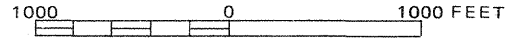


APPROXIMATE SCALE



NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

CHIPPEWA
COUNTY,
MINNESOTA
(UNINCORPORATED AREAS)

PANEL 160 OF 170

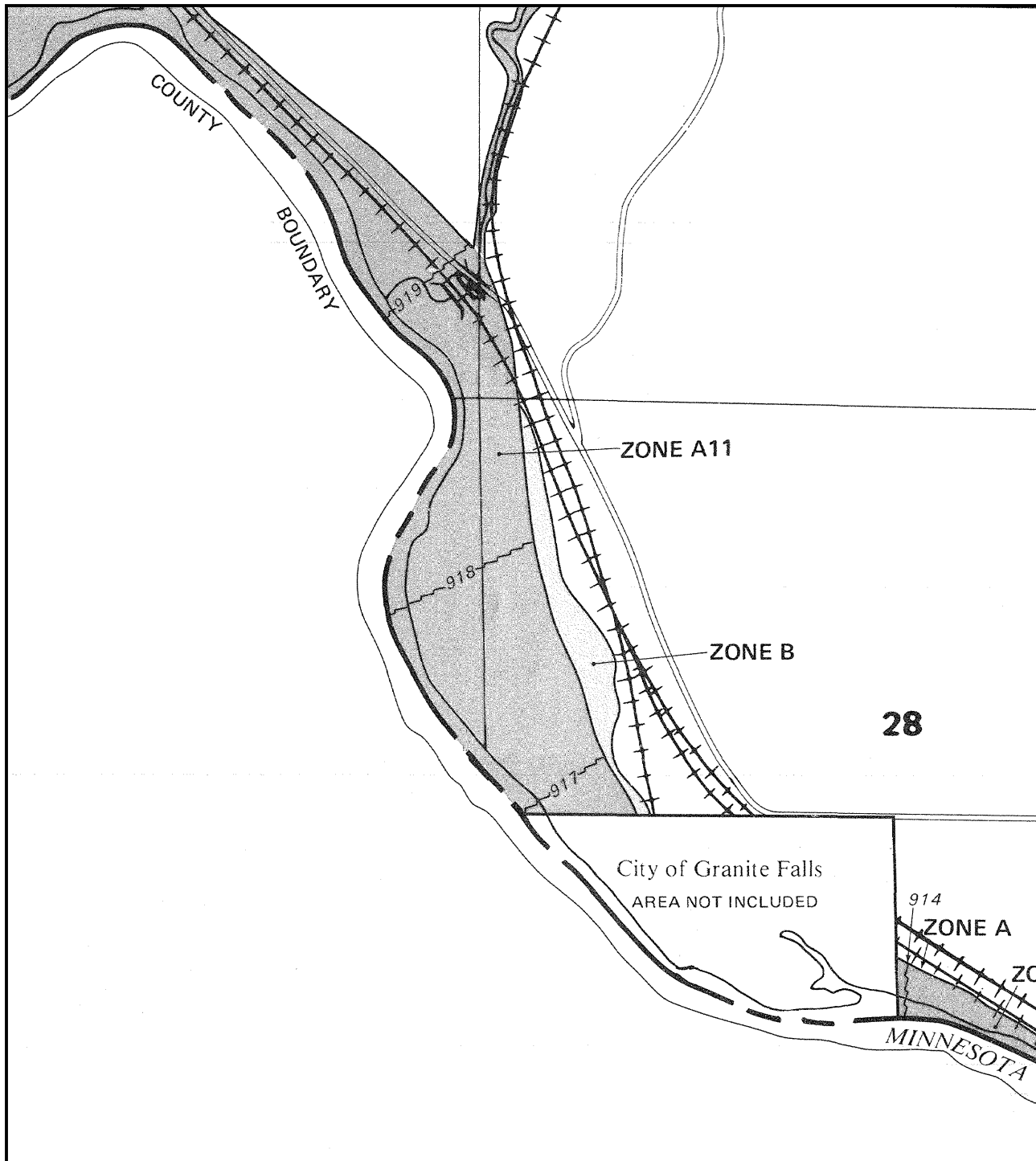
COMMUNITY-PANEL NUMBER
270066 0160 B

EFFECTIVE DATE:
JUNE 17, 1986

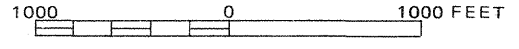


Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov



APPROXIMATE SCALE



NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

CHIPPEWA
COUNTY,
MINNESOTA
(UNINCORPORATED AREAS)

PANEL 160 OF 170

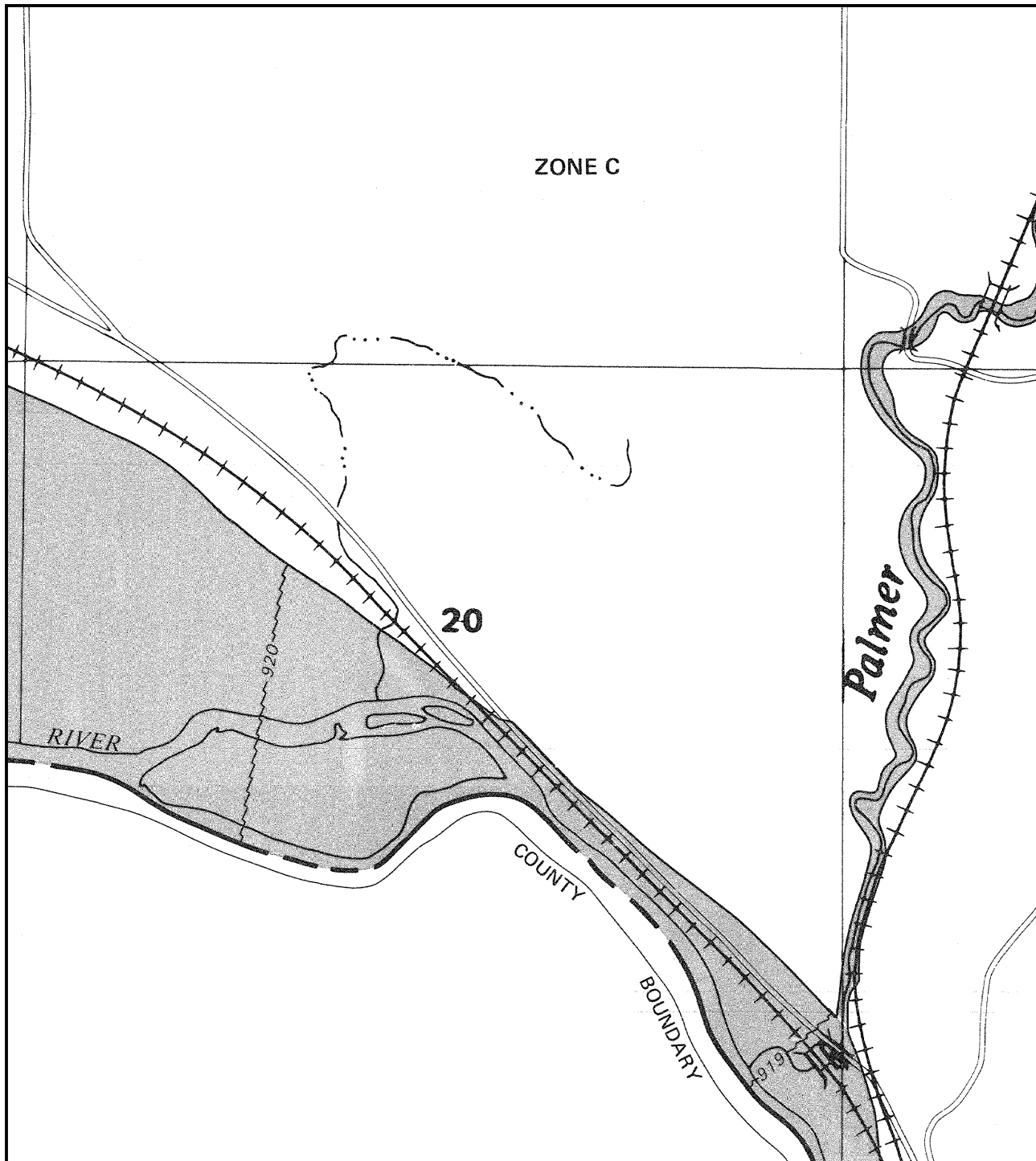
COMMUNITY-PANEL NUMBER
270066 0160 B

EFFECTIVE DATE:
JUNE 17, 1986

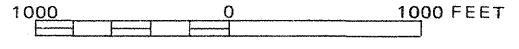


Federal Emergency Management Agency

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APPROXIMATE SCALE



NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

CHIPPEWA
COUNTY,
MINNESOTA
(UNINCORPORATED AREAS)

PANEL 160 OF 170

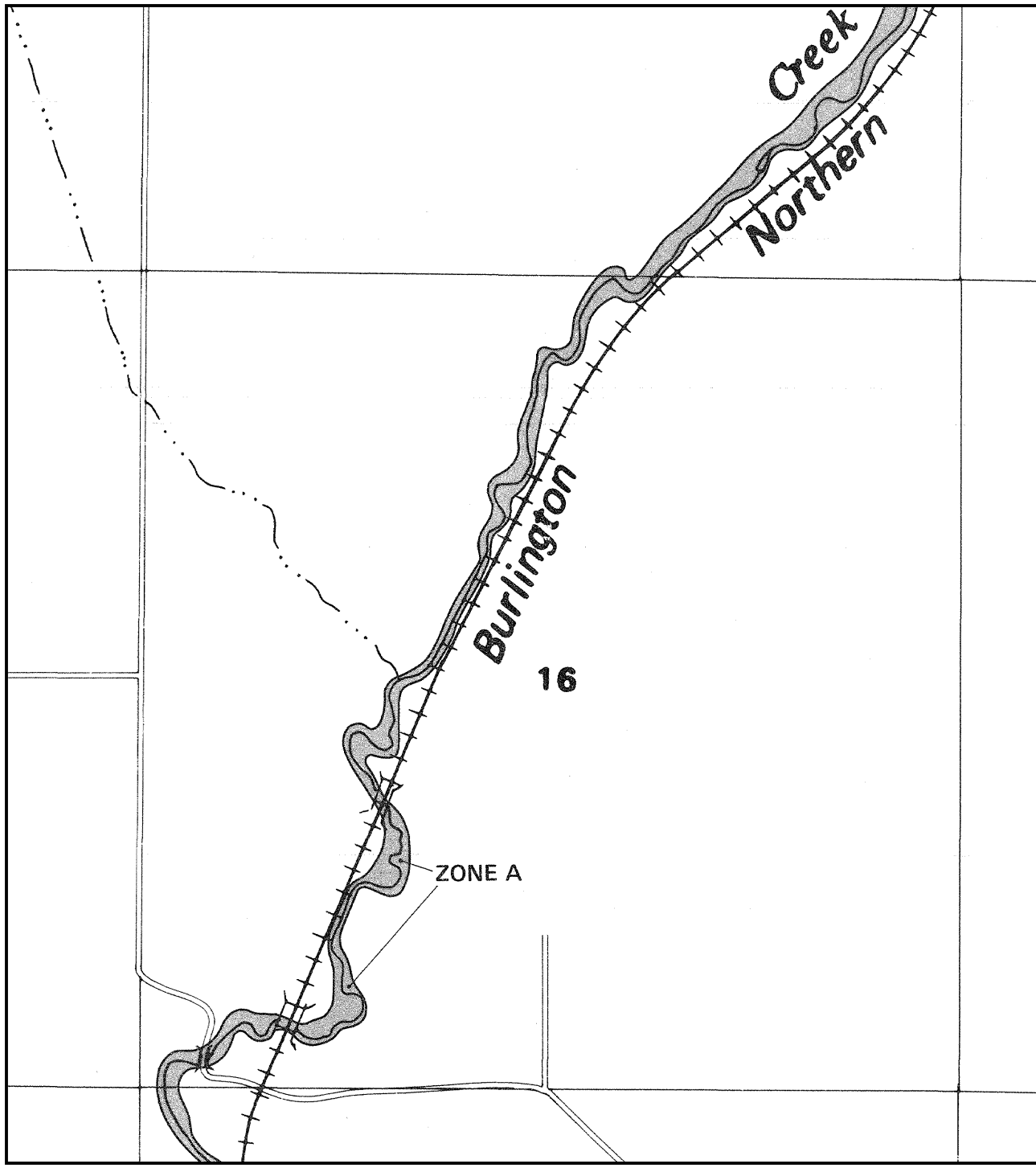
COMMUNITY-PANEL NUMBER
270066 0160 B

EFFECTIVE DATE:
JUNE 17, 1986

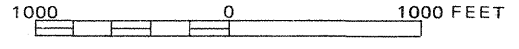


Federal Emergency Management Agency

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APPROXIMATE SCALE



NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

CHIPPEWA
COUNTY,
MINNESOTA
(UNINCORPORATED AREAS)

PANEL 160 OF 170

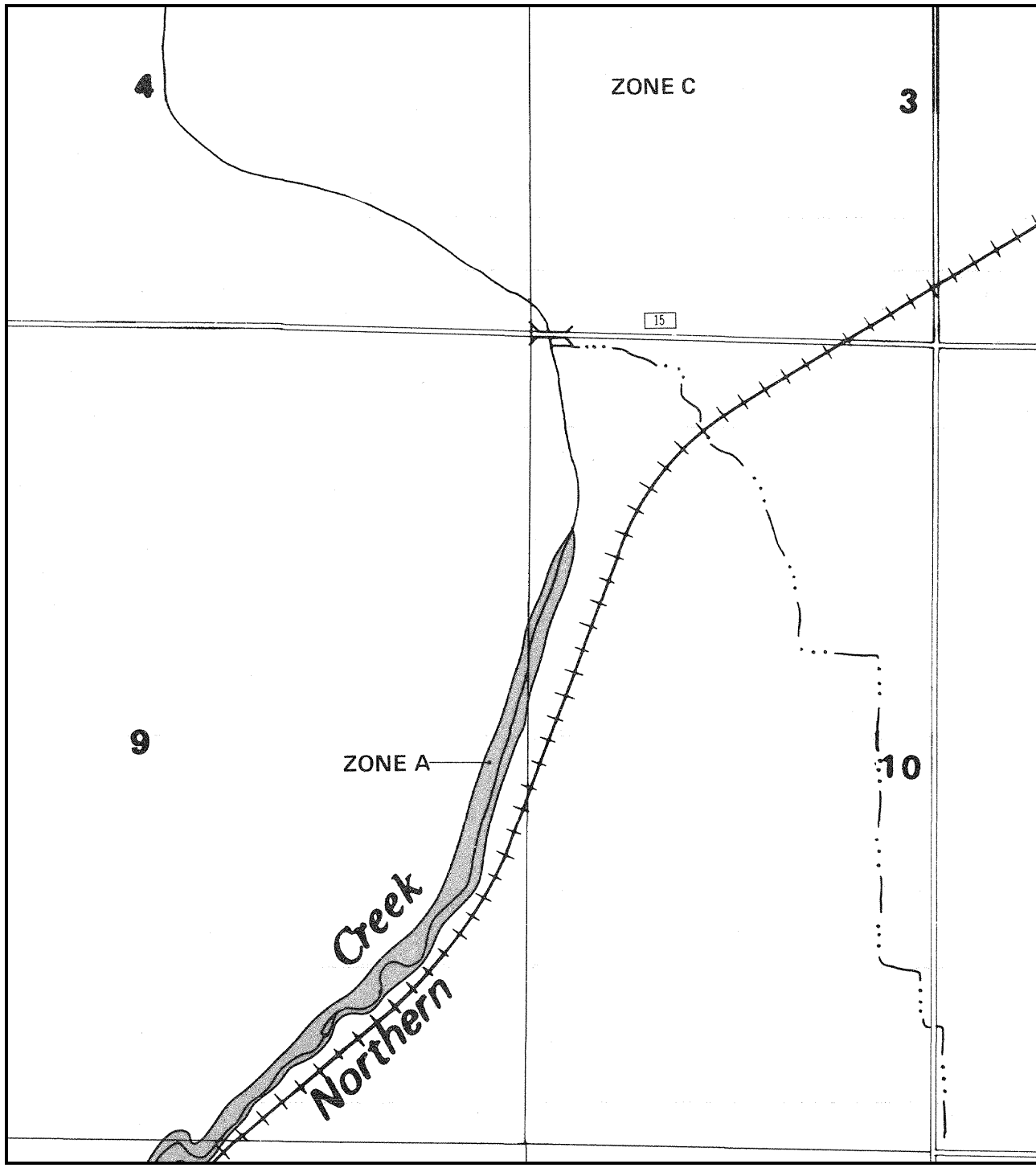
COMMUNITY-PANEL NUMBER
270066 0160 B

EFFECTIVE DATE:
JUNE 17, 1986

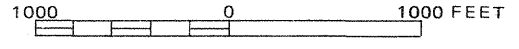


Federal Emergency Management Agency

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APPROXIMATE SCALE



NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

CHIPPEWA
COUNTY,
MINNESOTA
(UNINCORPORATED AREAS)

