius of detector (x). Label using codes provided, and write in any other features of interest (cave, road, etc.). Provide descriptions for bat features in spaces provided.

Acoustic Monitoring STATION

2011 Data Form

Station #: GP12-AB

Observer: B. Arens

Date: 6-16-14

Project: Grande Prairie

Station Information

Datum: NAD27 or NAD83 Zone: 14 Easting: 4717148 Northing: 0555147

Detector Type: SD2 SD1 Anabat II Serial Number(s): 05563 (microphone)
SM2 Pettersson B.A.T. (recorder, if applicable)

Placement: Ground Raised Raised System: N/A Pulley Fixed

Station Type: Fixed Temporary Microphone Protection: Plastic Bin Bat Hat None

Met Tower Present? Yes No Sound Reception: PVC Elbow Reflector Plate None

Microphone Ht (m): 1m Aspect: E Power Supply: 12.9V
(Height from ground to detector/microphone) (Bearing or Cardinal Direction of nrk) (e.g., voltage and Amp-hours of battery, solar panel, etc.)

Habitat Information

Habitat: <small>Rank by abundance within 100 m of detector. 1 = most abundant, etc.</small>	Shrub/Steppe	Deciduous Forest	<u>2</u>	Grassland	<u>1</u>	Other (describe)
	Crop/Agriculture	Coniferous Forest		Desert		
	Riparian/Wetland	Pinyon-Juniper		Water (laks, etc.)		

Topography: Flat Slope High Point Low Point Other: _____

Was this station chosen to sample a bat feature? Yes No

PICS SENW monitor

Photos: Take photos of the area from each cardinal direction (facing away from the detector), as well as from the direction the microphone is pointing, and one of the detector set up itself. Also take photos of any bat features present and anything else of interest (e.g., sage grouse pellets, etc.). Label and mail to your bat liaison on your thumb drive.

General Remarks: _____

Habitat Map

Codes Bat Features Description

- AS=anthropogenic structure : _____
- CV=cave : _____
- MN=mine : _____
- RO=rocky outcrop : _____
- CF=coniferous forest stand : _____
- DF=deciduous forest stand : _____
- WA=water : _____
- Other= : _____

Map out bat and habitat features within 100 m radius of detector (x). Label using codes provided, and write in any other features of interest (creek, road, etc.). Provide descriptions for bat features in spaces provided.

Acoustic Monitoring STATION

2011 Data Form

Station #: GP13-AB

Observer: B. Arens

Date: 6-21-14

Project: Grande Prairie

Station Information

Datum: NAD27 or NAD83 Zone: 14T Easting: 4721571 Northing: 0555334

Detector Type: SD2 SD1 Anabat II Serial Number(s): 03846 (microphone)
 SM2 Pettersson B.A.T. (recorder, if applicable)

Placement: Ground Raised Raised System: N/A Pulley Fixed

Station Type: Fixed Temporary Microphone Protection: Plastic Bin Bat Hat None

Met Tower Present? Yes No Sound Reception: PVC Elbow Reflector Plate None

Microphone Ht (m): 1m Aspect: E Power Supply: 12.9ah
(Height from ground to detector/microphone) (Bearing or Cardinal Direction of mic) (e.g., voltage and Amp-hours of battery, solar panel, etc.)

Habitat Information

Habitat:
Rank by abundance within 100 m of detector. 1 = most abundant, etc.

Shrub/Steppe		Deciduous Forest	<u>1</u>	Grassland	<u>2</u>	Other (describe)	
Crop/Agriculture		Coniferous Forest		Desert			
Riparian/Wetland		Pinyon-Juniper		Water (lake, etc.)			

Topography: Flat Slope High Point Low Point Other: _____

Was this station chosen to sample a bat feature? Yes No

Photos: Take photos of the area from each cardinal direction (facing away from the detector), as well as from the direction the microphone is pointing, and one of the detector set up itself. Also take photos of any bat features present and anything else of interest (e.g., sage grouse pellets, etc.). Label and mail to your bat liaison on your thumb drive.

General Remarks: _____

Habitat Map



Codes	Bat Features	Description
AS=anthropogenic structure	:	_____
CV=cave	:	_____
MN=mine	:	_____
RO=rocky outcrop	:	_____
CF=coniferous forest stand	:	_____
DF=deciduous forest stand	:	_____
WA=water	:	_____
Other=:	:	_____

Map out bat and habitat features within 100 m radius of detector (x). Label using codes provided, and write in any other features of interest (creek, road, etc.). Provide descriptions for bat features in spaces provided.

Observer: B Arens

Date: 6-21-14

Project: Grande Prairie

Station Information

Datum: NAD27 or NAD83 Zone: 14T Easting: 4721522 Northing: 0555332

Detector Type: SD2 SD1 Anabat II Serial Number(s): 05563
 SM2 Petterson B.A.T. (microphone)
(recorder, if applicable)

Placement: Ground Raised Raised System: N/A Pulley Fixed

Station Type: Fixed Temporary Microphone Protection: Plastic Bin Bat Hat None

Met Tower Present? Yes No Sound Reception: PVC Elbow Reflector Plate None

Microphone Ht (m): 1m Aspect: E Power Supply: 12ah
(height from ground to detector/microphone) (bearing or Cardinal Direction of site) (e.g., voltage and Amp-hours of battery, solar panel, etc.)

Habitat Information

Habitat:
Rank by abundance within 100 m of detector. 1 = most abundant, etc.

