Draft Black Oak & Getty Wind Avian and Bat Protection Plan

Black Oak Wind, LLC &
Getty Wind Company, LLC
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1.0 INTRODUCTION

The Black Oak / Getty Wind Farm (the Projects) ABPP provides strategy on mitigating risks to birds and bats during the construction and operation phases of the Projects. As part of these Projects' due diligence, this ABPP is created as documentation of reasonable and prudent measures instituted to prevent or minimize avian and bat mortality. Specifically, this document describes a program that identifies monitoring and mitigation protocols for impacts to affected species while considering the content of:

- ABPP white paper developed by the U.S. Fish and Wildlife Service (USFWS 2010a);
- Suggested Practices for Avian Protection On Power Lines: The State of the Art in 2006 (Appendix C Avian Protection Plan Guidelines) Edison Electric Institute, Avian Power Line Interaction Committee;
- Avian Surveys for the Paynesville Wind Resource Area, Stearns County, Minnesota, Hamer Environmental, 2010;
- Acoustic Bat Studies for the Paynesville-Zion Wind Resource Area Stearns County, MN, Hamer Environmental, 2010;
- Avian Monitoring Studies at the Buffalo Ridge, Minnesota Wind Resource Area: Results of a 4-year study. Johnson et al. 2000;
- *Bat Interactions with Wind Turbines at the Buffalo Ridge, Minnesota Wind Resource area: An Assessment of Bat Activity, Species Composition, and Collision Mortality,* EPRI, Palo Alto, CA and Xcel Energy, Minneapolis, MN: 2003;
- U.S. Fish and Wildlife Service Draft Land-Based Wind Energy Guidelines: *Recommendations on measures to avoid, minimize, and compensate for effects to fish, wildlife, and their habitats. Draft September 13, 2011; and*
- Summary of Post-Construction Monitoring at Wind Projects Relevant to Minnesota, Identification of Data Gaps, and Recommendations for Further Research Regarding Wind-Energy Development in Minnesota; Prepared for State of Minnesota Department of Commerce. Poulton, 2010.

2.0 PURPOSE

This document has been developed for the Black Oak and Getty Wind Farms to ensure compliance with the regulatory framework outlined in Section 4 of this document. It incorporates recommendations made by the Minnesota Department of Natural Resources (DNR) and the USFWS. It further provides (1) guidance on mitigating the risks to birds and bats during the construction and operation of the Projects, and (2) incorporates a framework for complying federal and state laws and meeting the proposed conditions of the Projects' site permits under consideration by the Minnesota Public Utilities Commission (MPUC). The processes and procedures set forth are designed to ensure:

1. Avian and bat fatalities and secondary effects on wildlife are minimized at the Projects' sites;

2. Project-related actions comply with federal and state wildlife regulations;

3. The proposed wildlife-related conditions contained in the MPUC site permits will be fulfilled;

4. Bird and bat injuries and fatalities are effectively documented to provide a basis for ongoing development of avian protection procedures;

5. Ongoing surveys, monitoring and management efforts are undertaken to avoid and minimize adverse wildlife impacts throughout all phases of the projects;

6. Adequate implementation training is provided to the Construction Contractor and Operations and Maintenance staff;

7. Coordination between the Projects, wildlife agencies, Minnesota Department of Commerce Energy Facilities Planning Staff (EFP Staff) and the MPUC is effective and continuous.

3.0 PROJECT DESCRIPTION

The Black Oak and Getty Wind Farms collectively constitute an 82 megawatt (MW) wind energy facility, with Black Oak contributing 42 MW (up to 26 turbines) and Getty contributing 40 MW (up to 26 turbines). The combined Projects make up a 14,664 acre (approximately 22 square miles) site located in Stearns County, Minnesota. Both projects have elected to jointly develop this ABPP because of their proximity to better facilitate the cumulative impacts they may have on the avian and bat species in the area. The projects may be built concurrently or separately. The Getty Wind Farm is located within both Sauk Centre and Getty Townships, and its project boundary encompasses approximately 7,600 acres. The Black Oak Wind Farm is located within Ashley and Raymond Townships, and its project boundary encompasses approximately 7,064 acres. The Projects may share a common substation and transmission line. Both Projects will also include collection systems, permanent meteorological towers, SODAR or LIDAR weather monitoring station, an operations and maintenance facility, either shared or joined, substation, transmission line, and associated roads. Table 1 identifies the PLSS locations within both Projects' boundaries. See Figure 1 at the end of this document for a map of the Black Oak and Getty Wind project vicinity.

Table 1: Project Sites PLSS locations

Project Name	County	Township Name	Township	Range	Section(s)
Black Oak	Stearns	Ashley	126N	35W	25-27, 34-36
Black Oak	Stearns	Raymond	125N	35W	1-3, 11-14, 23
Getty	Stearns	Getty	125N	35W	4-9, 16-21
Getty	Stearns	Sauk Centre	126N	35W	29-33

3.1 ENVIRONMENTAL SETTING, LAND USE AND COVER

The Black Oak and Getty Wind Farms and transmission line are located on the eastern edge of the Minnesota River Prairie Subsection of the Prairie Parkland Province and the Hardwood Hills Subsection of the Eastern Broadleaf Forest Province of the Minnesota DNR's Ecological Classification System. The Minnesota River Prairie is a large subsection that includes part of northwestern Iowa and spreads across southwestern Minnesota and into eastern South Dakota. The Hardwood Hills Subsection lies within the Mississippi flyway, within which lies the prairie pothole region and with the associated wetlands. This region provides breeding habitat for the North American and neotropical migratory waterfowl and waterbird species (whereas much of the rest of the state of Minnesota provides breeding habitat for forest and prairie passerine and raptor species).

3.2 LAND USE AND LAND COVER

The Black Oak and Getty Wind Farms as well as their transmission line are located on the eastern edge of the Minnesota River Prairie Subsection of the Prairie Parkland Province and the Hardwood Hills Subsection of the Eastern Broadleaf Forest Province of the Minnesota DNR's Ecological Classification System. The Minnesota River Prairie is a large subsection that includes part of northwestern Iowa and spreads across southwestern Minnesota and into eastern South Dakota. The Hardwood Hills Subsection lies within the Mississippi flyway, within which lies the prairie pothole region and with the associated wetlands. This region provides breeding habitat for North American and neotropical migratory waterfowl and waterbird species (whereas much of the rest of the state of Minnesota provides breeding habitat for forest and prairie passerine and raptor species).

Land use in this area is entirely rural with an agricultural-based economy and the Projects' facilities are sited primarily within agricultural land. Typical land cover includes agricultural or cropped fields, grasslands, isolated wetlands and small woodlots. The shared transmission line corridor is located primarily along agricultural field edges with the primary boundary being the roadway. Farmsteads are scattered along the relatively flat to gently rolling topography typically classified as rural open space. Farmsteads are typically encircled by isolated groves of deciduous and coniferous trees which function as windbreaks or windrows; the groves were established by landowners to prevent erosion and to shelter dwellings.

Lakes, wetlands, and ditches that attract waterfowl are encompassed within both Projects' boundaries. Several Waterfowl Production Areas (WPAs) and Wildlife Management Areas (WMAs) are located within or near the Projects' boundaries. Corn, soybeans, small grains and forage crops are grown throughout Stearns County, and much of the soil within both Projects is considered prime farmland by the U.S. Department of Agriculture Natural Resource Conservation Service (USDA NRCS). Some of the wetlands within both Projects are associated with creeks and unnamed intermittent streams, as well as isolated basins. Grasslands within both Project boundaries also provide habitat used by TES or SGCN species such as Wilson's phalarope, marbled godwit, and upland sandpiper. Woodlots and human structures can also provide roosting habitat for several bat species present in this region of the state.

4.0 REGULATORY FRAMEWORK

4.1 ENVIRONMENTAL LAW COMPLIANCE

There are Federal, State and Local environmental regulations that the projects are governed by; the following sections outline these regulations. The Projects intent is to comply with all of these regulations. This document is a guide by which construction and operations staff will be able to identify if they are or are not in compliance with them. Of particular note to the Projects is the State of Minnesota's Wind Siting Act (MN Statute 216F), discussed in Section 4.2 below. This act provides that the site permit application is the environmental document for the wind farm with no other environmental document required by state or local governments (i.e. an Environmental Assessment, Environmental Assessment Worksheet or an Environmental Impact Statement). A site permit application to the Minnesota Public Utilities Commission under this act is the source of most of the operational conditions and protocol that define standard procedures at the Projects. The County of Stearns, MN will have oversight of the routing of the projects' transmission line, under its Essential Services ordinance (Section 9).