PANEL 160 OF 170

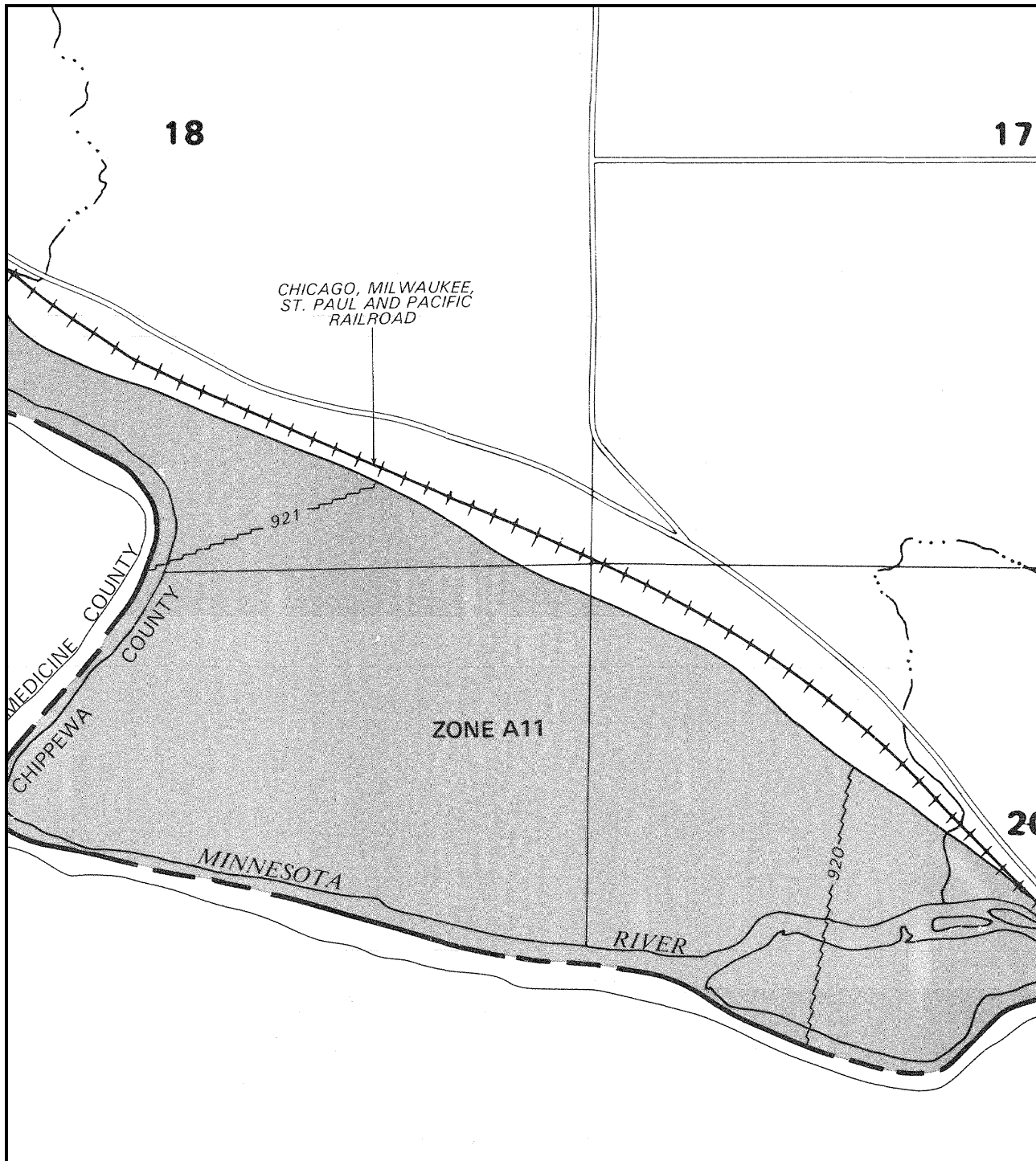
COMMUNITY-PANEL NUMBER
270066 0160 B

EFFECTIVE DATE:
JUNE 17, 1986



Federal Emergency Management Agency

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APPROXIMATE SCALE



NATIONAL FLOOD INSURANCE PROGRAM

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FLOOD INSURANCE RATE MAP

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MINNESOTA
(UNINCORPORATED AREAS)

PANEL 160 OF 170

COMMUNITY-PANEL NUMBER
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Federal Emergency Management Agency

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Minnesota Department of Natural Resources

Division of Ecological and Water Resources, Box 25

500 Lafayette Road

St. Paul, Minnesota 55155-4025

Phone: (651) 259-5091

E-mail: samantha.bump@state.mn.us

July 5, 2016

Correspondence # ERDB 20160322-0002

Mr. Michael Rutledge
Fagen Engineering, LLC
501 W Hwy 212; PO Box 159
Granite Falls, MN 54241

RE: Natural Heritage Review of the proposed Palmer's Creek Wind Farm

| County | Township (N) | Range (W) | Section(s) |
|----------|--------------|-----------|------------------|
| Chippewa | 116 | 39 | 1,12,13 |
| Chippewa | 116 | 40 | 3-10,15-22,27,28 |

Dear Mr. Rutledge,

As requested, the Minnesota Natural Heritage Information System has been queried to determine if any rare species or other significant natural features are known to occur within an approximate one-mile radius of the proposed project. Based on this query, rare features have been documented within the search area (for details, please visit the Rare Species Guide at <http://www.dnr.state.mn.us/rsg/index.html> for more information on the biology, habitat use, and conservation measures of these rare species). Please note that the following **rare features may be adversely affected** by the proposed project:

Ecologically Significant Areas

- The proposed project overlaps with a Prairie Core Area as identified in the Minnesota Prairie Conservation Plan, a twenty-five year strategy for accelerating prairie conservation in the state. To meet the Plan's goals, approaches within Prairie Core Areas will need to include restoration. As such, any efforts toward prairie or grassland restoration after project construction are encouraged. For information on landowner incentive programs to protect prairie and for guidance on restoration, please visit <http://www.dnr.state.mn.us/prairierestoration/index.html>.
- The Minnesota Biological Survey (MBS) has identified several Sites of Moderate Biodiversity Significance within the proposed project boundary. Sites of Biodiversity Significance are areas with varying levels of native biodiversity that may contain high quality native plant communities, rare plants, rare animals, and/or animal aggregations. Sites ranked as Moderate contain occurrences of rare species and/or moderately disturbed native plant communities, and/or landscapes that have a strong potential for recovery. These particular sites contain known occurrences of state-listed birds and plants, native prairie remnants, and a rare wetland community (see enclosed map; GIS shapefiles of MBS Sites of Biodiversity Significance and DNR Native Plant Communities can be downloaded from the MN Geospatial Commons website at <https://gisdata.mn.gov/>). **Given the ecological significance of these areas, the DNR recommends that the MBS Sites ranked Moderate be considered avoidance areas.** Indirect impacts from surface runoff or the spread of invasive species should also be considered during project design and implementation.

The Minnesota Biological Survey considered the southern ½ of the SE ¼ of T116N 39W Section 4 for a Site of Biodiversity Significance, but this area was determined to be below the minimum biodiversity threshold for statewide significance. This area, however, may have conservation value at the local level as habitat for native plants and animals, corridors for animal movements, buffers surrounding higher quality natural areas, or as areas with high potential for restoration of native habitat.

Native Prairie

- As noted above, the Minnesota Biological Survey has identified several Dry Hill Prairie remnants within the project boundary. Missouri milk-vetch (*Astragalus missouriensis var. missouriensis*) a state listed plant species of special concern has been documented within these native prairie remnants. Sullivant's milkweed (*Asclepias sullivantii*), a state-listed threatened plant, has been documented in the vicinity of the proposed project and may also occur within the prairie remnants in the project boundary. In the mid-1800's, Minnesota had eighteen million acres of prairie. Less than 1% remains. Given that more than 99% of Minnesota's prairies have been destroyed, and more than one-third of Minnesota's endangered, threatened, and special concern species are now dependent on the remaining small fragments of Minnesota's prairie ecosystem, we feel that all prairie remnants merit protection. We also recommend that turbines and other infrastructure be distant enough from native prairies as to allow for prairie management, such as prescribed burning.

Additional prairie remnants may exist in the area. To ensure that prairie is avoided, I recommend that a desktop analysis of historical aerial photos and applicable GIS layers (see attached guidance) be conducted for any grassland areas that have the potential to be impacted by the project. Any on-site prairie surveys should be conducted by a qualified surveyor (see attached list) following the attached guidance.

Rare Wetlands

- If the Wetland Conservation Act (WCA) is applicable to this project, please note that Silver Maple – (Virginia Creeper) Floodplain Forest has a conservation status rank of S3 and may qualify as “rare natural community” under this Act. Minnesota Rules, part 8420.0515, subpart 3 states that a wetland replacement plan for activities that modify a rare natural community must be denied if the local government unit determines that the proposed activities will permanently adversely affect the natural community. If you have any questions regarding this provision of the WCA, please contact Doug Norris, DNR Wetlands Program Coordinator, at 651-259-5125.

Please contact me if avoidance of MBS Sites and/or native prairie is not feasible, as surveys for rare species may be needed. We will need to discuss potential surveyors, survey protocol, and other requirements before any survey work for rare species is initiated. Project planning should also take into account that surveys (if needed) will need to be done during the appropriate time of the year, which may be limited. For your information, I have attached a document outlining the Rare Species Survey Process.

Mussels

The Minnesota River provides habitat for several state-listed mussels. As mussels are particularly vulnerable to deterioration in water quality especially increased siltation, it is important that effective erosion prevention and sediment control practices be implemented and maintained during construction and be incorporated into any stormwater management plans.

Snakes

The gopher snake (*Pituophis catenifer*), a state-listed species of special concern, and the western foxsnake (*Pantherophis vulpina*) a Species in Greatest Conservation Need as identified in Minnesota's State Wildlife Action Plan, have been documented in the vicinity of the proposed project and may be encountered on site. For more information about these rare snakes please visit http://dnr.state.mn.us/reptiles_amphibians/index.html. Given the presence of these rare snakes, the DNR recommends that the use of erosion control mesh, if any, be limited to wildlife-friendly materials (see enclosed fact sheet).

Bats

The Natural Heritage Information System (NHIS) tracks bat roost trees and hibernacula plus some acoustic data, but this information is not exhaustive. Although there are no NHIS records for bats in the vicinity of the proposed project, all seven of Minnesota's bats can be found throughout Minnesota. The northern long-eared bat (*Myotis septentrionalis*), tricolored bat (*Perimyotis subflavus*), big brown bat (*Eptesicus fuscus*), and little brown bat (*Myotis lucifugus*) are all state-listed species of special concern. Given the proximity to the river corridor which likely provides bat habitat and the potential for turbines to cause bat fatalities, measures to minimize impacts should be considered. Actions to minimize impacts may include, but are not limited to, the following recommendations:

- place turbines an adequate distance from the river corridor and forested areas,
- feather turbine blades below cut-in speeds, and
- conduct post-construction fatality monitoring.

The DNR looks forward to receiving the results of the acoustic bat surveys and may have additional comments regarding state-listed bats at that time. As the U.S. Fish and Wildlife Service (USFWS) has listed the northern long-eared bat as threatened under the Endangered Species Act (ESA), please coordinate with the USFWS regarding this species.

Birds

- A bald eagle (*Haliaeetus leucocephalus*) nest has been documented in T116N R40W Section 11 just outside of the project boundary. This nest was active when checked in 2000, 2001, and 2005. It is unknown whether the nest is still active or whether there are additional nests in the area. Bald eagles are federally protected under the Migratory Bird Treaty Act and under the Bald and Golden Eagle Protection Act. Both acts prohibit killing, selling, or otherwise harming eagles, their nests, or eggs. Please visit the USFWS website at <http://www.fws.gov/midwest/eagle/> for more information regarding conservation measures, [management guidelines](#), and [permitting](#).

- The proposed project overlaps with the Upper Minnesota River Valley Important Bird Area (IBA). Important Birds Areas, identified by Audubon Minnesota in partnership with the DNR, are part of an international conservation effort aimed at conserving critical bird habitats. They are voluntary and non-regulatory, but the designation does demonstrate the biological value of this area. This particular IBA incorporates the riparian corridor and adjacent river valley and upland communities along the Minnesota River and provides excellent habitat for a wide variety of bird species. This IBA contains significant bird habitat in an intensely agricultural area and is a natural corridor for migrating birds. Over 200 species, including state-listed species and Species in Greatest Conservation Need (SGCN; as identified in Minnesota's State Wildlife Action Plan - <http://www.dnr.state.mn.us/cwcs/index.html>) are known to use the IBA.

The Natural Heritage Information System contains breeding season observations of two rare grassland birds: the lark sparrow (*Chondestes grammacus*), a state-listed species of concern, and the upland sandpiper (*Bartramia longicauda*), a Species in Greatest Conservation Need (SGCN). A minimum of 20 SGCN are known to use grassland habitat within the Minnesota River Prairie Ecological Subsection (where the project is located). Potential impacts to grassland birds are a concern because many of these species are declining in number nationwide.

Please note that the Minnesota Biological Survey has not conducted surveys in this area in over fifteen years, so data on state-listed species in this area is incomplete. It should also be noted that many SGCN are not tracked in the NHIS and that the NHIS does not include records of migrating birds. The DNR looks forward to receiving the results of the avian point count surveys and may have additional comments regarding rare birds at that time.

Wind farms can affect birds due to collision mortality, displacement due to disturbance, habitat fragmentation, and habitat loss. Even if collision mortality rates are low, the additional mortality may be significant for rare species.

Given the known occurrences of state-listed species and the proximity of the proposed project to a significant migration corridor, post-construction avian fatality monitoring is recommended. Post-construction monitoring may provide information regarding unexpected impacts, if any, to rare birds. Knowledge of these types of extraordinary events would allow for the implementation of additional measures to minimize impacts.

Environmental Review and Permitting

- Please address potential impacts to the above rare features in the Public Utilities Commission (PUC) Site Permit Application. The Avian and Bat Protection Plan should also include measures to minimize impacts to rare birds and bats.
- The DNR may have additional comments regarding rare species once pre-construction surveys are completed.
- Please include a copy of this letter in any state or local license or permit application. **Please note that measures to avoid or minimize disturbance to the above rare features may be included as restrictions or conditions in any required permits or licenses.**

The Natural Heritage Information System (NHIS), a collection of databases that contains information about Minnesota's rare natural features, is maintained by the Division of Ecological and Water Resources, Department of Natural Resources. The NHIS is continually updated as new information becomes available, and is the most complete source of data on Minnesota's rare or otherwise significant species, native plant communities, and other natural features. However, the NHIS is not an exhaustive inventory and thus does not represent all of the occurrences of rare features within the state. Therefore, ecologically significant features for which we have no records may exist within the project area. **If additional information becomes available regarding rare features in the vicinity of the project, further review may be necessary.**

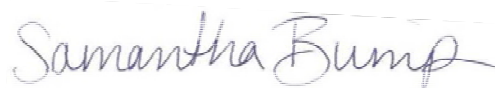
The enclosed results include an Index Report of records in the Rare Features Database, the main database of the NHIS. To control the release of specific location data, the report is copyrighted and only provides rare features locations to the nearest section. The Index Report may be reprinted, unaltered, in any environmental review document (e.g., EAW or EIS), municipal natural resource plan, or report compiled by your company for the project listed above. If you wish to reproduce the Index Report for any other purpose, please contact me to request written permission.

For environmental review purposes, the results of this Natural Heritage Review are valid for one year; the results are only valid for the project location (noted above) and the project description provided on the NHIS Data Request Form. Please contact me if project details change or for an updated review if construction has not occurred within one year.

The Natural Heritage Review does not constitute review or approval by the Department of Natural Resources as a whole. Instead, it identifies issues regarding known occurrences of rare features and potential effects to these rare features. To determine whether there are other natural resource concerns associated with the proposed project, please contact your DNR Regional Environmental Assessment Ecologist (contact information available at http://www.dnr.state.mn.us/eco/ereview/erp_regioncontacts.html). Please be aware that additional site assessments or review may be required.

Thank you for consulting us on this matter, and for your interest in preserving Minnesota's rare natural resources. An invoice will be mailed to you under separate cover.

Sincerely,



Samantha Bump
Natural Heritage Review Specialist

enc. Rare Features Database: Index Report
Map
Prairie Mapping and Ranking Guidance
DNR List of Surveyors
Rare Species Survey Process
Wildlife Friendly Erosion Control

Links: Minnesota Prairie Conservation Plan
http://files.dnr.state.mn.us/eco/mcbs/mn_prairie_conservation_plan.pdf
MN State Wildlife Action Plan
<http://www.dnr.state.mn.us/cwcs/index.html>

MBS Sites of Biodiversity Significance

http://www.dnr.state.mn.us/eco/mcbs/biodiversity_guidelines.html

DNR Native Plant Communities

<http://www.dnr.state.mn.us/npc/index.html>

USFWS Key to the Northern Long-Eared Bat 4(d) Rule for Non-Federal Activities

<http://www.fws.gov/midwest/endangered/mammals/nleb/KeyFinal4dNLEB.html>

USFWS Key to the Northern Long-Eared Bat 4(d) Rule for Federal Actions

<http://www.fws.gov/midwest/endangered/mammals/nleb/KeyFinal4dNLEBFedProjects.html>

USFWS Northern Long-eared Bat Website

<http://www.fws.gov/midwest/endangered/mammals/nleb/index.html>

USFWS Northern Long-eared Bat Fact Sheet

<http://www.fws.gov/midwest/endangered/mammals/nleb/nlebFactSheet.html>

cc: Jamie Schrenzel, Cynthia Warzecha, Kevin Mixon, Mike Worland, Megan Benage, DNR
Richard Davis, DOC
Mags Rheude, USFWS

From: [Michael Rutledge](#)
To: [Amy J. Denz](#)
Cc: [Justin D. Askim](#)
Subject: Fw: Historic Properties
Date: Thursday, September 22, 2016 7:58:29 AM
Attachments: [Archaeology.rtf](#)
[Historic.rtf](#)

FYI

Mike Rutledge
Environmental Services Dept. Head
FAGEN ENGINEERING, LLC
P.O. Box 159
Granite Falls, MN 56241
320-564-3324 Main
320-564-2625 Direct
320-564-4861 Fax
www.fageninc.com

----- Forwarded by Michael Rutledge/Eng on 09/22/2016 07:57 AM -----

From: Thomas Cinadr <thomas.cinadr@mnhs.org>
To: Michael Rutledge <MRutledge@fageneng.com>,
Date: 09/22/2016 07:04 AM
Subject: Re: Fw: Historic Properties

THIS EMAIL IS NOT A PROJECT CLEARANCE.