Shrub/Steppe		Deciduous Forest	<u>1</u>	Grassland	<u>2</u>	Other (describe)	
Crop/Agriculture		Coniferous Forest		Desert			
Riparian/Wetland		Pinyon-Juniper		Water (lake, etc.)			

Topography: Flat Slope High Point Low Point Other: _____

Was this station chosen to sample a bat feature? Yes No

Photos: Take photos of the area from each cardinal direction (facing away from the detector), as well as from the direction the microphone is pointing, and one of the detector set up itself. Also take photos of any bat features present and anything else of interest (e.g., sage grouse pellets, etc.). Label and mail to your bat liaison on your thumb drive.

General Remarks: _____

Habitat Map

Codes Bat Features

Codes	Bat Features	Description
AS=	anthropogenic structure	_____
CV=	cave	_____
MN=	mine	_____
RO=	rocky outcrop	_____
CF=	coniferous forest stand	_____
DF=	deciduous forest stand	_____
WA=	water	_____
Other=		_____

Map out bat and habitat features within 100 m radius of detector (s). Label using codes provided, and write in any other features of interest (cave, road, etc.). Provide descriptions for bat features in spaces provided.

Acoustic Monitoring STATION

2011 Data Form

Station #: GP-15 AB

Observer: B. Arens

Date: 6-21-14

Project: Grande Prairie

Station Information

Datum: NAD27 or NAD83 Zone: 14T Easting: 4724548 Northing: 0545721

Detector Type: SD2 SD1 Anabat II Serial Number(s): 040591 (microphone)
 SM2 Petterson B.A.T. (recorder, if applicable)

Placement: Ground Raised Raised System: N/A Pulley Fixed

Station Type: Fixed Temporary Microphone Protection: Plastic Bin Bat Hat None

Met Tower Present? Yes No Sound Reception: PVC Elbow Reflector Plate None

Microphone Ht (m): 1m Aspect: E Power Supply: 12.9ah
(Height from ground to detector/microphone) (Bearing or Cardinal Direction of mic) (e.g., voltage and Amp-hours of battery, solar panel, etc.)

Habitat Information

Habitat:
Rank by abundance within 100 m of detector. 1 = most abundant, etc.

Shrub/Steppe		Deciduous Forest	<u>2</u>	Grassland	<u>3</u>	Other (describe)	
Crop/Agriculture		Coniferous Forest		Desert			
Riparian/Wetland	<u>1</u>	Pinyon-Juniper		Water (lakes, etc.)			

Topography: Flat Slope High Point Low Point Other: _____

Was this station chosen to sample a bat feature? Yes No

Photos: Take photos of the area from each cardinal direction (facing away from the detector), as well as from the direction the microphone is pointing, and one of the detector set up itself. Also take photos of any bat features present and anything else of interest (e.g., sage grouse pellets, etc.). Label and mail to your bat liaison on your thumb drive.

General Remarks: _____

Habitat Map

Codes	Bat Features	Description
AS=	anthropogenic structure	_____
CV=	cave	_____
MN=	mine	_____
RO=	rocky outcrop	_____
CF=	coniferous forest stand	_____
DF=	deciduous forest stand	_____
WA=	water	_____
Other=		_____

Map out bat and habitat features within 100 m radius of detector (s). Label using codes provided, and write in any other features of interest (cliff, road, etc.). Provide descriptions for bat features in spaces provided.

Acoustic Monitoring STATION

2011 Data Form

Station #: GP110-AB

Observer: B. Arens

Date: 6-21-14

Project: Grande Prairie

Station Information

Datum: NAD27 or NAD83 Zone: 14T Easting: 4724598 Northing: 0545722

Detector Type: SD2 SD1 Anabat II Serial Number(s): 80451 (microphone)
SM2 Pettersson B.A.T. (recorder, if applicable)

Placement: Ground Raised Raised System: N/A Pulley Fixed

Station Type: Fixed Temporary Microphone Protection: Plastic Bin Bat Hat None

Met Tower Present? Yes No Sound Reception: PVC Elbow Reflector Plate None

Microphone Ht (m): 1m Aspect: E Power Supply: 12.9ah
(Height from ground to detector/microphone) (Bearing or Cardinal Direction of mic) (e.g., voltage and Amp-hours of battery, solar panel, etc.)

Habitat Information

Habitat:
Rank by abundance within 100 m of detector. 1 = most abundant, etc.

Shrub/Steppe		Deciduous Forest	<u>2</u>	Grassland	<u>3</u>	Other (describe)	
Crop/Agriculture		Coniferous Forest		Desert			
Riparian/Wetland	<u>1</u>	Pinyon-Juniper		Water (lake, etc.)			

Topography: Flat Slope High Point Low Point Other: _____

Was this station chosen to sample a bat feature? No Yes

Photos: Take photos of the area from each cardinal direction (facing away from the detector), as well as from the direction the microphone is pointing, and one of the detector set up itself. Also take photos of any bat features present and anything else of interest (e.g., sage grouse pellets, etc.). Label and mail to your bat liaison on your thumb drive.

General Remarks: _____

Habitat Map	Codes	Bat Features	Description
	AS=anthropogenic structure	:	_____
	CV=cave	:	_____
	MN=mine	:	_____
	RO=rocky outcrop	:	_____
	CF=coniferous forest stand	:	_____
	DF=deciduous forest stand	:	_____
	WA=water	:	_____
Other=:	:	_____	
<small>Map out <u>bat</u> habitat features within 100 m radius of detector (x). Label using codes provided, and write in any other features of interest (cuff, road, etc.). Provide descriptions for bat features in spaces provided.</small>			