4.2 STATE OF MINNESOTA SITE PERMITTING

The Wind Siting Act of Minnesota (Minnesota Statute 216F) requires that a site permit is issued from the Minnesota Public Utilities Commission (MPUC) in order to build and operate a large wind energy conversion system (LWECS). LWECS is defined as "any combination of [wind energy conversions system] with a combined nameplate capacity of 5,000 kilowatts or more." According to the Statute, the siting of LWECS must be compatible with environmental preservation, sustainable development, and the efficient use of resources (MN Stat. 216F.03). Further, the criteria considered by the MPUC in designating LWECS sites must include the impact of LWECS on humans and the environment (MN Stat 215F.05).

4.3 ENDANGERED SPECIES ACT OF 1973

In accordance with Section 7 of the Endangered Species Act (ESA) of 1973, actions that have a federal nexus such as involvement of federal land, federal funding or major federal permits necessitates consultation with the USFWS. The consultation may be either information or formal depending on the affects determination made by the lead federal agency. If it is determined in the Biological Assessment that the effects are "no affect" or "may affect, not likely to adversely affect" the consultation can be completed informally. If the determination is "may affect," or "likely to adversely affect", then the USFWS will write a Biological Opinion. Neither the Projects nor the transmission line involve federal funding, land or major permitting, and therefore, they do not trigger consultation under Section 7. However, the Projects have worked with USFWS and other wildlife agencies to address concerns; these interactions are discussed in Appendix C of this document.

Section 9 of the Endangered Species Act (ESA) provides protection for rare and migratory wildlife, specifically under three types of species designations: *endangered, threatened and candidate*. Under the *endangered* and *threatened* designations, it is unlawful for anyone to *take* an endangered listed species. Take includes, but is not limited to, harassing, harming, pursuing, hunting, shooting, wounding, trapping, killing, capturing or collecting protected species within the United States and its territorial seas. *Take* also extends to threatened species per 50 C.F.R. §§ 17.31 and 17.21. More specifically, *harm* in the definition of *take* means,

> "…an act which actually kills or injures wildlife [including] habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering." (50 C.F.R. 17.3)

Candidate species are not statutorily protected under the ESA because their listing is hindered by higher-priority listing activities. These species include both animals and plants that carry significant risk factors to deem them as endangered or threatened by the USFWS.

4.4 MIGRATORY BIRD TREATY ACT

The Migratory Bird Treaty Act (MBTA) is a statute that protects 1,006 bird species within the United States, making it unlawful to pursue, capture, kill, or possess any migratory bird or part, nest, or egg of any such bird listed in wildlife protection treaties between the United States, Great Britain, Mexico, Japan, and Russia (and several other countries of the former Soviet Union). Most birds (outside of introduced species and non-migratory game birds) within the US and the Project areas are protected under the MBTA. This protection extends to most avian species, except non-migratory game birds such as pheasants, grouse, quail, or any species introduced into the U.S. such as pigeons and house sparrows. More specifically, the Act prohibits activities that, in effect, result in direct taking or nest destruction, and not habitat. The MBTA protects from activities that "pursue, hunt, take, capture, kill, attempt to take, capture or kill, possess, offer for sale, sell, offer to purchase, purchase, deliver for shipment, ship, cause to be shipped, deliver for transportation, transport, cause to be transported, carry, or cause to be carried by any means whatsoever, receive for shipment, transportation or carriage, or export, at any time, or in any manner, any migratory bird, included in the terms of this Convention…for the protection of migratory birds…or any part, nest, or egg of any such bird," (16 USC 703), unless these activities are permitted by regulatory means.

Because the MBTA is a strict liability statute, proof of intent to harm or kill a migratory bird is not required for an action to be considered a criminal offense. Thus, the USFWS is able to exercise its jurisdiction and prosecute persons and entities that in good faith failed to adequately consult with the agency and develop reasonable measures to prevent the incidental take of migratory birds. Both Projects have engaged in extensive, early consultation with relevant wildlife agencies, which has aided in the reduction of potential risk of MBTA prosecution in future.

4.5 BALD AND GOLDEN EAGLE PROTECTION ACT

The federal Bald and Golden Eagle Protection Act of 1940 (BGEPA; 16 USC 668–668c, as amended) is administered by the USFWS and was enacted to protect bald and golden eagles, their nests, eggs, and parts (e.g., feathers or talons). The BGEPA states that no person shall take, possess, sell, purchase, barter, offer for sale, purchase or barter, transport, export, or import any bald or golden eagle alive or dead, or any part, nest or egg without a valid permit to do so (USFWS, n.d). The BGEPA also prohibits the take of bald and golden eagles unless pursuant to regulations. Take is defined by the BGEPA as an action "to pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb." Disturb is defined in the BGEPA as "to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available: (1) injury to an eagle; (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior; or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior" (USFWS, n.d.). In addition to immediate impacts, this definition also covers impacts that result from human-caused alterations initiated around a previously used nest site during a time when eagles were not present. Permits are issued to Native Americans to possess eagle feathers for religious purposes, and salvaged eagle carcasses can be sent to the National Eagle Repository in Colorado where they are redistributed to Native Americans. Although the bald eagle was removed from the Endangered Species List in June 2007, it is still federally protected under the BGEPA and Migratory Bird Treaty Act. In addition, the *National Bald Eagle Management Guidelines* were published in conjunction with delisting by the USFWS in May 2007 to provide provisions to continue to protect bald eagles from harmful actions and impacts.

In 2009, the USFWS issued a final rule on new permit regulations that would allow some disturbance of eagles "in the course of conducting lawful activities" (74 FR 46836–46879). USFWS's description of its 2009 rule suggests that physical take of an eagle will only be authorized if every avoidance measure has been exhausted. Removal of nests will still generally be permitted only in cases where the nest poses a threat to human health, or where the removal would protect eagles. Explanations of the rule on USFWS's website specify that take permits may be issued when "necessary for the protection of…other interests in any particular locality" (USFWS 2009). The discussion expands the definition of such public and private interests to include utility infrastructure development and maintenance. Considerations for issuing take permits include the health of the local and regional eagle populations, availability of suitable nesting and foraging habitat for any displaced eagles, and whether the take and associated mitigation provides a net benefit to eagles (74 FR 46836–46879, USFWS 2009). (http://www.fws.gov/midwest/Eagle/guidelines/bgepa.html).

4.6 STATE THREATENED AND ENDANGERED SPECIES LAWS

Under Minnesota law, a person "may not take, import, transport, or sell any portion of an endangered species of wild animal or plant, or sell or possess with intent to sell an article made with any part of the skin, hide, or parts of an endangered species of wild animal or plant," except as provided in the statute. Minn. Stat. 84.0895. The statute directs the Commissioner of the DNR to develop lists of endangered species, threatened species, and species of concern. This list of state-listed species can be found on the DNR website.

5.0 AGENCY CONSULTATION

Communication between the Projects and wildlife agencies including the DNR and USFWS began as early as July 2009, and has been ongoing throughout the development and state permitting process. This communication has been integral throughout the siting process, and through this correspondence, the Projects have worked to avoid environmentally-sensitive areas such as those with native prairie, wetlands, woodlots and buildings that are used by bats, as well as avian flyways between and among WPAs and WMAs. Among the agencies' chief concerns were ensuring no permanent detrimental impacts on wetlands, native prairie and other quality habitat areas, and to minimize overall risks to birds and bats.

The Projects also looked to information gathered during avian and bat surveys conducted at the Paynesville Wind Farm, located approximately 20 miles south and east of the Projects, in Stearns County, MN[1] to develop bird and bat mortality risk at the Black Oak/Getty wind sites. Methodologies were developed in cooperation with the DNR and USFWS. Avian studies began on the Black Oak and Getty Wind sites in April of 2011 and continued through the winter of 2011. More detail about these preconstruction surveys is discussed in Section 8.0 of this document. Avian studies conducted at the Projects' sites, along with the corresponding Acoustic Bat Studies for the Paynesville-Zion Wind Resource Area,[2] were discussed with agencies, and provided both the Projects and the agencies with a better understanding of potential impacts to birds and bats at the Black Oak and Getty Wind sites. The Projects will continue to work collaboratively and share study data with these agencies as needed.