This message simply reports the results of the cultural resources database search you requested. The database search produced results for only previously known archaeological sites and historic properties. Please read the note below carefully.

Archaeological sites and historic properties were identified in a search of the Minnesota Archaeological Inventory and Historic Structures Inventory for the search area requested. Reports containing the results of the searches are attached.

The result of this database search provides a listing of recorded archaeological sites and historic architectural properties that are included in the current SHPO databases. Because the majority of archaeological sites in the state and many historic architectural properties have not been recorded, important sites or structures may exist within the search area and may be affected by development or construction projects within that area. Additional research, including field survey, may be necessary to adequately assess the area's potential to contain historic properties.

Properties that are listed in the National Register of Historic Places

(NRHP) or have been determined eligible for listing in the NRHP are indicated on the reports you have received. The following codes on the reports you received are:

NR – National Register listed. The properties may be individually listed or may be within the boundaries of a National Register District.

CEF – Certified Eligible to the National Register findings are usually made during the federal review process, these properties have been evaluated as being eligible for listing in the National Register.

SEF – Staff eligible findings to the National Register are properties that have been determined eligible by SHPO staff.

DOE – Determination of Eligibility is made by the National Park Service and typically refers to properties deemed eligible but the owner objects to the listing.

CNEF – Certified Not Eligible to the National Register. SHPO has begun to record properties that have been evaluated as not eligible for listing in the National Register. If the box on the form has a check the property has been determined to be not eligible.

Properties without NR, CEF, SEF, DOE, or CNEF designations in the reports you received may not have been evaluated and therefore no assumption to their eligibility can be made.

If you require a comprehensive assessment of a project's potential to impact archaeological sites or historic architectural properties, you may need to hire a qualified archaeologist and/or historian. If you need assistance with a project review, please contact Kelly Gragg-Johnson in Review and Compliance @ 651-259-3455 or by email at kelly.graggjohnson@mnhs.org.

The Minnesota SHPO Survey Manuals and Database Metadata can be found at <http://www.mnhs.org/shpo/survey/inventories.htm>

SHPO research hours are 8:30 AM – 4:00 PM Tuesday-Friday.
The Office is closed on Mondays.

Tom Cinadr
Survey and Information Management Coordinator
Minnesota Historic Preservation Office
Minnesota Historical Society
345 Kellogg Blvd. West
St. Paul, MN 55102

651-259-3453

On Wed, Sep 21, 2016 at 12:49 PM, Michael Rutledge <MRutledge@fageneng.com> wrote:

Mr. Cinadr,

It appears that we gave you an erroneous project description below. The Townships should have been reversed. It should read:

Township #: 40 Range # 116 Sections 1,12, 13

Township #: 39 Range # 116 Sections 3,4,5,6,7,8,9,10,15, 16,
17, 18, 19,
20, 21, 22, 27, 28, 29

Unless you caught this error associated with the original request, can you please provide a new evaluation?

I apologize for this error.

Mike

Mike Rutledge
Environmental Services Dept. Head
FAGEN ENGINEERING, LLC
P.O. Box 159
Granite Falls, MN 56241
320-564-3324 Main
320-564-2625 Direct
320-564-4861 Fax
www.fageninc.com

----- Forwarded by Michael Rutledge/Eng on 09/21/2016 12:42 PM -----

From: Michael Rutledge/Eng
To: Thomas Cinadr <thomas.cinadr@mnhs.org>,
Date: 05/20/2016 09:51 AM
Subject: Re: Historic Properties

Tom,

Here they are:

County: Chippewa

Township #: 39 Range # 116 Sections: 1, 12, 13

Township #: 40 Range # 116 Sections: 3, 4, 5, 6, 7, 8,
9, 10, 15, 16,
17, 18, 19, 20, 21, 22, 27, 28, 29

Mike Rutledge

Environmental Services Dept. Head
FAGEN ENGINEERING, LLC
P.O. Box 159
Granite Falls, MN 56241
320-564-3324 Main
320-564-2625 Direct
320-564-4861 Fax

From: Thomas Cinadr <thomas.cinadr@mnhs.org>
To: Michael Rutledge <MRutledge@fageneng.com>,
Date: 05/19/2016 08:37 AM
Subject: Re: Historic Properties

Mike,

Please send me a complete list of Township/Range/Section coordinates you wish to be searched.

Tom

Tom Cinadr
Survey and Information Management Coordinator
Minnesota Historic Preservation Office
Minnesota Historical Society
345 Kellogg Blvd. West
St. Paul, MN 55102

651-259-3453

On Wed, May 18, 2016 at 12:15 PM, Michael Rutledge <MRutledge@fageneng.com>
wrote:

Mr. Cinadr,

We are in the early stages of development for a wind farm near Granite Falls, MN. Does your office provide a preliminary listing or map of historic properties within a geographic area so that we can take those into consideration when siting turbines and access roads? I assume at some point we will need to have a "boots on the ground" survey done by an archaeologist, but any information you can provide from a records search would certainly be appreciated. Just let me know what information you will need.

Thank you, in advance, for your assistance.

Mike

Mike Rutledge
Environmental Services Dept. Head
FAGEN ENGINEERING, LLC
P.O. Box 159
Granite Falls, MN 56241
320-564-3324 Main
320-564-2625 Direct
320-564-4861 Fax

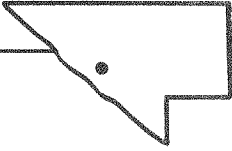
(See attached file: Archaeology.rtf)(See attached file: Historic.rtf)

History/Architecture Inventory

| PROPERTY NAME | ADDRESS | Twp | Range | Sec | Quarters | USGS | Report | NRHP | CEF | DOE | Inventory Number |
|--|--|-----|-------|-----|----------|---------------|------------|------|-----|-----|------------------|
| COUNTY: Chippewa | | | | | | | | | | | |
| CITY/TOWNSHIP: Granite Falls | | | | | | | | | | | |
| NSP Power Plant | off U.S. Hwy. 212 | 116 | 39 | 3 | N-NE-NE | Granite Falls | CP-85-1H | | | | CP-GRN-007 |
| CITY/TOWNSHIP: Granite Falls Twp. | | | | | | | | | | | |
| Christian Haakenson Farmstead | off Co. Hwy. 15 | 116 | 39 | 4 | SE | Asbury | CP-85-1H | | | | CP-GRT-002 |
| Olof Swennson Farmstead | Co. Hwy. 15 & Co. Hwy. 6 | 116 | 39 | 6 | SE | Asbury | CP-85-1H | Y | | | CP-GRT-003 |
| C.L. Berg Farmstead | off Co. Hwy. 6 | 116 | 39 | 6 | SW-NE-SW | Asbury | CP-85-1H | | | | CP-GRT-004 |
| William Sandahl Farmstead | off Co. Hwy. 15 | 116 | 39 | 6 | SE-SW | Asbury | CP-85-1H | | | | CP-GRT-005 |
| Sparta First Norwegian Baptist Church | Co. Hwy. 15 & Co. Hwy. 6 | 116 | 39 | 7 | N-NW | Asbury | CP-85-1H | | | | CP-GRT-006 |
| Bridge 7247 | | 116 | 39 | 10 | SW-SW | Asbury | | | | | CP-GRT-008 |
| Bridge L9162 | | 116 | 39 | 16 | NW-NW | Granite Falls | | | | | CP-GRT-009 |
| COUNTY: Multiple | | | | | | | | | | | |
| CITY/TOWNSHIP: Granite Falls | | | | | | | | | | | |
| Minnesota River Channel northwest of Granite Falls | Minnesota River from west edge of S20 to south edge of S28 | 116 | 39 | 19 | | Granite Falls | XX-2010-5H | | Y | | XX-RVR-008 |
| CITY/TOWNSHIP: Watson | | | | | | | | | | | |
| Minnesota River Channel northwest of Granite Falls | Minnesota River from west edge of S20 to south edge of S28 | 116 | 39 | 19 | | Granite Falls | XX-2010-5H | | Y | | XX-RVR-008 |

Archaeological Site Locations

| Site Number | Site Name | Twp. | Range | Sec. | Quarter Sections | Acres | Phase | Site Description | Tradition | Context | Reports | NR | CEF | DOE |
|-------------------------|----------------|------|-------|------|------------------|-------|-------|------------------|-----------|---------|---------|----|-----|-----|
| County: Chippewa | | | | | | | | | | | | | | |
| 21CP0009 | Harold Schuler | 116 | 39 | 18 | NW-NW | 0 0 | | EW | | | | | | |
| 21CP0060 | | 116 | 39 | 16 | SW-SW | 0.1 1 | | SA | | | | | | |
| 21CP0061 | | 116 | 39 | 16 | SW-SW | 0.1 1 | | SA | | | | | | |
| 21CP0062 | | 116 | 39 | 16 | SE-SW-SW | 0.1 1 | | SA | | | | | | |
| County: Yellow | | | | | | | | | | | | | | |
| 21YM0021 | | 116 | 40 | 13 | SW-SW | 1 | | EW | W-1 | | | | | |



CHIPPEWA COUNTY
LAND AND RESOURCE MANAGEMENT

629 North 11th Street, Suite 16 • Montevideo, Minnesota 56265 • (320) 269-6231 • (320) 269-7412 Fax

March 16, 2017

Mr. Mike Rutledge
Palmer's Creek Wind Farm, LLC
501 W. Hwy 212
Granite Falls, MN 56241

RE: Palmer's Creek Wind Farm
Chippewa County Windpower Management Ordinance, Section 12
Deferral of Permitting and Regulation of the Wind Farm

Dear Mike:

Palmer's Creek Wind Farm informed the Chippewa County Board of Commissioners it is developing a wind generation facility in Chippewa County, Minnesota for the generation of approximately 44.6MW. On behalf of the Board, I am confirming Chippewa County shall defer permitting related to the construction and operation of the Palmer's Creek Wind Farm to the State of Minnesota, as the total electric generation output of the wind farm is greater than Chippewa County Wind power Management Ordinance, Section 12, upper production limit of 5MWs.

While we defer permitting on this project, we retain the right to make comments as the PUC provides public notice on this project. Further, Chippewa County will require permits for accessory buildings as they are developed at the generation sites.

If you have any questions, please feel free to contact me at the above address or by email at swilliams@co.chippewa.mn.us

Sincerely,

Scott Williams, Director
Chippewa County Land and Resource Management

Interim Wildlife Monitoring Report Palmer's Creek Wind Farm



Palmer's Creek Wind Farm, LLC. *Prepared for:*



501 West Highway 212
Granite Falls, MN 56241



Responsive partner.
Exceptional outcomes.

Prepared by:

WENCK Associates, Inc.
301 1st Street NE, Suite 202
Mandan, ND 58554
Phone: 701-751-3370
Fax: 701-751-3372

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Appendix B

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Appendix C

Interim Acoustic Bat Summary Report; Palmer's Creek Wind Farm

1.0 Introduction

1.1 PROJECT OVERVIEW

Palmer's Creek Wind Farm, LLC (Palmer's Creek) proposes to construct the Palmer's Creek Wind Energy Facility (Project or PCWF), a Large Wind Energy Conversion System (LWECS), with a 44.6-megawatt (MW) nameplate capacity in Chippewa County, Minnesota (**Figure 1**). Wenck Associates, Inc. (Wenck) and New Century Environmental (NCE) were contracted by Palmer's Creek to conduct and analyze a variety of pre-construction wildlife surveys prior to building and operation of the proposed facility.

The data from these studies were used to identify species, species groups or species of concern that are present in the project area and vicinity that may be at a higher risk of mortality and/or displacement. Data is presented in several categories, and highlight federally listed species and state listed species. This is an interim report that contains data collected up to February 24, 2017. A final report will be submitted once the avian surveys have been completed during the summer of 2017.

1.2 DIURNAL FIXED-POINT AND INCIDENTAL AVIAN USE SURVEYS

Spring and fall are migration periods for non-resident avian species. During the spring, birds move north from wintering grounds to summer breeding grounds. In the fall, birds move south to wintering grounds. Spring and fall are prime periods to conduct avian surveys on potential wind farm areas to observe migratory species and resident species.

Avian surveys focus on inventory and monitoring with specific objectives that include: 1) an inventory of bird species in a specific project area; 2) determining the relative abundance of species; and 3) monitoring seasonal changes in species composition and relative abundance (Whitworth et al. 2007). Diurnal fixed-point surveys are one of the most common methods used to determine avian composition and abundance. Point counts not only focus on visual cues but also on auditory cues to give the observer an advantage in rough terrain. For some species, vocal cues may be the only reliable means of detection (Whitworth et al. 2007).

Incidental avian surveys are used to obtain bird distribution and composition information between point count locations. Larger birds, such as game birds, raptors, and waterfowl, large flocks of smaller birds, and birds that are a rarity in the area are typically recorded during incidental surveys.

1.3 EAGLE USE SURVEYS

Following Stage 2 of the Eagle Conservation Plan Guidance (USFWS 2013), eagle point count surveys have been and will continue to be conducted to collect quantitative data on eagle presence that would allow estimation of eagle exposure rate, which forms the basis of a risk assessment model. Eagle use surveys focus exclusively on eagles and occur at the eight (8) point count locations (**Figure 2**) used for point count surveys in 2016-2017. The objective of the eagle use survey is to document eagle movements and behavior within and adjacent to the study area in all four seasons to assess risk to eagles (primarily bald eagles). Eagle surveys are conducted by a qualified biologist and will continue for one calendar year to capture temporal variation in eagle use of the study area.

1.4 RAPTOR AND EAGLE NESTS

Raptors and eagles spend much of their time hunting and soaring within elevation ranges that correspond to the wind turbine rotor-sweep area (RSA), making them susceptible to turbine blades (Erickson et al. 2002). Because raptors and eagles are long-lived species with low reproduction rates, potential impacts from collision-related mortality are of concern (Erickson et al. 2002). Although specific studies are lacking, adults and recently fledged young could be at particular risk of collision with turbines because of their higher use of areas near nest sites. After young raptors and eagles fledge, fledglings often spend significant amounts of time flying and roosting near nest locations until they become capable flyers and hunters. Additionally, construction activities near active nests during the breeding season may potentially result in disturbance or abandonment of nest sites.

In 2007, the bald eagle (State Special Concern) was delisted from its federally threatened status in the lower 48 states, but it is still federally protected under the Bald and Golden Eagle Protection Act ("BGEPA"). It was also delisted in Minnesota in 2013.

Bald eagles associate with distinct geographic areas and landscape features, including nest sites, foraging areas, communal roost sites, migration corridors and migration stopover sites (USFWS 2013). They are typically found near water bodies, natural and manmade, due to the presence of fish. They prefer to nest, perch, and roost in old-growth or mature stands of trees, and they usually select a nesting tree that is the tallest among those in its vicinity to provide visibility. Nesting trees are usually situated near a water body that supports fish, their main preferred prey.

1.5 ACOUSTIC BAT SURVEYS

There are seven bat species known to occur in Minnesota – big brown bat (*Eptesicus fuscus*), silver-haired bat (*Lasionycteris noctivagans*), eastern red bat (*Lasiurus borealis*), hoary bat (*Lasiurus cinereus*), little brown bat (*Myotis lucifugus*), northern long-eared bat (*Myotis septentrionalis*) and tri-colored bat (eastern pipistrelle, *Perimyotis subflavus*) (MNDNR 2016). The northern long-eared bat (*Myotis septentrionalis*), tricolored bat (*Perimyotis subflavus*), big brown bat (*Eptesicus fuscus*), and little brown bat (*Myotis lucifugus*) are all state-listed species of special concern.

NCE initiated acoustic monitoring surveys to capture the diversity/abundance of bat species within the proposed Palmer's Creek Wind Farm (project area) and to meet due diligence with regulatory agencies (NCE 2017).

2.0 Methodology

2.1 DIURNAL FIXED-POINT AND INCIDENTAL AVIAN USE SURVEYS

2.1.1 Fixed-point Surveys

Avian point count (PC) surveys were conducted in summer 2016 through summer 2017 to capture migrating and resident species at the project site (**Table 1**). Survey data was used to evaluate avian use, behavior, and species composition during migration and determine resident avian species. Diurnal fixed-point count surveys were conducted at eight (8) circular plots (**Figure 2**). Point count locations were selected to capture a diverse range of habitats and locations with the best possible view shed.

Table 1: Palmer's Creek Point Count Dates

| Summer 2016 | | Fall 2016 | | Winter 2016-2017 | | Spring 2017 | | Summer 2016 | |
|---------------|-------------|---------------|-------------|------------------|-------------|---------------|-------------|---------------|-------------|
| Survey Number | Survey Week | Survey Number | Survey Week | Survey Number | Survey Week | Survey Number | Survey Week | Survey Number | Survey Week |
| 1 | 6/27/2016 | 6 | 9/5/2016 | 18 | 12/12/2016 | 24 | 2/27/2017 | 34 | 5/15/2017 |
| 2 | 7/11/2016 | 7 | 9/19/2016 | 19 | 12/26/2016 | 25 | 3/6/2017 | 35 | 5/29/2017 |
| 3 | 7/25/2016 | 8 | 9/26/2016 | 20 | 1/9/2017 | 26 | 3/13/2017 | 36 | 6/12/2017 |
| 4 | 8/8/2016 | 9 | 10/3/2016 | 21 | 1/23/2017 | 27 | 3/20/2017 | | |
| 5 | 8/22/2016 | 10 | 10/10/2016 | 22 | 2/6/2017 | 28 | 3/27/2017 | | |
| | | 11 | 10/17/2016 | 23 | 2/20/2017 | 29 | 4/3/2017 | | |
| | | 12 | 10/24/2016 | | | 30 | 4/10/2017 | | |
| | | 13 | 10/31/2016 | | | 31 | 4/17/2017 | | |
| | | 14 | 11/7/2016 | | | 32 | 4/24/2017 | | |
| | | 15 | 11/14/2016 | | | 33 | 5/1/2017 | | |
| | | 16 | 11/21/2016 | | | | | | |
| | | 17 | 11/28/2016 | | | | | | |

All observations within an 800-meter radius at each point count were recorded; any observations outside the 800-meter radius were considered incidental. Each PC survey lasted for 20 minutes; all audio and visual observations were recorded. Surveys were conducted by an experience ornithologist. Surveys were rotated to cover all daylight hours to ensure each PC was surveyed at various times of the day. Data recorded for each observation included species, number of individuals, time, and height above ground, behavior, and flight direction. A range finder and topographic maps were used as references to determine bird distances to the observer and flight heights. Birds not easily identifiable due to low light conditions and distance were identified to the lowest taxonomic level possible.