[1] Paynesville Wind docket can be found at www.puc.state.mn.us, docket number 10-49. Paynesville Avian Study Report number 56352-02.
[2] Ibid. Paynesville Bat Study Report 56352

6.0 PROJECT DESIGN AND DEVELOPMENT

In developing the Projects, an internal fatal flaw analysis was used to identify broader environmental and site-development issues. Both projects began before any issuance of the FWS siting guidelines however an assessment of the site that would qualify as tier 1 and tier 2 reviews was performed. Many of the areas of analysis are addressed within the Projects' respective site permit applications, including environmental impacts such as noise, population density, visual impacts, local economies, public health and safety, and others. These factors also collectively contributed to refining the sites and in determining turbine locations.

The Projects have consulted with wildlife agencies, gathered relevant environmental information and performed formal avian surveys of the site. The Projects have identified the presence of habitat for protected or sensitive species, and have sited turbines outside or away from these lands. These areas include wetlands, grasslands, prairie, depressions, and other habitats utilized by Threatened or Endangered Species (TES), Species of Greatest Conservation Need (SGCN), or concentration areas used by species covered by the federal MBTA. Many of these lands are within or near WMAs and WPAs that are either adjacent or in close proximity to the project, such as Padua and Tower WMAs and Behnen, Kenna and Trisko WPAs. Avian TES or SGCN noted during 2011 Tier 3 analyses include:

- trumpeter swans
- American white pelican
- American bittern
- northern harrier
- marbled godwits
- upland sandpipers
- Wilson's phalaropes
- western grebes
- red-necked grebes
- common loon
- sandhill cranes
- bald eagles
- Forster's terns
- black terns
- Franklin's gulls
- Northern rough-winged swallow
- sedge wren
- marsh wren
- brown thrasher
- swamp sparrow
- bobolink

The Projects coordinated early with wildlife agencies, conducted surveys and identified avian flight paths within and around the sites prior to siting turbines. Extensive avian studies were conducted prior to final micrositing; the results of these studies have greatly influenced the placement of turbines. For more information on these surveys, see Appendix A. The Projects have committed to siting away from avian flyways between and among WPAs, WMAs and outside of identified flight path corridors, as

demonstrated and documented by avian use surveys performed on the sites. Refer to Figures 3a, 3b and 3c for maps of avian flight corridors along with turbine layouts, illustrating flyway exclusion areas.

6.1 TURBINE SITING

Wind turbines and associated facilities for the Projects will be sited with consideration for the topographic and environmental characteristics of the site, efficiency of selected turbine models, and minimal impacts to area residents. Siting also considers the MPUC General Wind Turbine Permit Setbacks and Standards for LWECS permitted pursuant to Minnesota Statute §216F.08 and the setback requirements of Section 6.60 of Stearns County Zoning Ordinance 439. The Table 2 enumerates setbacks that will be adhered to in siting the Projects. See Figures 2a, 2b and 2c for potential turbine layouts.

6.2 SETBACK REQUIREMENTS

Table 2: Project Setback Requirements

Features	Setback
Wind access buffer (from non-participating)	3 rotor diameters (RD) non-prevailing, 5 RD prevailing wind direction
Public or private right-of-way	250 ft
Participating occupied structures	1,000 ft (plus any additional distance to meet noise standard)
Non-Participating occupied structures	1,000 ft (plus any additional distance to meet noise standard)
Internal wind spacing	5 RD prevailing, 3 RD non-prevailing with up to 20% of turbines closer than this requirment
Critical Avian Corridors	Outside those identified in Avian Use Assessment

The layout and design of the Projects will maximize energy generation while minimizing impacts to the land and surrounding community. The Projects have adhered to a voluntary setback of a minimum of 1,000 feet from non-participating occupied structures, unless other arrangements have been made with specific residents. A 250-foot setback has been incorporated from all public and private rights-of-way, and all turbines will be sited a minimum of five rotor diameters (RD) from the project perimeter and non-participating properties in the prevailing wind direction and three RD in the non-prevailing wind direction.

The Projects have been designed in an environmentally conscientious manner, with input from wildlife agencies and relevant site-specific information gathered during avian surveys for both Projects. As currently planned both Projects have either met or exceeded state and local siting requirements, and have met the concerns of wildlife agencies. To minimize adverse impacts to avian species, nearly all wind turbines and associated facilities are sited on cropland.

Access roads, wind turbine locations, and the underground collector system will not require significant cut and/or fill. The collector system is to be buried to minimize impact to existing farm operations, and

any disruption to drainage tile will be avoided to the extent possible during construction; further, any damage to tile as a result of construction activities will be repaired.

7.0 WILDLIFE RISK ASSESSMENT

The Projects followed the pre-decisional second release of USFWS' Wind Turbine Guidelines Advisory Committee (WTGAC) *Draft Land-Based Wind Energy Guidelines* in assessing potential impacts to wildlife and wildlife habitat from wind energy projects. The Committee began in 2007 under the Federal Advisory Committee Act to advise the Secretary of the Interior on developing effective measures to reduce the impacts that wind farms have on wildlife and habitat. Since this time, the Committee, made up of wildlife agency and wind industry experts, has developed and released three versions of draft recommendations to be used as guidance in steering wind projects, and the draft document utilizes a tiered approach to assess wildlife impacts. The tiered approach is built upon a series of questions to assist in identifying and quantifying potential risks of wind energy projects. The recommendations from the WTGAC also highlight species of concern protected by the ESA, BGEPA, MBTA, as well as those "designated by law, regulation or other formal process for protection and/or management by the relevant agency or other authority, or that has been shown to be significantly adversely affected by wind energy development," and "is determined to be possibly affected by the project."[3]

Two types of permit compliance activities are being used at the Projects to avoid or reduce impacts to wildlife: pre-construction consultation with agencies and assessing existing wildlife resources through pre-construction surveys. These serve to inform the Applicants of the types and extent of wildlife present within and adjacent to the project. These survey results have also informed project infrastructure siting and will also inform the extent of ongoing surveys to comply with regulatory programs such as the Endangered Species Act (ESA), Migratory Bird Treaty Act (MBTA), and the Bald and Golden Eagle Protection Act (BGEPA). Post-construction permit compliance includes acquiring temporary possession, depredation, and salvage permits issued by the USFWS MBTA office, nest removal or relocation permits issued by the USFWS under BGEPA also issued by the MBTA, and state salvage permits required for active nests or avian carcass removal.

7.1 RISK ASSESSMENT METHODOLOGY

Black Oak and Getty Wind feel they can have the greatest impact on reducing avian mortality by focusing its efforts on the areas that pose the greatest risk. Therefore, the ABPP includes methods for evaluating the risks posed to migratory birds and bats in a manner that identifies areas and issues of particular concern. The Black Oak/Getty risk assessment procedure will begin with an assessment of available data addressing areas of high avian/bat use, avian/bat mortality, nesting problems, established flyways, adjacent wetlands, prey populations, perch availability, evidence of perching on utility structures by large birds, effectiveness of existing procedures, remedial actions and other factors that can increase avian and contacts with project facilities.

The Projects' environmental staff will review avian and bat information collected by formal post-construction mortality surveys and informal recovery reports to assess impacts to wildlife after the Black

[3] USFWS WTGAC Third Draft of WEG Guidelines, September 2011.

Oak/Getty wind farm is in operation. Sources of information about avian or bat impacts at operating projects include results of formal post-construction monitoring as well as operations reports of wildlife incidents. Where results of formal monitoring indicate that either project-wide or per turbine mortality, whether for birds or bats, is higher than anticipated based on pre-project evaluations, on comparisons with regional averages, and/or on discussions with wildlife agencies, that finding will be considered an action level to reexamine the scope and sources of the avian or bat risk and to discuss causes and mitigation with the DNR and the USFWS. Because variation in mortality could reflect annual variation in bird or bat use of the area and/or the survey's statistical methods, and because determination of the significance of the fatalities may require additional monitoring (e.g., estimation of use), monitoring may be an appropriate step. If formal monitoring is not being conducted, a report by operating staff of any "incident" of unusual mortality event will be a trigger action to re-examine the scope and sources of the avian or bat risk. The need for additional study or action will depend on the species found—there will be less concern for non-native species such as pigeons that are not protected by the MBTA than for native species including species protected by the MBTA, with particular concern for more sensitive, declining, or imperiled species.

8.0 PRECONSTRUCTION SURVEYS

Tier I and Tier II analyses were completed for the Projects by reviewing available off-site information and by soliciting comments from the DNR and USFWS. During the spring of 2011, HDR Engineering, Inc. (HDR) biologists conducted Avian use/Flight Path surveys, Wetland Utilization surveys, Marbled Godwit surveys, and Raptor/Large Bird (RLB) nest surveys. The RLB survey effort resulted in further Eagle Nest monitoring, and is explained later in this section.

As more site characteristic information was developed, Tier III studies were conducted by monitoring a bald eagle's nest and by performing marbled godwit surveys within the Projects. Spring avian surveys began on the Black Oak and Getty project sites in April of 2011 and ended in late June, 2011, and an abundance of waterbird species, including the white pelican, were observed later in the season. Tundra swans were observed earlier in the surveys; however, as ephemeral water areas in crop fields dried up, the waterfowl species moved out of these observation areas. A pair of nesting bald eagles was observed 0.25 mile east of the Black Oak project boundaries between Getty and Raymond Townships, north of the Padua WMA, and two nesting pairs of marbled godwits were observed in pastured lands adjacent to the Black Oak project boundary southwest of the Padua WMA. Additionally, nesting red-necked grebes were observed within the Padua WMA. The white pelican, marbled godwit, bald eagle and red-necked grebe are significant because of their protected status under either the BGEPA, Minnesota Endangered Species statutes, or due to concerns raised by the USFWS or DNR staff. Avian Flight Patterns Maps are provided as Figures 3a, 3b and 3c (at the end of the main ABPP document), showing the locations of these observations.

These surveys have been used to guide the design of the project. Figures 3a, 3b and 3c show the current draft layouts as well as the critical corridors for avian species that have been observed.

8.1 AVIAN SURVEY PROTOCOL AND RESULTS

The Projects developed biological survey protocols prior to conducting avian surveys based on prior guidance given by USFWS and MDNR for surveys at the nearby Paynesville Wind Farm. These protocols were tailored to the sites' specific avian species composition, and they addressed concerns surrounding avian collisions with turbines, flight path disruption, and utilization of the site by certain avian species. The survey protocol for avian use included 1) Preconstruction Avian Use/Flight Paths, 2) Bald Eagle Nesting Activity, 3) Wetland Utilization, and 4) Marbled Godwit Surveys. The objectives of these surveys were to 1) sample avian use of the site during the spring migratory period, 2) identify breeding species within the site, 3) develop data on habitat use patterns, and 4) document flight paths used. Survey methods for the marbled godwit included pedestrian transect surveys and point count surveys, flight direction, behaviors, flight heights, weather information; time of day were recorded for all bird species during the surveys.

8.1.1 PRECONSTRUCTION FLIGHT PATHS / AVIAN USE

During the surveys, biologists documented observations on species, flight paths and direction, flight height, species abundance and avian behavior for 13 weeks beginning April 1, 2011through June 20, 2011. These surveys documented 22,863 individual birds, comprising 116 different species. Biologists estimated their flight heights, distances from survey points and flight behaviors. Of the 116 species documented by biologists, four species are identified by the DNR as TES. The behaviors of these species were incorporated into mapping software (ArcGIS) to analyze flight information and to identify corridors. No distinct flight corridors were identified for any particular bird species. However, some high use areas were identified in a corridor between Padua WMA and Trisko WPA. A full discussion of the findings from the Black Oak/Getty Avian Assessment is included as Appendix A.

8.1.2 RAPTOR / LARGE BIRD SURVEY

RLB surveys were conducted within 5 miles of the Projects' sites to identify raptor breeding use and other stick-nest activity at current and historic nest sites. HDR conducted Raptor/Large Bird Surveys to locate any eagle nests or areas utilized by eagles within and around the Projects' sites. These surveys along with Avian Use/Flight Path surveys were conducted in 30-minute intervals and results concluded that raptor use at the project sites is 0.36 birds per survey, which falls in the lowest quartile of comparable wind resource areas[4]. No large nests were identified within the Project boundary; however, an active bald eagle nest was located within one-mile of the project during 2011 Raptor/Large Bird surveys. Eagle Nest Activity observations were extended into July to document nest success and additional site use. Eagle Nest information was provided to the DNR and USFWS. HDR will continue to monitor eagle activity and perform more eagle surveys in the fall and winter of 2011. A report will be filed with the EFP following the surveys.

8.1.3 MARBLED GODWIT SURVEY

Finally, marbled godwit surveys were conducted off-site but near the Projects, on the Behnen, Trisko and Kenna WPAs. While the marbled godwit was the primary focus of these surveys, biologists also documented the presence and behavior of other species at the sites. The results of these surveys found that this state special concern species does utilize grassland areas both on and off–site and that although no breeding was documented within the Black Oak/Getty project boundaries during 2011, this species may utilize grassland sites within the projects during any year that site conditions are suitable for nesting.

8.1.4 WETLAND UTILIZATION SURVEY

Wetland utilization surveys for waterfowl and waterbird use were conducted beginning 7 April through 26 May, 2011 at open-water wetlands within one mile of the Projects' sites. Waterfowl and waterbird concentration areas included perennial wetlands at Padua, Kenna, Trisko WMA or WPA's as well as ephemeral wetlands located in agricultural fields on various fields throughout the Project. 2011 Wetland Utilization surveys found that state threatened species such as trumpeter swan, Wilson's phalaropes, horned grebes as well as special concern or SGCN species do use wetlands throughout the site during migration. Other special concern or SGCN species were documented at Padua, Trisko, and Kenna during

[4] See particularly Appendix A of Black Oak/Getty Avian Assessment document, 2011.

the breeding season and included American white pelican, red-necked grebes, black terns, northern harriers among others.

8.2 BAT SURVEY PROTOCOL AND RESULTS

The Black Oak and Getty Wind Farms have relied on the bat surveying and studies performed at the Paynesville Wind Resource Area (PWRA), located approximately 12 miles southeast of the Black Oak and Getty project boundary in Paynesville and Zion Townships, also in Stearns County, MN. Due to the close proximity of the PWRA to the Black Oak and Getty Wind Farms, the similarity of site characteristics among these projects, and the comparable sizes of the PWRA with the combined Black Oak and Getty sites, the PWRA provides an appropriate comparison for bat species abundance at the Black Oak and Getty combined sites. In 2009-2010, Hamer Environmental conducted studies to assess the potential impacts on resident and migratory bat communities within the PWRA. The following section discusses the protocol and results utilized during the Paynesville Bat Study.[5]

Acoustic surveys at the PWRA were conducted using Anabat SD1 data-logging, ultrasonic bat detectors affixed at 5 m and 56 m above ground level on two meteorological towers within the PWRA. Seasonal use of the proposed project area by resident and migratory bat populations was monitored from September 10 through November 11, 2009 and April 15, through September 7, 2010. Surveys recorded 3,583 identifiable bat calls over the course of 547 detector nights. Seventy-five percent of bat calls detected during the surveys were made by the silver-haired/big brown bat species group. The remaining detections consisted of hoary bats (9%), red bats (7%) and little brown bats (9%). Activity for all species peaked sharply from late July into early August, likely indicating migratory activity. A total of 3,583 bat calls were detected during this time frame. The mean number of calls recorded per detector night during the PWRA study was similar to rates recorded at sites in Minnesota and Wyoming, where mortality rates were lower than those recorded in eastern deciduous forests.[6]

During post-construction mortality studies at wind farms in North America, Arnett et. al. 2008 found that mortality was highest in tree roosting migratory bats. Studies conducted by Kunz et. al. 2007 and Arnett et. al. 2008 noted that the tree bat species most commonly found during ground searches included the red bat, hoary bat, and silvery bat. Forested areas located between the Padua WMA and the southern limits of the Projects' boundaries harbor habitat that could be utilized by these three bat species. These forested areas also lie within an area used frequently by waterfowl, waterbirds, and other avian species while flying between the Padua lakes and the Trisko WPA. Because of the large number of avian flights through this area, the Projects avoided placing turbines within this corridor. The projects have minimized the potential for impacts to these species by avoiding turbine placement in this area and by adhering to State and County setback guidelines from non-participating properties.