The data collected from these surveys can be used to estimate the potential effects of wind turbines on avian species in the project area. The survey protocol estimates avian use throughout the day and captures a variety of bird species. Songbirds are most active in the morning during the breeding season and can be difficult to detect during the afternoon,

compared to raptors which become more active as the sunlight heats the air and creates thermals, which individuals use for soaring.

Twenty-minute survey periods provide adequate time to detect both raptors and non-raptors. Double counting may occur during the 20-minute survey because individuals may appear and disappear from view. Double-counting of birds is not problematic for this type of survey because the objective is to document use in terms of number of birds noted per 20-minute survey, not number of distinct individual birds.

The ability to detect all species within the 800-meter survey radius varies among species and potentially not all individuals within the survey area are counted. This variation in detectability results in an overestimate of mean use in conspicuous species and an underestimate of mean use in reclusive species (Thompson 2002).

This report presents and discusses the results of the avian point count surveys completed as of February 24, 2017.

2.1.2 Incidental Observations

Incidental observations included those occurring while traveling between PC locations, pre- and post-PC survey time period, and outside the 800-meter radius circular plot. These observations were recorded but not used in the formal analysis.

2.1.3 Species Groupings

The data is presented in two primary groups of interest: raptors and non-raptors. Raptors were defined as vultures, hawks, eagles, falcons, and owls. Non-raptors were defined as all other avian species.

2.1.4 Mean Avian Use

Mean use was calculated by dividing the total number of birds per species observed by the total number of surveys conducted. Mean use was also calculated for each individual point count location to determine if there were areas with a higher mean use compared to other areas. The number of observations is also presented. This information helps depict whether a high mean use is driven by a single observation.

2.1.5 Flight Behavior

Flight behavior was evaluated by calculating the proportion of flying birds that were observed flying below, within, or above the turbine rotor sweep area (RSA). The Project is comprised of two (2) 2.3-MW and sixteen (16) 2.5-MW horizontal axis wind turbines. Each will have an anticipated hub height between 80 and 90 meters and a rotor diameter of approximately 116 meters. Therefore, an RSA between 22 and 148 meters above the ground was used.

2.1.6 Encounter Rate

The encounter rate is the rate at which a species was observed flying through the RSA during the avian point count surveys in the project area and suggests potential mortality risk from flight behavior.

To estimate the rate at which a species flies through the RSA, the following equation was applied to every species observed in the project area:

Encounter Rate = $A * P_f * P_t$

- ▲ A is the mean use of birds/20 minutes for a given species
- ▲ P_f is the proportion of all activity observations for a given species that were flying
- ▲ P_t is the proportion of flying observations that were within the turbine RSA

The encounter rate index is relative to the observations of species during the surveys and within the study area and cannot be extrapolated to the species that may use the project area in the future. The encounter rate index from this study does not take into consideration behavior (e.g. foraging, courtship), habitat use, and turbine avoidance differences between species.

2.2 EAGLE USE SURVEYS

Eagle use data is collected in 1-minute intervals so that the data can be translated into eagle exposure minutes. The data recorded for each survey includes the count start and stop times, eagle species observed, numbers and age classes of eagles seen, minutes of eagle flight in two height categories based on the USFWS Eagle Conservation Plan Guidance (< 200 and > 200 meters [m] above ground), notes on flight and other behaviors, and an individual identifier for each flight observation allowing it to be linked to a flight map. Each eagle flight observed will be drawn on a topographic map or aerial image of the study area and digitized using a GIS so that eagle locations and behaviors can be overlaid with Project features. Each sampling point will consist of an 800-meter (0.5-mile) radius circle (0.77 square mile) that provides distant, unobstructed views and allows visual observations of eagles and other large birds at a 2 to 3-mile distance. Numerical data is collected within 800-m-radius plots, but flight lines will be documented across line-of-sight and are not limited to the 800-m-radius survey plot. Detailed protocol study-specific data sheets and a data management plan are being adhered to and are utilized in the field.

Surveys are being conducted once a month during the non-migration months (April-August), surveys are conducted at a minimum of twice a month during the migration months (September-March) starting July 2016 and concluding in June 2017. There will be 20 survey weeks in total. Individual surveys consist of a 1-hour observation period at each of the eight point-count locations during each week of the surveys, for a total of 160 hours of observations. (**Figure 2** and **Table 2**). Surveys occur in all weather conditions except when visibility is poor. These surveys are conducted outside of the 20-minute avian point count surveys.

Table 2: Palmer’s Creek Eagle Use Survey Dates

| Summer 2016 | | Fall 2016 | | Winter 2016-2017 | | Spring 2017 | | Summer 2016 | |
|---------------|-------------|---------------|-------------|------------------|-------------|---------------|-------------|---------------|-------------|
| Survey Number | Survey Week | Survey Number | Survey Week | Survey Number | Survey Week | Survey Number | Survey Week | Survey Number | Survey Week |
| 1 | 7/25/2016 | 3 | 9/5/2016 | 10 | 12/12/2016 | 16 | 3/6/2017 | 19 | 5/15/2017 |
| 2 | 8/22/2016 | 4 | 9/19/2016 | 11 | 12/26/2016 | 17 | 3/20/2017 | 20 | 6/12/2017 |
| | | 5 | 10/3/2016 | 12 | 1/9/2017 | 18 | 4/11/2017 | | |
| | | 6 | 10/17/2016 | 13 | 1/23/2017 | | | | |
| | | 7 | 10/31/2016 | 14 | 2/6/2017 | | | | |
| | | 8 | 11/14/2016 | 15 | 2/20/2017 | | | | |
| | | 9 | 11/28/2016 | | | | | | |

2.3 RAPTOR AND EAGLE NEST SURVEYS

A raptor nest survey will be conducted to locate raptor nests and determine nest activity status and the species using those nests during the spring of 2017. The initial surveys will be conducted before trees leaf out, to locate nests and to identify early breeding species. The project area and a 1-mile buffer area will be surveyed from a vehicle using binoculars and spotting scopes. All raptor nest locations will be documented with Global Positioning System (GPS) coordinates. Raptor species, height of nest, nest activity status, nest condition, substrate, and other relevant data will be recorded for each nest. An additional visit will be conducted if nests are found to document the activity status of nests located during the initial survey and to identify nesting attempts by late nesting raptors such as Swainson’s hawks. Raptors may use nests intermittently among years as well as re-nest after a nest failure; therefore, early- and late-season nest surveys allow for a more accurate summary of breeding raptors.

A review of historical eagle nest data (MNDNR 2016) within one mile of the Project was completed at the request of Fagen, Inc. (Fagen). A bald eagle (*Haliaeetus leucocephalus*) nest has been documented in T116N R40W Section 11 just outside of the project area boundary. This nest was active when checked in 2000, 2001, and 2005. It is unknown whether the nest is still active or whether there are additional nests in the area.

An additional nest was located the spring of 2016 by Fagen, this nest was active in 2016 and is in T116N R39W Section 20, immediately outside of the project area boundary. Fagen staff have been monitoring nest use data in 2016 and will continue monitoring from April through August 15, 2017 or until all eaglets have fledged (Michael Rutledge, Fagen, Inc., Personal Communication, March 7, 2017).

2.4 ACOUSTIC BAT SURVEYS

Fagen deployed five separate Anabat systems (Anabat® SD-2 ultrasonic detectors) to record bat activity throughout the study area. The first deployment was done with two of the Anabat recorders during the fall of 2015 and continued through October 15, 2016. Three additional Anabat recorders were launched on August 3, 2016. Refer to **Figure 3** below.

3.0 Results

3.1 DIURNAL FIXED-POINT AND INCIDENTAL AVIAN USE SURVEYS

Of the approximate 6,150 acres that comprise the Palmer's Creek project area, approximately 3,970 acres were surveyed during PC surveys. Eight-point count locations were established and surveyed in the project area (**Figure 2**). A total of 36 surveys will be conducted over four seasons with seasons defined as summer (June 27, 2016–August 31, 2016 and May 14, 2017–June 17, 2017 [8-point count surveys]), fall (September 1, 2016–November 30, 2016 [12-point count surveys]), winter (December 1, 2016–February 25, 2017 [6-point count surveys]), and spring (February 26, 2017–May 15, 2017 [10-point count surveys]), as provided in **Table 1** above. The data presented below encompasses surveys conducted from June 27, 2016 through February 24, 2017. A final report breaking the data down by season will be completed after the avian surveys have been completed during the summer of 2017.

3.1.1 Species Composition

Survey data gathered through February 24, 2017 identified 2,916 avian individuals (60 different species) that were recorded during the eight fixed-PC surveys (**Table 2**). The most frequently observed birds were European starling (*Sturnus vulgaris*), (15.02 percent of all birds observed/438 individuals), American crow (*Corvus brachyrhynchos*), (11.08 percent/323 individuals), red-winged blackbird (*Agelaius phoeniceus*), (9.26 percent/270 individuals), brown-headed cowbird (*Molothrus bonariensis*), (8.20 percent/203 individuals), and barn swallow (*Hirundo rustica*), (6.17 percent/180 individuals (**Table 3**). The remaining 55 species comprised approximately 50.27 percent of the total birds observed.

3.1.2 Avian Use

Based on data gathered through February 24, 2017, the mean bird use was 15.85 birds/20 min (**Table 3**). The overall mean use by non-raptors was 15.52 birds/20 min; the highest mean use was European starling (2.38 birds/20 min), American crow (1.76 birds/20 min), red-winged blackbird (1.47 birds/20 min), brown-headed cowbird (1.30 birds/20 min), and barn swallow (0.98 birds/20 min) (**Table 3**).

For the species groups, overall mean use was highest for songbirds (11.34 birds/20 min) (**Table 3**).

Raptors are a group of special interest because of their propensity to fly at heights within a turbine RSA. The mean use for raptors/vultures/owls was 0.33 birds/20 minute. Seven raptor species were identified during the surveys: red-tailed hawk (*Buteo jamaicensis*) (0.15 birds/20 min), turkey vulture (*Cathartes aura*) (0.07 birds/20 min), Bald Eagle (*Haliaeetus leucocephalus*) (0.05 birds/20 min), Swainson's Hawk (*Buteo swainsoni*) (0.03 birds/20 min), Rough-legged Hawk (*Buteo lagopus*) (0.02 birds/20 min), Northern Harrier (*Circus cyaneus*) (0.01 birds/20 min), and American kestrel (*Falco sparverius*) (0.01 birds/20 min) (**Table 3**).

3.1.3 Frequency of Occurrence

Based on data gathered through February 24, 2017, the most common species present during the surveys is the field sparrow (*Spizella pusilla*) (17.93 percent of all surveys), which was widely distributed throughout the project area (**Table 3**). Other frequently occurring species included American goldfinch (*Spinus tristis*) (17.39 percent of all surveys), blue jay (*Cyanocitta cristata*) (17.39 percent of all surveys), and Red-winged Blackbird (14.67 percent of all surveys) (**Table 3**).

3.1.4 Flight Height and Encounter Rate

Based on data gathered through February 24, 2017, 77.64 percent of all individuals observed were flying (**Table 3**). Flight height and flight direction data was recorded for all the flying birds (**Table 3**). Approximately 43.65 percent of flying raptor species flew below the RSA, 30.90 percent flew within the RSA, and 25.45 percent flew above the RSA. For all other species, 91.18 percent flew below the RSA, 7.24 percent flew within the RSA, and 1.58 percent flew above the RSA (**Table 3**).

Unknown duck and unknown blackbird were the two highest non-raptors with encounter rates of 0.25 and 0.22 respectively (**Table 3**).

3.1.5 Sensitive Species Observations

Based on data gathered through February 24, 2017, two state special concern species (bald eagle and American white pelican (*Pelecanus erythrorhynchos*)) were observed during the avian surveys. Neither of these species are protected by the federal Endangered Species Act.

3.1.6 Flight Direction

Data gathered through February 24, 2017 indicated that birds were generally flying in variable directions (46.69 percent). Specific directions of flight and respective percentages are as follows: south (13.12 percent), southeast (8.83 percent), north (8.48 percent), southwest (7.07 percent), west (6.27 percent), east (4.20 percent), northwest (3.22 percent), and northeast (2.12 percent) (**Table 3**).

3.1.7 Incidental Surveys

Based on data gathered through February 24, 2017, staff documented six species and a total of 22 individual incidental observations. One species, a single northern pintail (*Anas acuta*), was detected during incidental surveys, but not during the point count surveys. See **Table 4** below.

Table 2: Palmer's Creek Incidental Observations

| Species | Obs | Indv |
|------------------|-----------|-----------|
| Red-tailed Hawk | 11 | 11 |
| Turkey Vulture | 4 | 6 |
| Bald Eagle | 2 | 2 |
| Northern Harrier | 1 | 1 |
| Northern Pintail | 1 | 1 |
| American Kestrel | 1 | 1 |
| TOTAL | 20 | 22 |

3.2 EAGLE USE SURVEYS

Surveys are being conducted once a month during the non-migration months (April-August), surveys are conducted at a minimum of twice a month during the migration months (September-March) starting July 2016 and concluding in June 2017. There will be 20 survey weeks in total. Individual surveys consist of a 1-hour observation period at each of the eight point-count locations during each week of the surveys, for a total of 160 hours of observations. Surveys occur in all weather conditions except when visibility is poor. These surveys are conducted outside of the 20-minute avian point count surveys.

Eagle use surveys, conducted through February 24, 2017, documented 11 bald eagles with 37 flight minutes, and 91 percent of the individuals were flying within the RSA. Most of these eagles have been observed within one mile of the Minnesota River (Wenck 2017).

3.3 RAPTOR AND EAGLE NESTS

An aerial (fixed-wing) raptor/eagle nest survey will be conducted in April 2017 that will encompass a 10-mile buffer of the proposed wind farm. For any nests observed, the following will be recorded: GPS location, approximate nest height, nest substrate, nest size, actively used or non-use, and species using nest.

3.4 ACOUSTIC BAT SURVEYS

The data collected from Fagen was sent to NCE, who processed the data in zero-crossing through Kaleidoscope (Ver. 3.1.8) to confirm presence diversity and abundance of bat species. The software uses a presence/absent indicator by giving each species of bat a p-value. The lower the p-value, the more likely the species of bat is present. Bat presence, in the form of vocalization, was detected, identified by species, and catalogued, thereby allowing estimates of species occurrences, distribution and relative abundance.

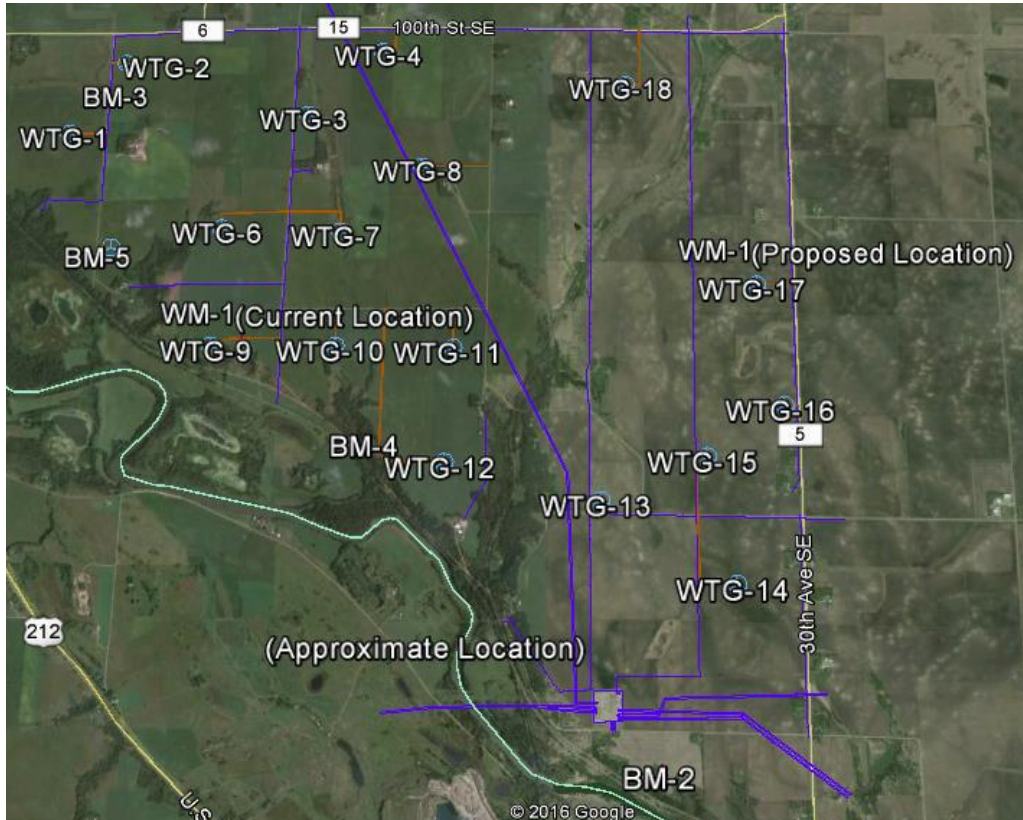


Figure 3. Bat Monitor (BM) Locations. BM-1 is not shown on the map but lies next to BM-2.

Bat Monitors (BM) 1 & 2 gathered data throughout the fall of 2015 and were deployed again in May 2016. Monitors 3-5 were added in September 2016.

Monitors 1 & 2 were deployed on September 13, 2015 and removed on October 11, 2015. They were deployed again on April 12, 2016, then removed on October 15, 2016. Monitor 3, Monitor 4 and Monitor 5 were deployed on August 3, 2016 then removed on October 15, 2016. The monitors were deployed for 287 trap nights.

From the five (5) Anabat recording systems, 232,116 sound files were recorded. Visual examination and filtering of files to eliminate extraneous noise (e.g., wind, insects, etc.) resulted in a total of 14,442 bat detections.

There was a total of six bat species documented throughout the course of the study (September-October 2015 and 2016). The tricolored bat, also known as the eastern pipistrelle (*Pipistrellus sublavus*) was documented at this site and is listed as a species of concern in the state of Minnesota. It was detected in small numbers but was found at every monitor except for Monitor 1. The northern long-eared myotis (*Myotis septentrionalis*) is a federally threatened species whose home range lies within the study area. However no confirmed documentation was recorded here. Even though a total of five clicks of which Kaleidoscope classified as MYSE (northern long-eared myotis) the P-value was given a 1 for every monitor indicating the likelihood of presence is near non-existent. All other species documented are of least concern. Of the six-species documented, the silver-haired bat (*Lasiorycteris noctivagans*), hoary bat (*Lasiurus cinereus*) and big brown bat (*Eptesicus*

fuscus) were among the most common followed by the little brown bat (*Myotis lucifugus*) and eastern red bat (*Lasiurus borealis*). See **Appendix C** for the entire *Interim Acoustic Bat Summary Report*.

Bat acoustic surveys will continue through the 2017 season.

4.0 Discussion and Impact Assessment

4.1 DISCUSSION

The avian community currently detected within project area during the point count surveys is characterized by species associated with typical mid-western agricultural lands and mixed-grass prairie vegetation. The majority of project area and vicinity has been developed for agricultural use, specifically row crops such as corn, sunflower, and soybeans with additional developed lands devoted to pastureland. Within disturbed habitats such as these, the greatest potential impact of wind facilities to avian species is risk of collisions with turbines. Mean avian fatality rates estimated from wind facilities in the Midwest (NE, WI, MN, and IA) range from 0.44 to 11.83 birds/turbine/year (0.49 – 7.17 birds/MW/year; Tetra Tech 2012). Palmer's Creek bird fatalities are estimated to fall within this range.

4.2 RAPTOR USE AND ENCOUNTER RATE

Survey data gathered through February 24, 2017 totaled 60 individual raptors observed for a mean use of 0.33 raptors/20 minute (**Table 3**). This rate was compared to a study of 37 other wind energy facilities that implemented similar protocols. The raptor annual mean use at these wind-energy facilities ranged from 0.09 to 2.34 raptors/20 min survey. Based on the results from these wind energy facilities, as summarized by Derby et al. 2010, a ranking of seasonal raptor mean use was developed: low (0-0.5 raptors/20 min. survey); low to moderate (0.5-1.0 raptors/20 min); moderate (1.0-2.0 raptors/20 min); high (2.0-3.0 raptors/20 min); and very high (> 3.0 raptors/20 min). Under this ranking, the current mean raptor use in the project area is considered low.

Encounter rate analysis may also suggest which species may be at risk to become turbine casualties. The encounter rate is an index and only considers probability of exposure based on abundance, number of individuals flying, and flight height of each species within the RSA for turbines to be used at the wind-energy facility.

Raptor encounter rates in the project area are considered moderate, based on 17 of 60 individuals observed flying within the RSA/20 minute during the surveys (**Table 3**). Approximately 28.33 percent of all raptor observations were within the RSA. The highest raptor encounter rate was red-tailed hawk with 0.15 individuals flying within the RSA/20 min. Turkey vulture was second with an encounter rate of 0.07 individuals flying within the RSA/20 min, followed by bald eagle, 0.05 individuals flying within the RSA (**Table 3**).

High numbers of raptor fatalities have been documented at wind-energy facilities (e.g. Altamont Pass); however other studies at wind-energy facilities in the United States found that 3.2 percent of the total casualties were raptors (Erickson et al. 2001). Results from Altamont Pass in California suggest that species mortality is not all related to abundance (Orloff and Flanery 1992). Based on species occurrence/abundance and encounter rates within the Palmer's Creek project area during the surveys, turkey vultures, red-tailed hawks and bald eagles may be at highest collision risk with the Project.

High raptor use (greater than 2.0 birds/20 min) has been associated with high raptor fatality at wind farms (Strickland et al. 2011). Conversely, raptor fatality appears to be low when raptor use is low (less than 1.0 birds/20 min; Strickland et al. 2011), which is the

case for raptor use in the project area. Currently the project area has a raptor use of 0.33 birds/20 min (**Table 3**).

Turkey vultures and red-tailed hawks were the raptor species with the highest mean use and were also among the most frequently detected raptor species in the project area. Both species are commonly associated with agricultural and grassland habitats which provide opportunities for foraging, and activity associated with susceptibility to turbine-collisions (Thelander et al. 2003). In a recent study of raptor response to wind farms, red-tailed hawks were observed engaging in high-risk behaviors at operational wind facilities (Garvin et al. 2011). Results from post-construction fatality monitoring studies indicate that red-tailed hawks are frequently found as turbine-related fatalities (228 records of red-tailed hawk from 27 studies – Tetra Tech 2012; Jain 2005, Grodsky and Drake 2011, Johnson and Erickson 2011). However, Garvin et al. (2011) documented that red-tailed hawks, despite high-risk behavior, also demonstrated collision avoidance behavior (Garvin et al. 2011). Thus, risk of turbine-related fatalities in the project area exists for red-tailed hawks, but turbine-related fatalities would be expected to be low given the moderate level of use and no nests currently detected within the Palmer’s Creek project area. Project-related fatalities of red-tailed hawk, should they occur, are unlikely to population-level impacts because red-tailed hawks are common nationwide (Sauer et al. 2011). Turkey vultures are also very common nationwide and Project-related fatalities, should they occur, would not have population-level impacts.

4.3 NON-RAPTOR USE AND ENCOUNTER RATE

Migratory bird species in the United States are protected by the Migratory Bird Treaty Act (MBTA). Passerine species have been the most abundant bird fatality at wind energy facilities outside California (Erickson et al. 2001 and Erickson et al. 2002), often comprising more than 80 percent of the bird fatalities. Both migrant and resident passerine fatalities have been observed (Erickson et al. 2001 and Erickson et al. 2002). Passerines make up a large proportion of the birds observed during the avian surveys in the project area and would be expected to make up the largest proportion of fatalities. Encounter rates indicate that the unknown duck (*Anatidae sp.*), unknown blackbird (*Turdus sp.*), red-winged blackbird, American crow, and ring-billed gull (*Larus delawarensis*) are likely to be exposed to collisions from wind turbines in the project area (**Table 3**). The red-winged blackbird is commonly found as a turbine-related fatality (more than 20 records of post-construction fatality from 27 studies; Tetra Tech 2012, Johnson et al. 2000, Howe et al. 2002, TRC Environmental 2008, Gruver et al 2009, BHE Environmental 2010, Jain et al. 2011, Grodsky and Drake 2011). Thus, risk of turbine-related fatalities of red-winged blackbird, and perhaps other at risk non-raptors in the project area, should they occur, are unlikely to have population-level impacts because collision fatalities appears to have little effect on North American land bird populations (Arnold and Zink 2011).

There were other species that flew through the RSA during the PC surveys, but their frequency of occurrence and overall numbers were not high enough to warrant significant collision exposure (**Table 3**).

4.4 LISTED AND SENSITIVE SPECIES RISK

The sensitive species observed in the project area are summarized in Section 3.6. No federally listed threatened, endangered or candidate species were observed during the surveys to date. Based on data gathered through February 24, 2017, two state special

concern species (bald eagle and American white pelican (*Pelecanus erythrorhynchos*)) were observed during the avian surveys. None of these species are protected by the federal Endangered Species Act.

As of February 24, 2017, eagle use surveys documented 11 bald eagles with 37 flight minutes, and 91 percent of the individuals were flying within the RSA. Most of these eagles have been observed within one mile of the Minnesota River (Wenck 2017). Monitoring of eagle activity will continue into summer 2017, the results of the survey will be analyzed once the surveys have been completed.

4.5 ACOUSTIC BAT SURVEYS

There was a total of six bat species documented throughout the course of the surveys (Fall 2015 and Fall 2016). Three species of concern in the state of Minnesota were observed during the acoustic bat monitoring (tricolored bat, big brown bat, and little brown bat). The northern long-eared bat is a federally threatened species with a species range that includes the majority of the eastern United States, extending west through Minnesota to the western borders of the Dakotas. No confirmed documentation of the northern long-eared bat in the project area was recorded during the Fall 2015 to Fall 2016 acoustic bat monitoring (see **Appendix C**).

Bats typically utilize farm buildings and dead and dying trees with cavities and loose bark as roosting and maternity habitat. Bats typically use forests, riparian corridors and wetlands as feeding habitats due to higher nocturnal insect densities in these areas. There is minimal native vegetation that serves as wildlife habitat within the project area near direct areas of Project impact. There are bats in the project area and some wind turbine collision bat mortality is likely to occur because of the Project. Compared to birds, less is known about bat populations and habitat preferences on a local, regional or national level. Bat mortality is likely to be greatest for migratory tree bat species, including hoary, eastern red and silver-haired bats during the fall migration period (Johnson 2005, Arnett et al. 2008).

5.0 Conclusions

It appeared that birds were using specific areas near the project site, especially along the Minnesota River. Strong associations with topographic features along the Minnesota River were noted for raptors or other large avian species. The Minnesota River appears to be a flyway or concentration area for migrating avian species.

Data collected through February 24, 2017 suggest an overall low impact in the project area on the local avian community as compared to other upper Midwest wind farms. The low mean-use rate in the project area is primarily due to few common residents and migratory species. Raptor use was low for each raptor species detected. Although there is potential for turbine-related fatalities of unknown ducks, unknown blackbirds, red-winged blackbirds, American crow, ring-billed gulls, red-tailed hawks, and turkey vultures, fatalities are not expected to have population-level impacts. If avian fatality rates are similar to other wind facilities within the region, it is estimated the Project would result in fatality rates between 0.44 – 11.83 birds/turbine/year (0.49 – 7.17birds/MW/year).

Assuming the general relationship between bat activity and bat mortality observed at other sites is broadly applicable to similar locations, levels of turbine-related bat mortality at the Palmer's Creek Wind Farm is estimated to be on the lower end of the spectrum, and similar with others in the region.

No federally-listed endangered, threatened, or candidate species were observed within the project area. However, two state special concern species (bald eagle and American white pelican) were observed during the avian surveys. No historical bald eagle nests are within the project area. All migratory avian species are protected by the Migratory Bird Treaty Act of 1918.

The data, information and conclusions presented in this report are considered preliminary findings. Once field surveys are completed for the Project, additional data and information will be incorporated into a final report. This will require updating conclusions and other information as currently presented.

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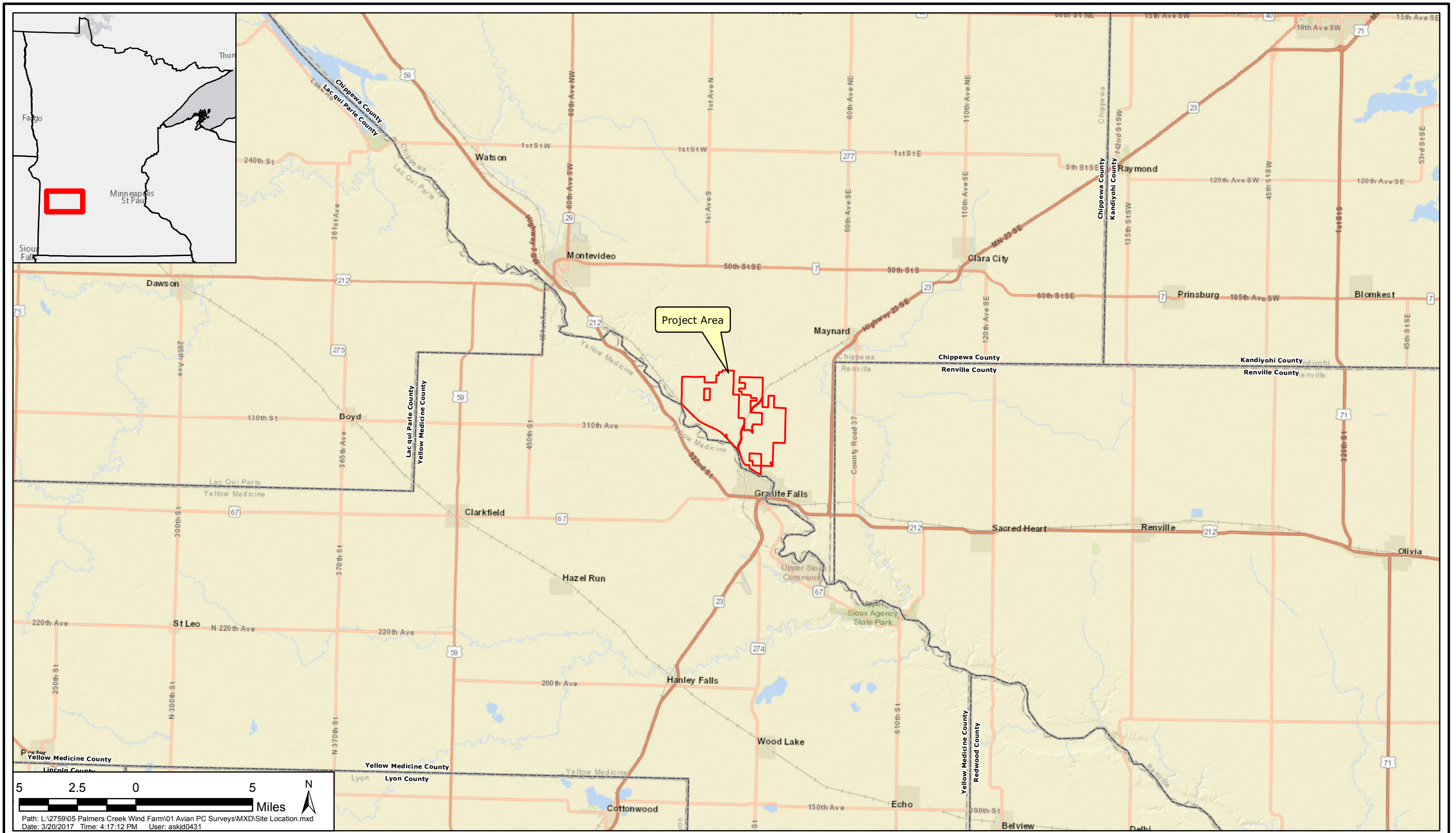
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Appendix A-Tables