[5] The Paynesville Bat Study Report can be found as document no. 201011-5635201 in Docket No. IP-6830/WS-10-49.
[6] Ibid.

9.0 CONSTRUCTION PHASE

9.1 MINIMIZE DISTURBANCE

The Projects will minimize the areas of construction and temporary ground-disturbance activities to the extent practicable. Temporary disturbances during construction of the project include crane pads at each turbine location, temporary crane paths, temporary laydown areas at the base of each turbine, trenching in the underground electrical collection system and storage or stockpile areas. The majority of this work will occur within tilled and cultivated agricultural fields, thereby minimizing impacts to quality habitat and fragmentation. The Projects will restore the pre-construction vegetation in areas where temporary ground-disturbance activities, such as temporary crane paths or the installation of underground infrastructure, will occur. Additionally, while impacts to avian nesting cover are not anticipated due to construction timing, the Projects will work to avoid the clearing of perennial vegetation and any potential avian nesting cover to the extent practicable. While the Projects have acted diligently to avoid all areas of native prairie, in the event that change in project design causes the relocation of facilities into areas of nesting cover, the Projects will reexamine the construction sequence so as to not disturb nesting cover that contains hatched or unhatched clutches.

The Projects will implement management measures to restore areas that are impacted due to temporary construction activities. After all practicable avoidance measures are taken to reduce temporary impacts to vegetated areas; any temporarily disturbed areas will be re-vegetated to blend with existing vegetation. Further measures will be taken to minimize disturbance from construction activities. The Projects will ensure construction teams are aware of and attempt to prevent spreading invasive species via the movement of people, materials and equipment into and out of the site to prevent the spread and colonization of any new populations of invasive species. Measures include washing off any soil, dirt and debris on equipment, such as wheels and turbine components, as well as footwear if necessary, prior to moving equipment over native prairie land, as soil may be embedded with roots or seeds of invasive plant species.

During construction the Projects will follow regulations set forth by the MPCA to comply with NPDES Guidelines. These rules are reflected in the following construction erosion and sediment control BMPs:

- Minimize disturbed area and install silt fence at down gradient edge of disturbed area, prior to disturbance, to minimize sediment flow and pollution to natural areas outside the construction zone.

- If streams are within the area of construction additional silt fence must be placed along the edge of the stream ten feet (10') from edge of channel, if possible, as a primary sediment break. If natural vegetation along the edge of stream is to be disturbed, silt curtain must be placed at the edge of said stream, in a fashion proper with rate of flow, as a secondary precaution. If natural vegetation is not to be disturbed then it should provide necessary filtration to preclude the need of silt curtain in the stream.

- If soil is disturbed outside of the agricultural till area, the soil must be stabilized within fourteen (14) days of non-disturbance. If said area is along special or impaired water (PWI waters) the area must be stabilized within seven (7) days of disturbance. Ditch bottoms 200 feet from edge of surface water or property must be stabilized within 24 hours. If soil is disturbed around culvert or other water discharge location the area has to be stabilized within 24 hours of disturbance.

- Erosion and sediment control devices require weekly inspections to ensure that they are staying effective. In the event of a half inch (½") or greater rainfall inspection must occur within 24 hours.

- If failures are found any discharge associated with said failure must be cleaned up as soon as possible and no later than seven (7) days from time of discovery.

- Clean up any track out from vehicles traveling through the site on to roadways must be cleaned up within 24 hours.

- Upon construction completion, disturbed areas must be stabilized within 14 days.

- Material stockpiling will be kept to specified areas and will be surrounded with silt fence at least eight feet (8') from the edge of the stock pile as to provide barrier for potential erosion and sediment run off from stock pile yard. Hazardous material will be handled per the individual material guidelines as well as on-site spill kits.

In addition to the regulations set forth by the MPCA, Stearns County has an established set of BMPs for storm water pollution prevention. These BMPs include control measures meant to meet the requirements of the NPDES Phase II permit. The six minimum control measures are as follows:

1. Public Education and outreach on storm water impacts
    a. Example: brochures, handouts and newsletters
2. Public participation and involvement
    a. Example: Storm Water Pollution Prevention Program annual public hearing
    b. Example: Adopt-A-Highway Program
3. Illicit discharge detection and elimination
    a. Example: Recycling and Hazardous Material Collection Program
4. Construction site runoff control
    a. Example: Erosion control training for County staff
5. Post-construction storm water management in new development and redevelopment
    a. Example: MPCA guidelines for County-owned projects
6. Pollution prevention/good housekeeping for municipal operations
    a. Example: NPDES permit for industrial activity

9.2 SITE MAINTENANCE

The Projects will exercise proper caution and safety measures to minimize risks to avian and bat populations near and within the site. To minimize the risk of wildfire that could destroy bird and bat habitat, or that could be injurious to construction personnel, the contractor will be responsible for maintaining a clean and orderly site, handle and store flammable chemicals, petroleum and other materials with the potential for combustion, in a safe manner. Accumulation of outdoor storage or waste will be addressed immediately so as not to attract birds and bats. The site manager will be responsible for enforcement of BMPs that focus on reducing impacts to birds and bats, as well as the implementation of this document.

9.3 NEST MANAGEMENT

This ABPP includes procedures for nest management for the life of the project on operational grounds and on project structures. These procedures will be explained to Black Oak/Getty employees during training to ensure uniform treatment of avian nest issues among personnel. Many bird species build nests on transmission and generation facilities as well as on the adjacent maintenance pads, roads and other ground cover. Species such as barn swallows, cliff swallows, kingbirds, crows, robins and several raptor species are known to use generation and transmission facilities as nesting substrate. Additionally, turbine pads can provide substrate to ground nesting species such as common nighthawks, killdeer, horned larks among others. Depending on where nests are located, they may pose fire, safety, power outage, bird electrocution, and bird collision risks. Nest management may include trimming nest material, removing nests, or relocating nests to areas of less risk. In some instances nesting platforms can be constructed in locations that reduce the risk to birds using the area and to equipment.

By siting turbines, collector lines and other facilities in agricultural lands, impact to bald eagles and marbled godwits are minimized. However, in the absence of other suitable nest sites, other species such as some songbirds and raptors will use man-made structures for nesting. State and federal laws and regulations protect these nests from removal at certain times of the year without first obtaining authorization from state and federal wildlife agencies. It is unlawful to destroy nests when eggs or young birds are in them. Black Oak/Getty employees will be trained to understand that no impacts to occupied nests can occur unless there is an immediate safety threat, in which case, coordination with the USFWS and DNR will need to occur. While some nests are benign and need no management, others may need to be managed to reduce the risk of equipment failure, bird and bat collisions, and electrocution.

9.4 TRAINING

The contractor will be the lead entity for the construction management of the Projects and will be responsible to provide training to all construction staff working on the project. Training will include but is not limited to:

- Environmental compliance
- Threatened & endangered species, and species of concern
- Avian and bat issues
- Sediment and erosion control BMPs

- Vegetation management and noxious weeds
- Wetland and water resources
- Hazardous materials
- Water crossings
- Cultural and historic resources

Training, both formal and informal, will be provided for all construction staff depending on the work responsibilities of personnel. A variety of formats will be employed to present information to those receiving training such as department or group meetings and discussions, one-on-one training, presentations, posters and handouts. Copies of any training materials distributed will also be kept at the construction trailer/field office, and the hours and attendees of training sessions will be documented by the appropriate designee. Expected formal training opportunities include:

- Pre-construction meeting with contractor and construction managers
- Pre-construction meeting with relevant agencies
- Regular status meetings as determined by contractor
- Regular field meetings with construction personnel

Table 3 summarizes the timing for training and issues that will be covered for the construction personnel at the site during that time period. It is important to train the appropriate individuals during the appropriate time period, and this sequencing will help ensure that this occurs.

TABLE 3: SUMMARY OF CONSTRUCTION TRAINING ACTIVITIES AND TIMING

Issue	**Concerns/Summary**
Eagle	Nesting bird disturbance Training on bird identification and proper notification procedure Trained biologist conducting nest monitoring April 15 – August 15
Birds	Destruction of occupied nests Training to identify potential nesting habitat If construction is in grasslands, trees or wetlands between April 1 and July 31,
General Wildlife	General awareness and sensitivity training related to all wildlife

The primary, civil, erection and electrical contractors will work to implement BMPs to construct the project in a way that minimizes impacts to avian species on-site. This includes maintaining flexibility in the construction of components where feasible, as well as encouraging the education of construction teams on site-specific environmental and avian concerns. Education may also include training in the identification of different types of birds and bats, which may be accomplished by utilizing posters that identify sensitive species, and which are posted at the construction trailer facility. The site personnel will be required to receive training on the Wildlife Incident Reporting System discussed in Section 10.3.4.

The Projects will ensure that the civil contractor has a proper safety program in place, and that construction and operations crews have been adequately trained to that effect. To minimize the risk of wildfire that could destroy bird and bat habitat, or that could be injurious to construction personnel,

construction crews will exercise proper caution and safety measures while handling and storing flammable chemicals, petroleum, and other materials with the potential for combustion. The contractor will be required to maintain a clean and orderly site, and the unnecessary accumulation of outdoor storage or waste will be addressed immediately so as not to attract birds and bats. The site manager will be responsible for enforcement of BMPs that focus on reducing impacts to birds and bats, as well as the implementation of this document. Operations and Maintenance (O&M) staff will be trained on this document, and training on avian protection planning and practices external to this document is highly encouraged by the Projects.

In the event of permit non-compliance issues, the construction contractor will take the measures necessary to correct the situation and maintain compliance. A stop work order may be issued if an emergency occurs, or if a violation is not corrected in a reasonable timeframe. The contractor will designate a project representative responsible for notifying and documenting issues of non-compliance with the permit.

9.5 CONSTRUCTION MONITORING PLAN

The Project is sited in an area dominated by cultivated agriculture, thereby offering a low to moderate risk for potential environmental impacts. While this proper siting avoids and minimizes most potential impacts to birds, bats, and other wildlife, the Projects will implement the following training and action during the construction phase. The Projects recognize that different phases of construction will utilize different construction personnel at different times of the year. The construction monitoring plan is designed to be implemented during these appropriate times, such that the construction personnel receive the necessary training and are implementing the plan accordingly. Construction personnel will be trained in the following areas when appropriate:

- awareness and general identification of bald eagles and marbled godwits;
- awareness of potential bird nesting areas;
- awareness of potential bat roosting/breeding habitat and; and
- awareness of general wildlife issues.

It is through this awareness training that all construction personnel can be accountable in observing and then reporting potential issues to appropriate site representative (e.g., construction manager). Additional training will be given to the identified site representative on procedures to be followed and actions to be taken at the appropriate times of the year and in the appropriate situations.

9.6 CONSTRUCTION STANDARDS

9.6.1 AVIAN SPECIES

The primary concern for avian species during the construction phase will be related to disturbance of the active bald eagle nest and impacts to the marbled godwit, which utilizes grasslands both within and outside of the Projects' boundaries. Construction personnel will be trained to identify potential nesting habitat (e.g., grasslands, wetlands, wooded areas) and to contact the Site Manager prior to disturbance.

The Site Manager will coordinate any necessary searches with the environmental inspector, and will notify the construction personnel when construction can continue.

9.6.2 BAT SPECIES

Similar to avian species, the primary concern for bats during the construction phase will be to the destruction of occupied roosting or breeding habitat (e.g., large trees, old buildings). If construction occurs between April 1 and October 15 that will directly take down large trees, remove old buildings, or otherwise directly impact potential bat roosting or breeding habitat, construction personnel will be directed to halt activities and a trained biologist(s) will search the area to ensure no bats are present. This searching could include visual inspection of trees, old buildings, and other cavities where bats may be found, or watching for bats departing these areas during dusk or returning at dawn. Construction personnel will be trained to identify potential habitat and to contact the Site Manager prior to disturbance. The Site Manager will coordinate the searches with the environmental inspector and will notify the construction personnel when construction can continue. If areas are previously disturbed prior to April 1 or after October 15, concerns with bat species during construction can be averted.

9.6.3 GENERAL WILDLIFE RESOURCES

In addition to training related to identifying issues and avoidance measures during construction for bald eagles, marbled godwits, and other birds and bats, construction personnel will also be trained to identify and avoid impacts to wildlife in general. For example, during construction, personnel will visually inspect each open trench/pit daily to determine if any animal has become entrapped in the trench/pit. If an animal has become entrapped, the Site Manager will be notified and appropriate actions will be taken to safely remove and release the animal. This will require general wildlife awareness and sensitivity training for all construction personnel.

9.7 TRAFFIC PLAN

During the construction period, heavy trucks, light trucks, and other construction equipment will access construction sites via existing county and gravel roads. Routes that avoid travel near the existing eagle nest will be developed for and utilized by construction personnel. Other construction vehicle travel will be reduced by requiring all construction workers to park their personal vehicles at a central location on the project. The Projects will confine all construction and construction-related activities to the minimum necessary to safely construct generation, transportation, transmission and maintenance facilities as depicted in the final site design and engineering plans. Approved work space limits shall be marked and maintained throughout the construction period. All construction-related traffic within the wind farm areas will be limited to a maximum speed limit of 25 mph unless a lower speed limit is posted. Any carrion killed by collisions with vehicles will be removed from roads constructed to maintain or access project facilities.

During the operational phase of the project, traffic volume will be minimal, consisting mainly of local traffic and routine trips by technicians to check and maintain wind generation and transportation equipment.

9.8 COLLECTION AND TRANSMISSION LINES

The Projects will design project electrical facilities based upon the Avian Power Line Interaction Committee's (APLIC) guidelines for minimizing risk of electrocution of birds from power lines. Electrocution is commonly a concern with electrical facilities, and the electrocution of large birds, such as raptors, is more commonly associated with distribution lines. Electrocution occurs when birds with large wingspans come in contact with two conductors or a conductor and a grounding device. Adequate spacing of the transmission line design diminishes the risk of raptor electrocution, and the Projects will implement such a design so as to eliminate the risk of electrocution. To the extent practicable, the collector system will be placed underground, thereby eliminating the risk of electrocution.

Historically, utilities have had success in reducing collisions on transmission lines by marking the shield wires with FDs. FDs are preformed, spiral-shaped devices made of polyvinyl chloride that are wrapped around the shield wire and are designed to increase its visibility.

The Projects recognize there is potential for temporary displacement of wildlife during the construction of both the wind farm and the transmission line. However, this displacement is anticipated only for a short distance and it is temporary. Fallow farm fields, fencerows and woodlots in cultivated areas may provide cover for displaced birds during construction of the transmission line.

Raptors, waterfowl and other bird species may be affected by the construction and placement of the transmission lines. Avian collisions with transmission structures are a possibility in areas where there are agricultural fields that serve as feeding areas, wetlands, and open water. As such, transmission structures will not be located within these wetland areas to the extent feasible.

9.9 MINIMIZATION OF ROADS

The Projects will expand the widths of access roads only as necessary during the construction phase of the project, and will build only those access roads necessary to access the turbines. After construction, any expanded road widths will be narrowed to approximately 14-16 feet, and vegetation alongside the roads will be restored. BMPs for erosion and sediment control will be implemented in areas where runoff may result in the degradation of soil quality and in environmentally sensitive areas.

9.10 SWPPP

The Projects' Storm Water Pollution Prevention Plan (SWPPP) will be utilized as a resource to ensure control measures are taken to prevent erosion and runoff during construction of the project. Of particular concern is runoff into sensitive habitats as well as runoff into streams and roadside ditches. The measures within the SWPPP will comply with the requirements of the MPCA General Permit for Storm Water Associated with Construction Activity under the National Pollutant Discharge Elimination System (NPDES) / State Disposal System Permit Program.