**Table 3. Palmer's Creek Cumulative Point Count Data
Survey #1 (6/29/16) - Survey #23 (2/24/17)**

| Species | Group | Obs | Ind | Fly | Mean Use per 20 min | Percent Composition | No. Surveys Species Observed | Frequency (% Surveys) | Proportion Ind. Flying | Proportion Ind. | | | Encounter Rate | Encounter | | | | | | | | | |
|-------------------------|-------|------------|--------------|--------------|------------------------|------------------------|------------------------------------|--------------------------|---------------------------|---------------------|----------------------|---------------------|-------------------|--------------|--------------|--------------|--------------|---------------|--------------|--------------|--------------|---------------|-------|
| | | | | | | | | | | Flying Below RSA | Flying Within RSA | Flying Above RSA | | N | NE | E | SE | S | SW | W | NW | Var | |
| European Starling | SB | 15 | 438 | 384 | 2.38 | 15.02% | 5 | 2.72% | 87.7% | 100.0% | 0.0% | 0.0% | 0.00 | 8.1% | 0.0% | 0.0% | 0.0% | 11.5% | 0.0% | 0.0% | 0.0% | 0.0% | 80.5% |
| American Crow | C | 44 | 323 | 127 | 1.76 | 11.08% | 25 | 13.59% | 39.3% | 81.9% | 18.1% | 0.0% | 0.13 | 22.8% | 2.4% | 0.0% | 15.7% | 11.8% | 7.9% | 0.8% | 13.4% | 25.2% | |
| Red-winged Blackbird | SB | 27 | 270 | 258 | 1.47 | 9.26% | 27 | 14.67% | 95.6% | 89.9% | 10.1% | 0.0% | 0.14 | 0.4% | 1.6% | 0.0% | 20.9% | 19.0% | 14.7% | 0.4% | 0.0% | 43.0% | |
| Brown-headed Cowbird | SB | 20 | 239 | 203 | 1.30 | 8.20% | 19 | 10.33% | 84.9% | 100.0% | 0.0% | 0.0% | 0.00 | 5.9% | 0.0% | 0.5% | 7.4% | 9.4% | 26.1% | 23.6% | 6.9% | 20.2% | |
| Barn Swallow | SB | 22 | 180 | 180 | 0.98 | 6.17% | 22 | 11.96% | 100.0% | 100.0% | 0.0% | 0.0% | 0.00 | 0.0% | 0.0% | 1.1% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 98.9% | |
| American Goldfinch | SB | 34 | 132 | 132 | 0.72 | 4.53% | 32 | 17.39% | 100.0% | 98.5% | 1.5% | 0.0% | 0.01 | 9.8% | 1.5% | 34.8% | 11.4% | 18.9% | 6.1% | 2.3% | 0.8% | 14.4% | |
| Blue Jay | SB | 41 | 114 | 66 | 0.62 | 3.91% | 32 | 17.39% | 57.9% | 100.0% | 0.0% | 0.0% | 0.00 | 9.1% | 15.2% | 16.7% | 6.1% | 12.1% | 10.6% | 15.2% | 6.1% | 9.1% | |
| Snow Bunting | SB | 6 | 109 | 109 | 0.59 | 3.74% | 0 | 0.00% | 100.0% | 100.0% | 0.0% | 0.0% | 0.00 | 0.0% | 15.6% | 0.0% | 0.0% | 15.6% | 0.0% | 18.3% | 0.0% | 50.5% | |
| Rock Pigeon | PD | 28 | 105 | 105 | 0.57 | 3.60% | 18 | 9.78% | 100.0% | 98.1% | 1.9% | 0.0% | 0.01 | 22.9% | 0.0% | 11.4% | 0.0% | 1.9% | 0.0% | 11.4% | 13.3% | 39.0% | |
| Wild Turkey | GB | 5 | 93 | 0 | 0.51 | 3.19% | 1 | 0.54% | 0.0% | 0.0% | 0.0% | 0.0% | 0.00 | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | |
| Field Sparrow | SB | 33 | 84 | 51 | 0.46 | 2.88% | 33 | 17.93% | 60.7% | 100.0% | 0.0% | 0.0% | 0.00 | 7.8% | 0.0% | 3.9% | 0.0% | 3.9% | 3.9% | 2.0% | 0.0% | 78.4% | |
| Canada Goose | WF | 8 | 71 | 65 | 0.39 | 2.43% | 7 | 3.80% | 91.5% | 46.2% | 0.0% | 53.8% | 0.00 | 1.5% | 0.0% | 0.0% | 13.8% | 56.9% | 27.7% | 0.0% | 0.0% | 0.0% | |
| Dark-eyed Junco | SB | 9 | 70 | 70 | 0.38 | 2.40% | 5 | 2.72% | 100.0% | 100.0% | 0.0% | 0.0% | 0.00 | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 5.7% | 7.1% | 87.1% | |
| Unknown Duck | WF | 5 | 60 | 46 | 0.33 | 2.06% | 3 | 1.63% | 76.7% | 0.0% | 100.0% | 0.0% | 0.25 | 30.4% | 0.0% | 0.0% | 69.6% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | |
| Black-capped Chickadee | SB | 12 | 58 | 54 | 0.32 | 1.99% | 7 | 3.80% | 93.1% | 100.0% | 0.0% | 0.0% | 0.00 | 0.0% | 0.0% | 3.7% | 0.0% | 0.0% | 14.8% | 0.0% | 0.0% | 81.5% | |
| Horned Lark | SB | 11 | 57 | 50 | 0.31 | 1.95% | 10 | 5.43% | 87.7% | 100.0% | 0.0% | 0.0% | 0.00 | 0.0% | 0.0% | 0.0% | 0.0% | 30.0% | 0.0% | 50.0% | 0.0% | 20.0% | |
| Unknown Blackbird | SB | 1 | 40 | 40 | 0.22 | 1.37% | 1 | 0.54% | 100.0% | 0.0% | 100.0% | 0.0% | 0.22 | 100.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | |
| Unidentified Sparrow | SB | 4 | 35 | 34 | 0.19 | 1.20% | 0 | 0.00% | 97.1% | 100.0% | 0.0% | 0.0% | 0.00 | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 2.9% | 0.0% | 97.1% | |
| Common Grackle | SB | 7 | 32 | 32 | 0.17 | 1.10% | 7 | 3.80% | 100.0% | 100.0% | 0.0% | 0.0% | 0.00 | 0.0% | 12.5% | 3.1% | 6.3% | 59.4% | 15.6% | 0.0% | 3.1% | 0.0% | |
| American Robin | SB | 16 | 29 | 17 | 0.16 | 0.99% | 16 | 8.70% | 58.6% | 100.0% | 0.0% | 0.0% | 0.00 | 11.8% | 0.0% | 5.9% | 23.5% | 11.8% | 11.8% | 0.0% | 17.6% | 17.6% | |
| Red-tailed Hawk | RVO | 24 | 27 | 25 | 0.15 | 0.93% | 17 | 9.24% | 92.6% | 56.0% | 24.0% | 20.0% | 0.03 | 16.0% | 0.0% | 4.0% | 24.0% | 24.0% | 12.0% | 8.0% | 4.0% | 8.0% | |
| Mourning Dove | PD | 15 | 25 | 19 | 0.14 | 0.86% | 15 | 8.15% | 76.0% | 100.0% | 0.0% | 0.0% | 0.00 | 42.1% | 0.0% | 15.8% | 0.0% | 5.3% | 5.3% | 31.6% | 0.0% | 0.0% | |
| Ring-billed Gull | GT | 6 | 25 | 25 | 0.14 | 0.86% | 6 | 3.26% | 100.0% | 32.0% | 68.0% | 0.0% | 0.09 | 0.0% | 0.0% | 0.0% | 4.0% | 8.0% | 0.0% | 8.0% | 12.0% | 68.0% | |
| Common Yellowthroat | SB | 12 | 22 | 0 | 0.12 | 0.75% | 12 | 6.52% | 0.0% | 0.0% | 0.0% | 0.0% | 0.00 | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | |
| Cedar Waxwing | SB | 6 | 21 | 19 | 0.11 | 0.72% | 6 | 3.26% | 90.5% | 100.0% | 0.0% | 0.0% | 0.00 | 0.0% | 0.0% | 42.1% | 36.8% | 21.1% | 0.0% | 0.0% | 0.0% | 0.0% | |
| Yellow Warbler | SB | 4 | 20 | 13 | 0.11 | 0.69% | 3 | 1.63% | 65.0% | 100.0% | 0.0% | 0.0% | 0.00 | 0.0% | 0.0% | 0.0% | 0.0% | 100.0% | 0.0% | 0.0% | 0.0% | 0.0% | |
| Ring-necked Pheasant | GB | 10 | 19 | 6 | 0.10 | 0.65% | 6 | 3.26% | 31.6% | 100.0% | 0.0% | 0.0% | 0.00 | 0.0% | 0.0% | 0.0% | 100.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | |
| American Tree Sparrow | SB | 2 | 19 | 18 | 0.10 | 0.65% | 2 | 1.09% | 94.7% | 100.0% | 0.0% | 0.0% | 0.00 | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 100.0% | |
| Clay-colored Sparrow | SB | 12 | 16 | 0 | 0.09 | 0.55% | 12 | 6.52% | 0.0% | 0.0% | 0.0% | 0.0% | 0.00 | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | |
| Northern Flicker | WP | 6 | 15 | 15 | 0.08 | 0.51% | 6 | 3.26% | 100.0% | 100.0% | 0.0% | 0.0% | 0.00 | 0.0% | 26.7% | 0.0% | 20.0% | 33.3% | 20.0% | 0.0% | 0.0% | 0.0% | |
| Western Meadowlark | SB | 3 | 14 | 14 | 0.08 | 0.48% | 3 | 1.63% | 100.0% | 100.0% | 0.0% | 0.0% | 0.00 | 0.0% | 0.0% | 0.0% | 50.0% | 35.7% | 0.0% | 14.3% | 0.0% | 0.0% | |
| Turkey Vulture | RVO | 9 | 12 | 12 | 0.07 | 0.41% | 9 | 4.89% | 100.0% | 33.3% | 50.0% | 16.7% | 0.03 | 0.0% | 0.0% | 25.0% | 33.3% | 8.3% | 0.0% | 16.7% | 0.0% | 16.7% | |
| Tree Swallow | SB | 5 | 12 | 12 | 0.07 | 0.41% | 5 | 2.72% | 100.0% | 100.0% | 0.0% | 0.0% | 0.00 | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 100.0% | |
| Bank Swallow | SB | 1 | 12 | 12 | 0.07 | 0.41% | 1 | 0.54% | 100.0% | 100.0% | 0.0% | 0.0% | 0.00 | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 100.0% | |
| Downy Woodpecker | WP | 11 | 11 | 8 | 0.06 | 0.38% | 9 | 4.89% | 72.7% | 100.0% | 0.0% | 0.0% | 0.00 | 12.5% | 0.0% | 12.5% | 25.0% | 12.5% | 12.5% | 25.0% | 0.0% | 0.0% | |
| Killdeer | SH | 7 | 10 | 5 | 0.05 | 0.34% | 7 | 3.80% | 50.0% | 100.0% | 0.0% | 0.0% | 0.00 | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 100.0% | |
| Vesper Sparrow | SB | 6 | 10 | 0 | 0.05 | 0.34% | 6 | 3.26% | 0.0% | 0.0% | 0.0% | 0.0% | 0.00 | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | |
| Bald Eagle | RVO | 8 | 10 | 9 | 0.05 | 0.34% | 6 | 3.26% | 90.0% | 11.1% | 33.3% | 55.6% | 0.02 | 0.0% | 33.3% | 0.0% | 44.4% | 11.1% | 0.0% | 0.0% | 0.0% | 11.1% | |
| Savannah Sparrow | SB | 1 | 8 | 0 | 0.04 | 0.27% | 0 | 0.00% | 0.0% | 0.0% | 0.0% | 0.0% | 0.00 | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | |
| Chipping Sparrow | SB | 7 | 8 | 4 | 0.04 | 0.27% | 7 | 3.80% | 50.0% | 100.0% | 0.0% | 0.0% | 0.00 | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 100.0% | |
| Song Sparrow | SB | 5 | 7 | 0 | 0.04 | 0.24% | 5 | 2.72% | 0.0% | 0.0% | 0.0% | 0.0% | 0.00 | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | |
| Eastern Bluebird | SB | 2 | 6 | 6 | 0.03 | 0.21% | 2 | 1.09% | 100.0% | 100.0% | 0.0% | 0.0% | 0.00 | 16.7% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 83.3% | 0.0% | |
| Swainson's Hawk | RVO | 4 | 5 | 3 | 0.03 | 0.17% | 3 | 1.63% | 60.0% | 66.7% | 33.3% | 0.0% | 0.01 | 0.0% | 0.0% | 0.0% | 33.3% | 33.3% | 33.3% | 0.0% | 0.0% | 0.0% | |
| Mallard | WF | 2 | 5 | 0 | 0.03 | 0.17% | 2 | 1.09% | 0.0% | 0.0% | 0.0% | 0.0% | 0.00 | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | |
| Least Flycatcher | SB | 4 | 5 | 1 | 0.03 | 0.17% | 4 | 2.17% | 20.0% | 100.0% | 0.0% | 0.0% | 0.00 | 0.0% | 100.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | |
| Sedge Wren | SB | 5 | 5 | 0 | 0.03 | 0.17% | 5 | 2.72% | 0.0% | 0.0% | 0.0% | 0.0% | 0.00 | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | |
| American White Pelican | WB | 1 | 4 | 4 | 0.02 | 0.14% | 1 | 0.54% | 100.0% | 0.0% | 100.0% | 0.0% | 0.02 | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 100.0% | 0.0% | |
| Rough-legged Hawk | RVO | 3 | 4 | 4 | 0.02 | 0.14% | 2 | 1.09% | 100.0% | 25.0% | 25.0% | 50.0% | 0.01 | 0.0% | 0.0% | 0.0% | 100.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | |
| Eastern Wood-Pewee | SB | 3 | 3 | 0 | 0.02 | 0.10% | 3 | 1.63% | 0.0% | 0.0% | 0.0% | 0.0% | 0.00 | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | |
| Eastern Kingbird | SB | 2 | 3 | 1 | 0.02 | 0.10% | 2 | 1.09% | 33.3% | 100.0% | 0.0% | 0.0% | 0.00 | 100.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | |
| Belted Kingfisher | SB | 2 | 2 | 1 | 0.01 | 0.07% | 2 | 1.09% | 50.0% | 100.0% | 0.0% | 0.0% | 0.00 | 0.0% | 0.0% | 0.0% | 0.0% | 100.0% | 0.0% | 0.0% | 0.0% | 0.0% | |
| Snow Goose | WF | 1 | 2 | 2 | 0.01 | 0.07% | 1 | 0.54% | 100.0% | 100.0% | 0.0% | 0.0% | 0.00 | 0.0% | 0.0% | 0.0% | 0.0% | 100.0% | 0.0% | 0.0% | 0.0% | 0.0% | |
| Grasshopper Sparrow | SB | 2 | 2 | 0 | 0.01 | 0.07% | 2 | 1.09% | 0.0% | 0.0% | 0.0% | 0.0% | 0.00 | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | |
| Yellow-headed Blackbird | SB | 2 | 2 | 1 | 0.01 | 0.07% | 2 | 1.09% | 50.0% | 100.0% | 0.0% | 0.0% | 0.00 | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 100.0% | |
| Northern Harrier | RVO | 1 | 1 | 1 | 0.01 | 0.03% | 0 | 0.00% | 100.0% | 100.0% | 0.0% | 0.0% | 0.00 | 0.0% | 0.0% | 100.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | |
| American Kestrel | RVO | 1 | 1 | 1 | 0.01 | 0.03% | 1 | 0.54% | 100.0% | 100.0% | 0.0% | 0.0% | 0.00 | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 100.0% | 0.0% | |
| Wilson's Snipe | SH | 1 | 1 | 0 | 0.01 | 0.03% | 1 | 0.54% | 0.0% | 0.0% | 0.0% | 0.0% | 0.00 | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | |
| Bobolink | SB | 1 | 1 | 0 | 0.01 | 0.03% | 1 | 0.54% | 0.0% | 0.0% | 0.0% | 0.0% | 0.00 | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | |
| Willow Flycatcher | SB | 1 | 1 | 0 | 0.01 | 0.03% | 1 | 0.54% | 0.0% | 0.0% | 0.0% | 0.0% | 0.00 | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | |
| Marsh Wren | SB | 1 | 1 | 0 | 0.01 | 0.03% | 1 | 0.54% | 0.0% | 0.0% | 0.0% | 0.0% | 0.00 | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | |
| | | 547 | 2,916 | 2,264 | 15.85 | 100.0% | | | 77.6% | | | | 0.96 | 8.48% | 2.12% | 4.20% | 8.83% | 13.12% | 7.07% | 6.27% | 3.22% | 46.69% | |

Appendix B-Figures



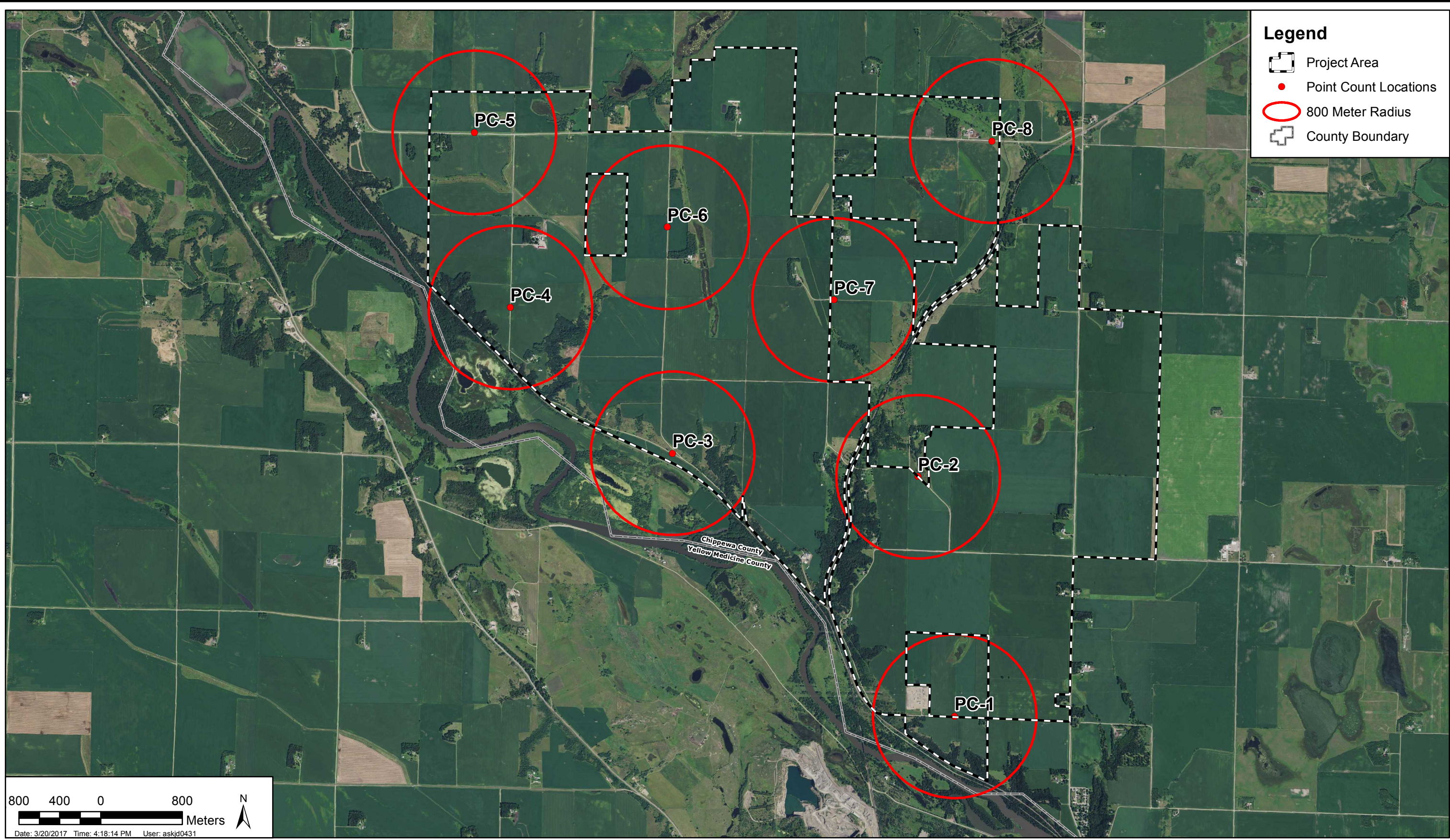
FAGEN ENGINEERING

Site Location Map



MAR 2017

Figure 1



FAGEN ENGINEERING
Point Count Locations

WENCK
ASSOCIATES
Responsive partner. Exceptional outcomes.