10.0 OPERATIONAL PHASE

10.1 AVIAN AND BAT MORTALITY

A combination of several factors likely contribute to the susceptibility to wind turbine collisions by avian and bat species. These factors may include the abundance and composition of avifauna in the area, the way in which avifauna are dispersed within a geographic area, the presence of suitable nesting and foraging habitat, the presence and abundance of prey, the time of the day or night, season of the year, and the siting or layout of wind turbines. Predicting the fatality rates for the Projects is best understood by utilizing the data and information learned from:

- Jain, A.A. 2005. *Bird and bat behavior and mortality at a northern Iowa wind farm.* Master's Thesis, Iowa State University, Ames, IA.
- Good, M.D. et al. 2003. *Avian and Bat Mortality Associated with the Initial Phase of the Foote Creek Rim Windpower Project, Carbon County, Wyoming, 1998-2002.* Prepared for Pacificorp, Inc., SeaWest Windpower, Inc., and Bureau of Land Management Rawlins District Office, Rawlins, WY.
- Erickson, W.P., et al. 2004. *Stateline Wind Project Wildlife Monitoring Final Report, July 2001-December 2003.* Technical report peer-reviewed by and submitted to FPL Energy, the Oregon Energy Facility Siting Council, and the Stateline Technical Advisory Committee.
- Erickson, M.D., et al. 2000b. *Avian Monitoring Studies at the Buffalo Ridge Wind Resource Area, Minnesota: Results of a 4-year study.* Northern States Power Co., Minneapolis, MN.
- Summary of Post-Construction Monitoring at Wind Projects Relevant to Minnesota, Identification of Data Gaps, and Recommendations for Further Research Regarding Wind-Energy Development in Minnesota. WEST, Inc. 2010.
- Bird and bat behavior and mortality at a northern Iowa wind farm. Master's Thesis, Iowa State University, Ames, IA.
- National Research Council. 2007. Environmental Impacts of Wind-Energy Projects. The National Academies Press. Washington, DC.

The *Summary of Post-Construction Monitoring at Wind Projects* documented by Poulton provides a comprehensive cross-section of results from publicly-available post-construction avian and bat mortality monitoring studies at LWECS across the U.S. that are listed above. Table 4 below identifies avian and bat fatality rates for a sample of the studies discussed within the Poulton et al. document.

TABLE 4: AVIAN AND BAT FATALITY RATES AT WIND FARMS

Location	Name of Wind Farm	Nameplate Capacity in MW	No. of Turbines	Adjusted Bird Fatalities/ MW/Yr	Adjusted Bird Fatalities/Turbine/ Yr	Adjusted Bat Fatalities/MW/YR	Adjusted Bat Fatalities/ Turbine/ Yr
Minnesota	Buffalo Ridge	Approx 235	354	1.43-5.93	0.5-4.45	0.76-2.72	0.26-2.04
Wisconsin	Blue Sky Green Field	145	88	7.17	11.83	24.6	40.5
Wisconsin	Kewaunee	20.46	31	1.95	1.29	6.45	4.26
Iowa	Top of Iowa	80.1	89	0.49 (2003)	.44 (2003	7.34 (2003)	6.60 (2003)
Iowa	Top of Iowa	80.1	89	1.07 (2004)	0.96 (2004)	9.81 (2004)	8.83 (2004)
Wyoming	Foote Creek Rim	41.4	69	2.50	1.5	2.23	1.34
Alberta, Canada	Summerview	70.2	39	1.06	1.91	10.27	18.49
Maine	Mars Hill	42	28	1.65	2.47	0.12	0.17

The Poulton et al. (WEST) document concurs that the hierarchical data collection and decision-making process discussed within the Federal Advisory Commission's (FAC) advisement to the USFWS Wind Turbine Guidelines is generally a good structure to follow in planning wildlife studies. The Projects have performed an Avian Use Study (see Appendix A) to define species in the area and the risk level, but has not used it to define an acceptable level for avian mortality.

10.2 OPERATIONAL STANDARDS

During operations, the Projects will require the implementation of maintenance practices that avoid and minimize drawing birds and bats near wind turbines. The site operations crew will work with DNR, USFWS and other wildlife staff in properly collecting, reporting and disposing of carcasses. The site operations crew will contact wildlife authorities if the crews find roadside carrion that could potentially attract raptors or scavengers. In addition to these measures, general farming practices such as tilling, harvesting and mowing will provide another measure that will limit the accumulation of surface water and thereby deter avifauna.

10.2.1 MINIMIZE LIGHTING

During the operational phase of the Projects, the site operations manager will enforce this plan in an effort to reduce risks to birds and bats. All unnecessary lighting, except those required for safety by the FAA and other lights needed for safety and security purposes, will be turned off.

USFWS' draft Wind Turbine Guidelines[7] recommend that wind turbine lighting be designed such that the blinking lights illuminate simultaneously in order to prevent disorientation with birds and bats. This

[7] U.S. Fish and Wildlife Service Draft Land-Based Wind Energy Guidelines: *Recommendations on measures to avoid, minimize, and compensate for effects to fish, wildlife and their habitats.*

measure is less likely to attract insects to a constant light source, and thus the birds and bats that feed on them. Further, the USFWS recommends the use of minimum intensity, maximum off-phased strobe lights where necessary; constantly lighted sources, such as L-810 obstruction lights, are not recommended. The FAA recommends synchronized flashing or blinking red lights (L864), and generally recommends lighting only the perimeter of the wind farm project with lighting gaps of no more than 0.5 mile between lights, and no more than one mile across turbine clusters, as well as lighting turbines that are isolated from strings or clusters of other turbines. Turbines within the Projects will be lighted in compliance with FAA minimum standards. In keeping with the Draft Guidelines, the use of motion- or infrared-activated lights on building facilities will be investigated as a method to reduce attraction of insects, birds and bats. The use of high-intensity lights such as spotlights, steadily-burning bright lights, and sodium vapor lights will be minimized.

10.3 POST CONSTRUCTION AVIAN AND BAT MONITORING

Post-construction avian and bat fatality monitoring will be performed in compliance with the final Site Permits issued by the MPUC. Quarterly reports will be prepared summarizing fatality monitoring. These reports will also be made available to project partners and utilized for decision-making purposes. Reporting protocol is discussed in Section 10.3.4 of this document.