MAR 2017
Figure 2

Path: L:\2759\05 Palmers Creek Wind Farm\01_Avian_PC_Surveys\MXD\Point_Count_Locations.mxd

Appendix C- Interim Acoustic Bat Summary Report

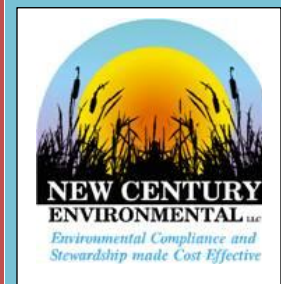
FAGEN, INC.

GRANITE FALLS, MINNESOTA

Palmer's Creek Wind Farm

Acoustic Bat Summary Report

2017



NEW CENTURY ENVIRONMENTAL LLC, COLUMBUS, NE

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Palmer's Creek WRA Acoustic Bat Monitoring Study
Fagen, Inc.
Granite Falls, Minnesota

Prepared By
New Century Environmental, LLC.
Columbus, Nebraska

Executive Summary

In early summer of 2016, Mike Rutledge of Fagen Engineering contacted Mike Gutzmer of New Century Environmental, LLC (NCE) to aid in the effort of completing a bat report that would capture the diversity/abundance of bat species within the study area of Palmer's Creek to meet due diligence with regulatory agencies, which was done through acoustic monitoring. The client proposed to develop a wind farm within the study area of Chippewa County, Minnesota (just north across the Minnesota River from Granite Falls). The study area lies within the Des Moines Lobe Western Corn Belt Plains (47b) ecoregion of Minnesota. Staff of Fagen Engineering deployed five separate ANABAT systems to record bat activity throughout the study area, the first deployment was done with two of the ANABAT recorders during the fall of 2015 and continued through 15 October 2016. Three more ANABAT recorders were launched on 03 August, 2016. The data collected from Fagen Engineering was sent to NCE via Procore Portal. NCE then took the data and processed in zero-crossing through Kaleidoscope version 3.1.8 to confirm presence diversity and abundance of bat species. The software uses a presence/absent indicator by giving each species of bat a p-value. The lower the p-value, the more likely the species of bat is present. Bat presence, in the form of vocalization, was detected, identified by species, and catalogued, thereby allowing us to estimate species occurrences, distribution and relative abundance.

Introduction

In early summer of 2016, Mike Rutledge of Fagen Engineering, LLC contacted Mike Gutzmer of New Century Environmental, LLC (NCE) to aid in the effort of completing a bat report that would capture the diversity/abundance of bat species within the study area of Palmer's Creek to meet due diligence with regulatory agencies. The client proposed to develop a wind farm in Chippewa County, Minnesota (just north across the Minnesota River from Granite Falls). Bat fatalities result from wind turbine strikes as they feed on insects at night. The heat from the wind turbines attract insects and therefore bring the bats close to the wind turbine. With decreasing bat populations, the gathering of necessary bat data is crucial for this proposed site. Threatened and Endangered bat species become at risk in wind farm areas. Populations of bat species are experiencing long-term declines, due in part to habitat loss and fragmentation, invasive species, and numerous anthropogenic impacts, increasing the concern over the potential effects of energy development. All studies of bat impacts have demonstrated that fatalities peak in late summer and early fall, coinciding with the migration of many species (Johnson 2005; Kunz et al. 2007a; Arnett et al. 2008). A smaller spike in bat fatalities occurs during spring migration for some species at some facilities (Arnett et al. 2008). However, the seasonal fatality peaks noted above may change as more facilities are developed and studied.

Study Area

The study area is located within Chippewa County, Minnesota (just north across the Minnesota River from Granite Falls). The study area lies within the Des Moines Lobe Western Corn Belt Plains (47b) ecoregion of Minnesota. This ecoregion consists of fast fertile plain of deep soils dominated by row crops. The boundaries of the Minnesota River Prairie Subsection coincide with large till plains flanking the Minnesota River. The unit is bounded to the southwest by the Prairie Coteau. A series of moraines define the eastern boundary, the Alexandria Moraine to the northeast and the Bemis moraine to the southeast (Minnesota 2016).

The Minnesota River Prairie is a large subsection that includes part of northwestern Iowa and spreads across southwestern Minnesota into eastern South Dakota. The Minnesota River forms a broad valley, dividing the area in half. This valley once had a continuous band of floodplain forest that extended upstream as far as Lac Qui Parle, with highly unique bedrock exposures. There are 150 lakes larger than 160 acres in the subsection, most of which are shallow. Before settlement by people of European descent, the predominant vegetation was tallgrass prairie and wetlands. Fire was once a common natural disturbance and critical to maintaining native prairie communities (Minnesota, 2016).

Today, row-crop agriculture is the predominant land use, and prairie remnants and floodplain forests are rare. A major concern is impacts on water quality from intensive agricultural activities, including use of fertilizers and pesticides, expanding use of pattern tiling, and ditching and draining of small wetlands. Continued loss of the small amount of native upland habitat and over-intensive grazing remain a concern (Minnesota, 2016).



Figure 1: Vicinity map of study area. Chippewa county is located in southwestern Minnesota.

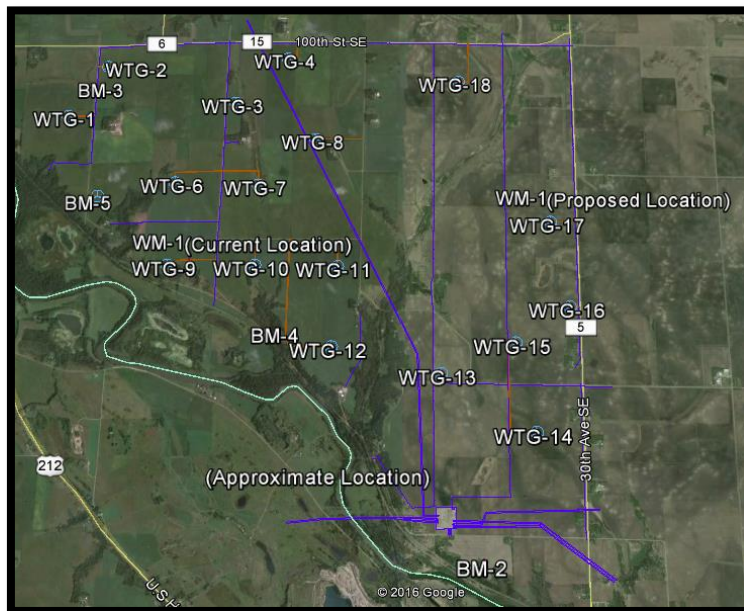


Figure 2: Project location along with bat monitor (BM) locations. BM-1 is not shown on the map but lies next to BM-2.

Methods

Data was gathered in the field by Fagen Engineering, LLC within the study area from five different Anabat acoustic recorders (map in Study Area section shows locations of monitors). Monitors 1 & 2 gathered data throughout the fall of 2015 and were deployed again in May of 2016. Monitors 3-5 were added in September of 2016.

Monitors 1 & 2 were deployed on September 13, 2015 and removed on October 11, 2015. They were deployed again on April 12, 2016 then removed on October 15. Monitor 3, monitor 4 and monitor 5 were deployed on August 3rd, 2016 then removed on October 15th, 2016. The monitors were deployed for 287 trap nights

The data was uploaded through the Procore portal where New Century Environmental staff could access the data to download and process through a program called Kaleidoscope Pro version 3.1.8. The Kaleidoscope classifier uses a source library of user submitted reference calls to compare to recordings. It accepts and displays full-spectrum signals, to match with the calls known bat species. The software uses a presence/absence indicator by giving each species of bat a p-Value of 0 to 1. The lower the P-Value, the more likely the species is present. Variability in the quality of recordings and variations in calls among individual bats creates challenges to acoustic bat classification.

Kaleidoscope Pro has been approved by the U.S. Fish & Wildlife Service for use for presence/absence analysis for Indiana bats (*Myotis sodalis*). Similarly, the approved programs may also be used for presence/absence analysis for northern long-eared bats (*Myotis septentrionalis*). The U.S Geological Survey also tested acoustic matching programs and Kaleidoscope Pro passed their standard validation process (USFWS 2016).

Results

From the five Anabat recording systems, 232,116 sound files were recorded. Visual examination and filtering of files to eliminate extraneous noise (e.g., wind, insects, etc.) resulted in a total of 14,442 bat detections.

Monitor 1 recorded 3,181 files that Kaleidoscope Pro was able to classify as bat passes. The silver haired bat was the most common species at this site being 62% of total detections. The big brown bat was the second most common being 13% of total detections. The federally threatened northern long-eared myotis was detected 4 times (0.001%), but had a P-value of 1 which almost certainly means it was nonexistent at this site. The eastern pipistrelle had a total of 55 (2%) detections.

| Code | Common name | Scientific Name | Conservation status | P-Value | # of passes |
|------|----------------------------|----------------------------------|-----------------------|---------|-------------|
| LANO | Silver-Haired Bat | <i>Lasionycteris noctivagans</i> | Least concern | 0 | 1971 |
| EPFU | Big-Brown Bat | <i>Eptesicus fuscus</i> | Least concern | 0 | 427 |
| LACI | Hoary Bat | <i>Lasiurus cinereus</i> | Least concern | 0 | 347 |
| LABO | Eastern Red Bat | <i>Lasiurus borealis</i> | Least concern | 0 | 158 |
| MYLU | Little Brown Bat | <i>Myotis lucifugus</i> | Least concern | 0 | 219 |
| MYSE | Northern long-eared myotis | <i>Myotis septentrionalis</i> | Federally threatened | 1 | 4 |
| PESU | Eastern pipistrelle | <i>Perimyotis subflavus</i> | MN species of concern | 0 | 55 |

Figure 3: Summary of species diversity and abundance for monitor 1.

Monitor 2 recorded 3,004 files that Kaleidoscope Pro was able to classify as bat passes. The silver haired bat was the most common species at this site being 57% of total detections. The second most common was the hoary bat at 30% of detections. The federally threatened northern long eared myotis only had a total of 2 (0.0007%) detections but had a P-value of 1. The eastern pipistrelle had a total of 14 (0.005%) detections.

| Code | Common name | Scientific Name | Conservation status | P-Value | # of passes |
|------|----------------------------|----------------------------------|-----------------------|---------|-------------|
| LANO | Silver-Haired Bat | <i>Lasionycteris noctivagans</i> | Least concern | 0 | 1717 |
| EPFU | Big-Brown Bat | <i>Eptesicus fuscus</i> | Least concern | 0 | 167 |
| LACI | Hoary Bat | <i>Lasiurus cinereus</i> | Least concern | 0 | 887 |
| LABO | Eastern Red Bat | <i>Lasiurus borealis</i> | Least concern | 0 | 165 |
| MYLU | Little Brown Bat | <i>Myotis lucifugus</i> | Least concern | 0.14 | 52 |
| MYSE | Northern long-eared myotis | <i>Myotis septentrionalis</i> | Federally threatened | 1 | 2 |
| PESU | Eastern pipistrelle | <i>Perimyotis subflavus</i> | MN species of concern | 0.01 | 14 |

Figure 4: Summary of species abundance and diversity for monitor 2

Monitor 3 recorded 4,870 files that Kaleidoscope Pro was able to classify as bat passes. The hoary bat was the most common species at this site being 75% of total detections. The second most common was the silver haired bat being 8% of total detections. The northern long eared bat had only 1 (0.0002%) detections with a p-value of 1. The eastern pipistrelle had a total of 64 (1%) detections.

| Code | Common name | Scientific Name | Conservation status | P-Value | # of passes |
|------|----------------------------|----------------------------------|-----------------------|---------|-------------|
| LANO | Silver-Haired Bat | <i>Lasionycteris noctivagans</i> | Least concern | 0.34 | 401 |
| EPFU | Big-Brown Bat | <i>Eptesicus fuscus</i> | Least concern | 0 | 263 |
| LACI | Hoary Bat | <i>Lasiurus cinereus</i> | Least concern | 0 | 3672 |
| LABO | Eastern Red Bat | <i>Lasiurus borealis</i> | Least concern | 0 | 306 |
| MYLU | Little Brown Bat | <i>Myotis lucifugus</i> | Least concern | 0 | 163 |
| MYSE | Northern long-eared myotis | <i>Myotis septentrionalis</i> | Federally threatened | 1 | 1 |
| PESU | Eastern pipistrelle | <i>Perimyotis subflavus</i> | MN species of concern | 0 | 64 |

Figure 5: Summary of species diversity and abundance for monitor 3

Monitor 4 recorded 1,512 files Kaleidoscope Pro classified as bat passes. The most common species at this site was the silver-haired bat being 46% of total detections. The second most common was the hoary bat being 26% of total detections. The northern long-eared myotis was not recorded at this site. The eastern pipistrelle had a total of 59 (4%) detections.

| Code | Common name | Scientific Name | Conservation status | P-Value | # of passes |
|------|----------------------------|----------------------------------|-----------------------|---------|-------------|
| LANO | Silver-Haired Bat | <i>Lasionycteris noctivagans</i> | Least concern | 0 | 688 |
| EPFU | Big-Brown Bat | <i>Eptesicus fuscus</i> | Least concern | 0 | 143 |
| LACI | Hoary Bat | <i>Lasiurus cinereus</i> | Least concern | 0 | 390 |
| LABO | Eastern Red Bat | <i>Lasiurus borealis</i> | Least concern | 0 | 129 |
| MYLU | Little Brown Bat | <i>Myotis lucifugus</i> | Least concern | 0 | 103 |
| MYSE | Northern long-eared myotis | <i>Myotis septentrionalis</i> | Federally threatened | 1 | 0 |
| PESU | Eastern pipistrelle | <i>Perimyotis subflavus</i> | MN species of concern | 0 | 59 |

Figure 6: Summary of species diversity and abundance for monitor 4

Monitor 5 recorded 1,875 files Kaleidoscope Pro classified as bat passes. The most common species at this site was the silver haired bat being 46% of total detections. The second most common was the hoary bat with being 21%) of total detections. The northern long-eared myotis had a total of 2 (0.001%) detections. The eastern pipistrelle had a total of 70 (4%) detections.

| Code | Common name | Scientific Name | Conservation status | P-Value | # of passes |
|------|----------------------------|----------------------------------|-----------------------|---------|-------------|
| LANO | Silver-Haired Bat | <i>Lasionycteris noctivagans</i> | Least concern | 0 | 871 |
| EPFU | Big-Brown Bat | <i>Eptesicus fuscus</i> | Least concern | 0 | 316 |
| LACI | Hoary Bat | <i>Lasiurus cinereus</i> | Least concern | 0 | 403 |
| LABO | Eastern Red Bat | <i>Lasiurus borealis</i> | Least concern | 0 | 138 |
| MYLU | Little Brown Bat | <i>Myotis lucifugus</i> | Least concern | 0 | 75 |
| MYSE | Northern long-eared myotis | <i>Myotis septentrionalis</i> | Federally threatened | 1 | 2 |
| PESU | Eastern pipistrelle | <i>Perimyotis subflavus</i> | MN species of concern | 0 | 70 |

Figure 7: Summary of species diversity and abundance for monitor 5.

Discussion

There are seven species of bats that occur regularly in Minnesota; our most common species, the little brown myotis, occurs over most of North America. Along with the Northern myotis and big brown bat, it hibernates in Minnesota caves and mines. In summer, they roost in caves, mines, hollow trees, and buildings. Large groups of these bats hang upside-down in caves. The eastern pipistrelle is the smallest species, weighing only two-tenths of an ounce. It is found in the same Minnesota caves and mines, though it is less common and in fewer numbers.

The silver-haired bat and Eastern red bat are forest dwellers that usually live near water and feed among the trees. Usually a red bat pair will repeatedly fly the same route in search of food. Another woodland species is the hoary bat. It is the largest Minnesota bat, weighing an ounce or more. All three species are somewhat solitary, roost in trees, and migrate south for the winter (Minnesota, 2016).

In early July 2016, a species previously not known to be native to Minnesota, the evening bat, was discovered. Researchers from the DNR Nongame Wildlife Program and Central Lakes College were conducting a survey as part of a project to study summer breeding habits of the state’s forest bats. The bat was captured at the Minnesota Army National Guard’s Training Site in Arden Hills.

All seven bat species that occur in Minnesota may be found throughout the state.

| Common name | Scientific Name | State Status | Federal Status |
|----------------------------|----------------------------------|--------------------|----------------|
| Northern long-eared myotis | <i>Myotis septentrionalis</i> | Threatened | Threatened |
| Eastern Pipistrelle | <i>Pipistrellus subflavus</i> | MN species concern | Not listed |
| Little brown bat | <i>Myotis lucifugus</i> | Not listed | Not listed |
| Big brown bat | <i>Eptesicus fuscus</i> | Not listed | Not listed |
| Silver-haired bat | <i>Lasionycteris noctivagans</i> | Not listed | Not listed |
| Eastern red bat | <i>Lasiurus borealis</i> | Not listed | Not listed |
| Hoary bat | <i>Lasiurus cinereus</i> | Not listed | Not listed |
| Evening bat | <i>Nycticeius humeralis</i> | Newly discovered | Not listed |

Figure 8: Bat species found in Minnesota with federal and state conservation status.

There were a total of six bat species documented throughout the course of the study (September-October 2015 and 2016). The eastern pipistrelle (*Pipistrellus subflavus*) was documented at this site and is listed as a species of concern in the state of Minnesota. It was detected in small numbers but was found at every monitor except for monitor 1. The northern long-eared myotis (*Myotis septentrionalis*) is a federally threatened species whose home range lies within the study site. However no confirmed documentation was recorded here. Even though a total of five clicks of which Kaleidoscope classified as MYSE (northern long-eared myotis) the P-value was given a 1 for every monitor indicating the likelihood of presence is near non-existent. All other species documented are of least concern. Of the six species documented the silver-haired bat (*Lasionycteris noctivagans*), hoary bat (*Lasiurus cinereus*) and big brown bat (*Eptesicus fuscus*) were among the most common followed by the little brown bat (*Myotis lucifugus*) and eastern red bat (*Lasiurus borealis*).

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Appendix

Summary Graphs

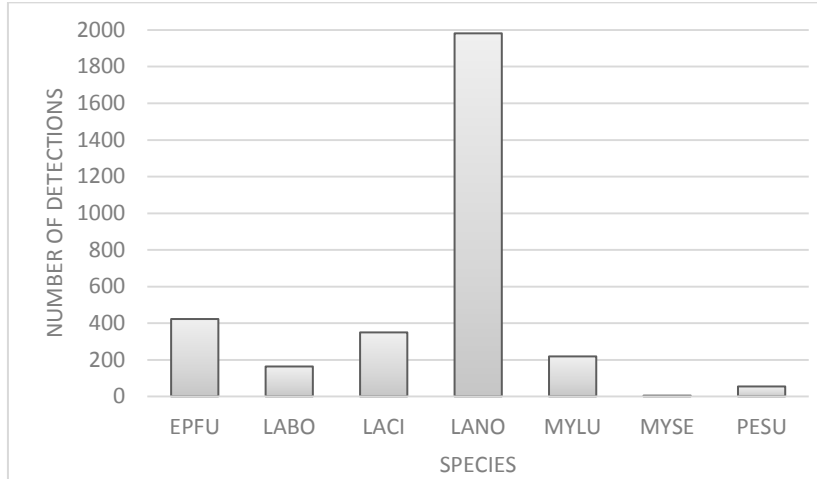


Figure 9.1: Total number of bat detections by species for monitor 1

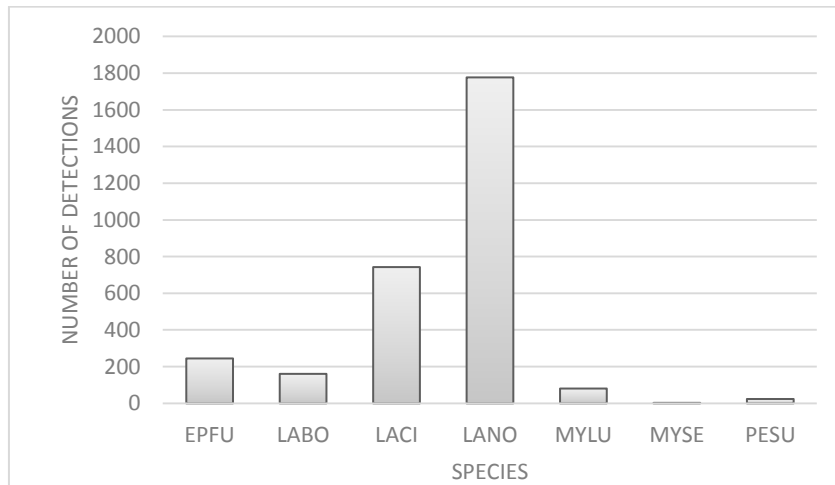


Figure 9.2: Total number of bat detections by species for monitor 2

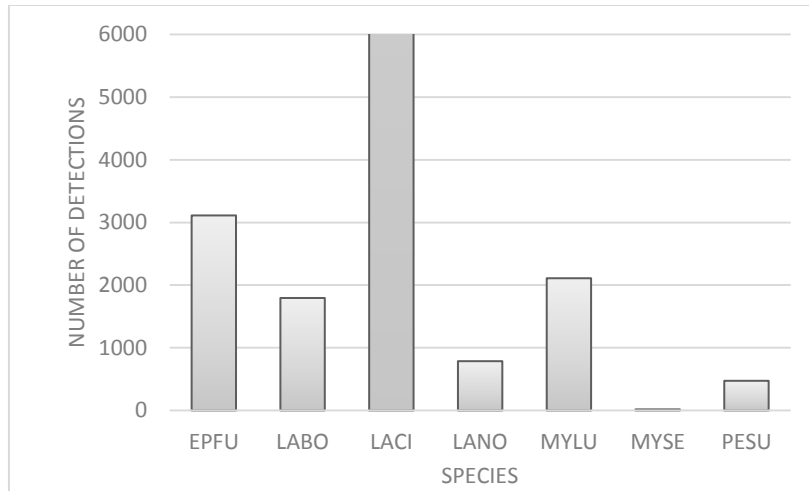


Figure 9.3: Total number of bat detections by species for monitor 3

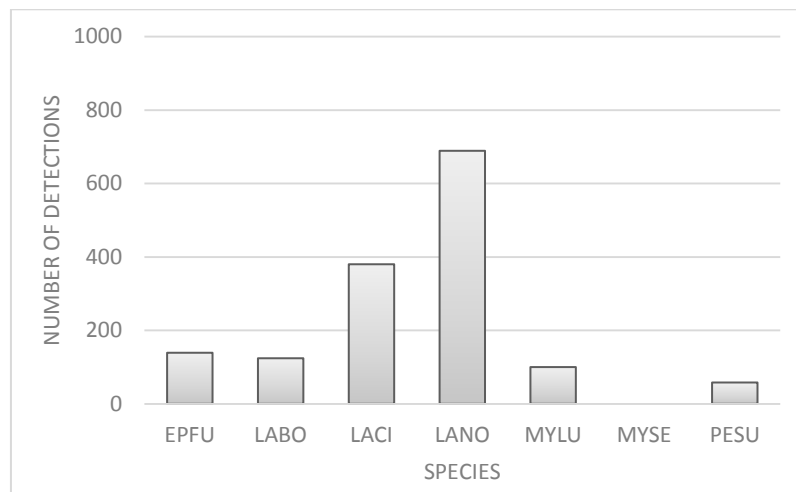


Figure 9.4: Total number of bat detections by species for monitor 4

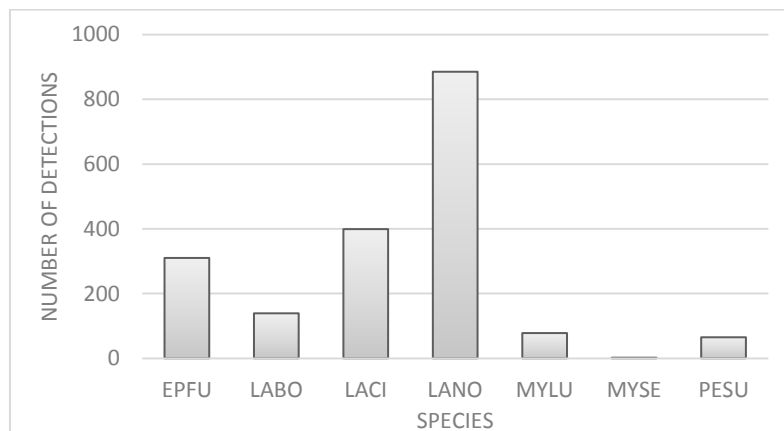


Figure 9.5: Total number of bat detections by species for monitor 5

Kaleidoscope Data

KALEIDOSCOPE 3.1.8

Bats of North America 3.1.0 S/A:+1

| Monitor 1 | | | |
|------------|---------|------------|------------------|
| | Species | Detections | Presence p-value |
| Fall 2015 | EPFU | 123 | 0.95 |
| | LABO | 41 | 0 |
| | LACI | 144 | 0 |
| | LANO | 725 | 0 |
| | MYLU | 45 | 0 |
| | MYSE | 0 | 1 |
| | PESU | 10 | 0 |
| 5/28/2016 | EPFU | 118 | 0.77 |
| | LABO | 34 | 0 |
| | LACI | 104 | 0 |
| | LANO | 670 | 0 |
| | MYLU | 39 | 0 |
| | MYSE | 0 | 1 |
| | PESU | 8 | 0 |
| 9/2/2016 | EPFU | 91 | 0 |
| | LABO | 46 | 0 |
| | LACI | 53 | 0 |
| | LANO | 194 | 0 |
| | MYLU | 96 | 0 |
| | MYSE | 2 | 1 |
| | PESU | 23 | 0 |
| 10/7/2016 | EPFU | 92 | 0 |
| | LABO | 34 | 0 |
| | LACI | 38 | 0 |
| | LANO | 377 | 0 |
| | MYLU | 39 | 0 |
| | MYSE | 0 | 1 |
| | PESU | 14 | 0 |
| 10/15/2016 | EPFU | 3 | 0.33 |
| | LABO | 3 | 0 |
| | LACI | 8 | 0 |
| | LANO | 5 | 0.46 |
| | MYLU | 0 | 1 |
| | MYSE | 0 | 1 |
| | PESU | 0 | 1 |

| Monitor 2 | | | |
|------------|---------|------------|------------------|
| | Species | Detections | Presence p-value |
| Fall 2015 | EPFU | 33 | 0.22 |
| | LABO | 31 | 0 |
| | LACI | 38 | 0 |
| | LANO | 148 | 0 |
| | MYLU | 15 | 0 |
| | MYSE | 1 | 1 |
| | PESU | 0 | 1 |
| 5/28/2016 | EPFU | 9 | 1 |
| | LABO | 8 | 0 |
| | LACI | 29 | 0 |
| | LANO | 167 | 0 |
| | MYLU | 9 | 0 |
| | MYSE | 0 | 1 |
| | PESU | 2 | 0.08 |
| 9/2/2016 | EPFU | 108 | 1 |
| | LABO | 84 | 0 |
| | LACI | 631 | 0 |
| | LANO | 1085 | 0 |
| | MYLU | 20 | 0 |
| | MYSE | 1 | 1 |
| | PESU | 9 | 0.01 |
| 10/7/2016 | EPFU | 17 | 1 |
| | LABO | 41 | 0 |
| | LACI | 189 | 0 |
| | LANO | 313 | 0 |
| | MYLU | 8 | 0.14 |
| | MYSE | 0 | 1 |
| | PESU | 3 | 0.33 |
| 10/15/2016 | EPFU | 0 | 1 |
| | LABO | 1 | 0.10 |
| | LACI | 0 | 1 |
| | LANO | 4 | 0 |
| | MYLU | 0 | 1 |
| | MYSE | 0 | 1 |
| | PESU | 0 | 1 |

| Monitor 3 | | | |
|------------|---------|------------|------------------|
| | Species | Detections | Presence p-value |
| 9/2/2016 | EPFU | 2 | 1 |
| | LABO | 0 | 1 |
| | LACI | 208 | 0 |
| | LANO | 0 | 1 |
| | MYLU | 0 | 1 |
| | MYSE | 0 | 1 |
| | PESU | 0 | 0 |
| 10/7/2016 | EPFU | 260 | 0 |
| | LABO | 303 | 0 |
| | LACI | 3463 | 0 |
| | LANO | 399 | 1 |
| | MYLU | 163 | 0 |
| | MYSE | 1 | 1 |
| | PESU | 69 | 0 |
| 10/15/2016 | EPFU | 1 | 0.77 |
| | LABO | 3 | 0 |
| | LACI | 1 | 0.09 |
| | LANO | 2 | 0.34 |
| | MYLU | 0 | 1 |
| | MYSE | 0 | 1 |
| | PESU | 0 | 1 |

| Monitor 4 | | | |
|------------|---------|------------|------------------|
| | Species | Detections | Presence p-value |
| 9/2/2016 | EPFU | 96 | 0 |
| | LABO | 82 | 0 |
| | LACI | 309 | 0 |
| | LANO | 289 | 0 |
| | MYLU | 85 | 0 |
| | MYSE | 0 | 1 |
| | PESU | 34 | 0 |
| 10/7/2016 | EPFU | 46 | 1 |
| | LABO | 47 | 0 |
| | LACI | 84 | 0 |
| | LANO | 397 | 0 |
| | MYLU | 18 | 0 |
| | MYSE | 0 | 1 |
| | PESU | 25 | 0 |
| 10/15/2016 | EPFU | 1 | 0.69 |
| | LABO | 0 | 1 |
| | LACI | 0 | 1 |
| | LANO | 2 | 0.16 |
| | MYLU | 0 | 1 |
| | MYSE | 0 | 1 |
| | PESU | 0 | 1 |

| Monitor 5 | | | |
|------------------|---------|------------|------------------|
| | Species | Detections | Presence p-value |
| 9/2/2016 | EPFU | 130 | 0 |
| | LABO | 79 | 0 |
| | LACI | 162 | 0 |
| | LANO | 427 | 0 |
| | MYLU | 58 | 0 |
| | MYSE | 2 | 1 |
| | PESU | 40 | 0 |
| 10/7/2016 | EPFU | 186 | 0 |
| | LABO | 58 | 0 |
| | LACI | 239 | 0 |
| | LANO | 444 | 0 |
| | MYLU | 17 | 0 |
| | MYSE | 0 | 1 |
| | PESU | 27 | 0 |
| 10/15/2016 | EPFU | 1 | 1 |
| | LABO | 0 | 0.61 |
| | LACI | 2 | 0 |
| | LANO | 0 | 1 |
| | MYLU | 0 | 1 |
| | MYSE | 0 | 1 |
| | PESU | 3 | 0 |

Species Descriptions

Silver Haired Bat

The silver-haired bat (*Lasionycteris noctivagans*) is a solitary migratory species and the only member of the genus *Lasionycteris*. They are found in Bermuda, Canada, Mexico and the United States. They often roost in tree cavities or in bark crevices on tree trunks, especially during migration. This medium-sized bat is mostly black (including the wings, ears, interfemoral membrane, and fur) with white-tipped hairs. The basal upper half of its tail membrane is densely furred. This gives the bat a frosted appearance for which it is named. This species has a flattened skull with a broad rostrum. This species weighs around 8–12 g, has a total length of ~100 mm, a tail length of 40 mm, and a forearm length of 37–44 mm. Silver-haired bats consume primarily soft-bodied insects, such as moths, but will also take spiders and harvestmen. This species will forage low, over both still and running water, and also in forest openings. Silver-haired bats are slow but maneuverable flyers that typically detect prey only a short distance away. In addition to the hoary bat (*Lasiurus cinereus*) and eastern red bat (*Lasiurus borealis*), the silver-haired bat is one of the three tree bat species most commonly killed at wind energy facilities (over 75% of the mortalities).

Big Brown Bat

The big brown bat (*Eptesicus fuscus*) is native to North America, Central America, the Caribbean, and extreme northern South America. This medium-sized bat ranges from 10–13 cm in body length, with a wingspan 28-33, and weighs between 14-16 g. The fur is moderately long and shiny brown. The wing membranes, ears, feet, and face are dark brown to blackish in color. Big brown bats roost during the day in hollow trees, beneath loose tree bark, in the crevices of rocks, or in man-made structures such as attics, barns, old buildings, eaves and window shutters. Big brown bats are insectivorous, eating many kinds of night-flying insects including moths, beetles, and wasps.

Hoary Bat

The hoary bat (*Lasiurus cinereus*) is a species of bat in the vesper bat family, Vespertilionidae. It occurs throughout most of North America and much of South America. The hoary bat averages 13-14.5 cm long with a 40 cm wingspan and a weight of 26 g. Its coat is dark brown and the hairs on the back are frosted with silver. The body is covered in fur except for the undersides of the wings. This species normally roosts alone on trees, hidden in the foliage, but on occasion has been seen in caves with other bats. It prefers woodland, mainly coniferous forests, but hunts over open areas or lakes. It hunts alone and its main food source is moths. The bat is migratory and may travel from Canada as far south as the southern United States or Bermuda.

Eastern Red Bat

The eastern red bat (*Lasiurus borealis*) is widespread across eastern North America, with additional records in Bermuda. This is a medium-sized bat, averaging weights of 9.5-14 g and measurements of 112.3 mm in total length. Adults are usually dimorphic: males have red hair while females are chestnut-colored with whitish frosting on the tips of the fur. Moths form the majority of the diet, but red bats also prey on beetles, flies, and other insects.

Eastern Pipistrelle

The Eastern Pipistrelle (*Perimyotis subflavus*) is found commonly in the eastern portion of the United States, but extends into southeastern Nebraska. This reddish, yellowish and brownish bat is one of the smallest bats in the eastern part of the US. The forearms are orange to red while the wing membrane is black. Adults weigh between 4-10g and reach a forearm length of 30-35mm. These bats feed on small insects on the edges of forested areas, rivers, streams or open water.

Little Brown Bat

The Little Brown Bat (*Myotis lucifugus*) is found throughout much of North America. It is most common in the northern half of the continental United States and Southern Canada. The bat's fur is dark brown and glossy on the back with slightly paler, greyish fur underneath. Wing membranes are dark brown on a typical wingspan of 22–27 cm. Ears are small and black with a short, rounded tragus. Adult bats are typically 6–10 cm long and weigh 5–14g. Since many of their preferred meals are insects with an aquatic life stage, such as mosquitoes, they prefer to roost and forage near water.