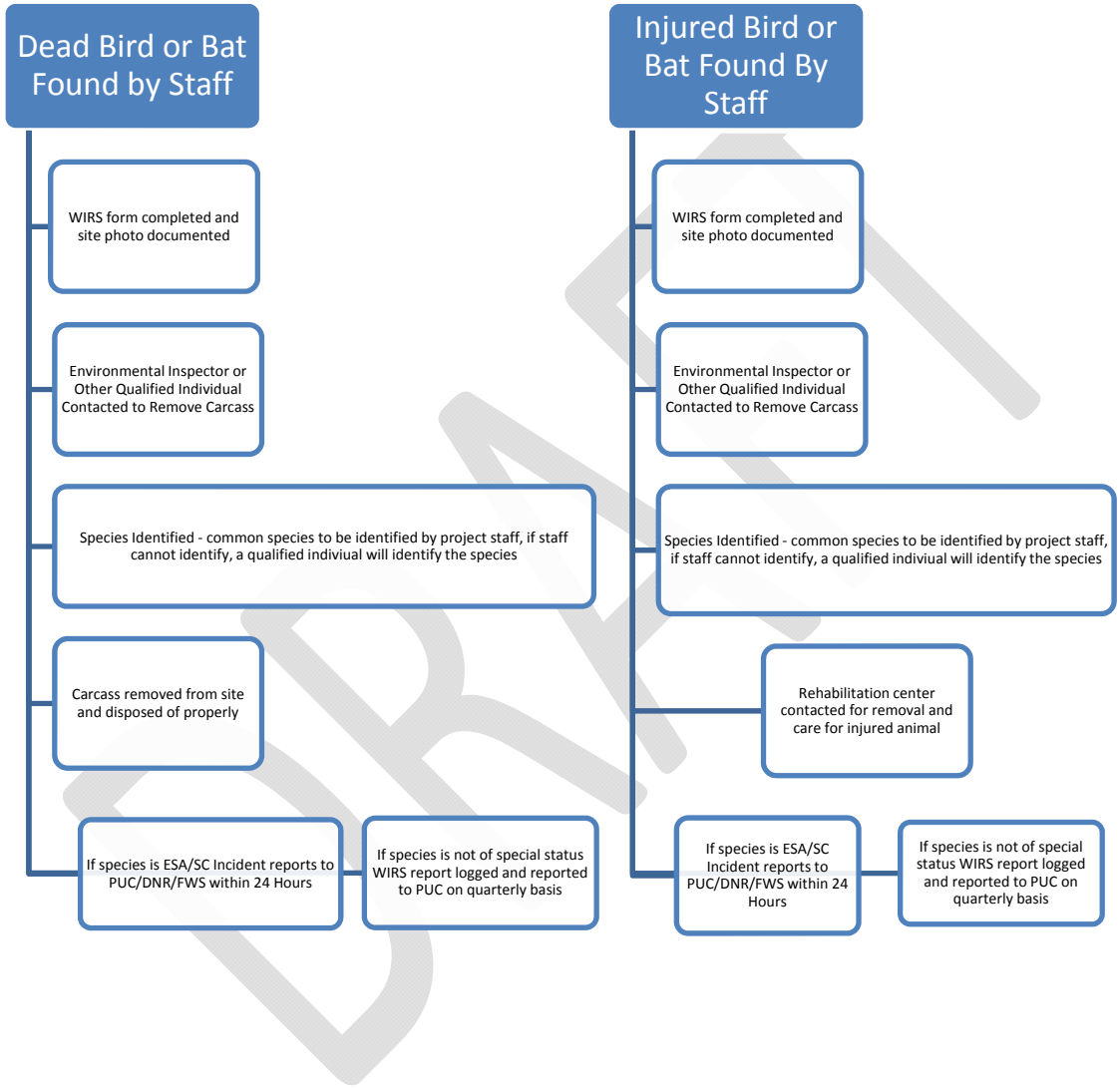
Upon the commissioning of the project, Prairie Rose Wind will employ the site-specific Wildlife Incident Reporting System (WIRS). The WIRS will be designed to provide a means of recording avian and bat casualties found in the wind project to increase the understanding of wind turbine and wildlife interactions. The WIRS will provide a set of standardized instructions for Prairie Rose Wind Farm personnel to follow in response to wildlife incidents in the project area. The WIRS form can be found in Appendix B of this document. Each incident will be documented on a data sheet and reported by the EI to the designated environmental affairs contact per the requirements of the Prairie Rose Wind Site Permit. The data will be logged into and maintained within a tracking spreadsheet by the Prairie Rose Wind environmental affairs staff, and regular review of the reported incidents will be undertaken by the same. Site personnel will be required to receive training on WIRS procedures as well as how to complete and submit the WIRS report.

The long-term operational effort will consist of managerial, operations, and maintenance staff documenting and reporting of mortality discovered during the course of wind farm operation. The WIRS will provide a set of standardized instructions for wind farm personnel to follow in response to wildlife incidents within the Projects. An example of the WIRS form can be found in Appendix B of this document. Each incident will be documented on a data sheet and reported to the designated environmental affairs contact per the requirements of site permits issued by the MPUC. The data will be logged into and maintained within a tracking spreadsheet by the Projects' environmental affairs staff, and regular review of the reported incidents will be undertaken by the same. Designated site personnel will be required to receive training on WIRS procedures, as well as how to complete and submit the WIRS report. Quarterly reports are due by the 15th of each January, April, July and October commencing the day following commercial operation and terminating upon the expiration of the permits. Each report shall identify any dead or injured avian and bat species, locations of find and the date the species was

discovered. A Geographical Information System (GIS) may also be used and can generate maps, make identification of problem areas by tracking both the specific locations where mortalities may be occurring, as well as the extent of such mortalities. Issue rectification and design configurations can also be tracked.

10.3.1 WILDLIFE CARCASS AND INJURY DISCOVERY PROCESS

The following chart provides the wildlife carcass and injury discovery process. This chart is designed to comply with the site permit reporting requirements for both projects. The project will have a qualified individual such as a wildlife biologist available to review site photos and identify species in the event that a staff person is not capable of performing a field identification.



10.3.2 REPORTING PROTOCOL

Post-construction avian and bat monitoring will be conducted at the sites, and will be performed in accordance with the final site permits issued by the MPUC. The reporting protocol for the Projects will include submitting quarterly avian and bat reports to the MPUC. Quarterly reports are due by the 15th of each January, April, July and October commencing the day following commercial operation and

terminating upon the expiration of the permits. Each report shall identify any dead or injured avian and bat species, locations of find by turbine number, and the date the species was discovered. Additionally, quarterly reports will be prepared summarizing the fatality monitoring for the Projects. These reports will also be made available to project partners and utilized for decision-making purposes.

In accordance with the Projects' site permits, in the event that five or more dead or injured non-protected avian or bat species or a single dead or injured state threatened, endangered, species of special concern, or federally listed species are discovered in the vicinity of the rotor swept area, the MPUC, USFWS and DNR shall be notified within 24 hours.

10.3.3 POST CONSTRUCTION PERMITTING EFFORTS

The Projects will obtain required wildlife permits from the USFWS and DNR for handling dead or injured birds protected by programs such as the MBTA, BGEPA, and state nest relocation permits. Temporary possession, depredation, and salvage permits issued by the USFWS under the BGEPA and MBTA and state salvage permits will be part of the post-construction monitoring efforts and each of these permits will be acquired before monitoring begins.

Results compiled from pre-construction studies and ongoing fall/winter surveys determined that impacts to birds and bats are likely but will not be significant enough to affect area populations. This data is also being used to inform compliance with the BGEPA take permit, MBTA temporary possession, depredation, and salvage permits, and state salvage permitting requirements to monitor avian and bat mortality for up to three years post-construction.

The BGEPA and the Draft Eagle Conservation Plan Guidance of January 2011 for wind development sites provides steps for voluntary compliance. Black Oak/Getty will collect additional eagle use data over the course of an entire year and up to two miles from the project boundaries. The ongoing study will focus on Important Eagle Use Areas (IEUA) as defined by the BGEPA which states important eagle-use areas are" an eagle nest, foraging area, or communal roost site that eagles rely on for breeding, sheltering, or feeding, and the landscape features surrounding such nest, foraging area, or roost site that are essential for the continued viability of the site for breeding, feeding, or sheltering eagles."

Although the Eagle Take Permit rule was issued in 2009, guidance outlining permit issuance are not expected until early 2012. Therefore specific eagle study protocol will not be discussed in this document but will be finalized and developed in coordination with the USFWS and DNR. It is anticipated that the studies may consist of point counts and transect survey components to identify IEUAs and to document eagle use and behaviors. Eagle observations will be used to quantify eagle activity, numbers, age, flight type, flight height, time in activity, flight direction, and other pertinent behaviors (i.e. territorial, courtship, etc.).

For compliance with the MBTA, post construction mortality monitoring study methodologies will be developed in cooperation with the USFWS and DNR and will follow guidelines set forth in the following documents:

- Draft Avian and Bat Survey Protocols for Large Wind Energy Conversion Systems in Minnesota (August 25, 2011),
- U.S. Fish and Wildlife Service Wind Turbine Guidelines Advisory Committee (March 4, 2010)
- U.S. Fish and Wildlife Service Draft Land-Based Wind Energy Guidelines: *Recommendations on measures to avoid, minimize, and compensate for effects to fish, wildlife, and their habitats. Draft September 13, 2011*

Compliance with the BGEPA and MBTA, allowing the 'possession' of the bird/carcass requires the possession of a salvage, Rehabilitation, Special Purpose, Scientific Collecting, or related permits. The issuance and use of Federal Migratory Bird permits also requires annual reporting to USFWS. Contacts at the USFWS and DNR are:

USFWS:

Deanne Endrizzi
Office of Migratory Bird Permits
U.S. Fish and Wildlife Service
5600 America Boulevard West, Suite 990
Bloomington, MN 5437-1458

MN State Salvage Permit:

Laurie Naumenn
Permit and Promotions Specialist
Nongame Wildlife Program Information Officer
Division of Ecological and Water Resources
Department of Natural Resources
Box 25, 500 Lafayette Rd.
St. Paul, MN 55155
Telephone Number 651-259-5148

10.4 QUALITY CONTROL AND ADAPTIVE MANAGEMENT

This ABPP includes mechanisms to review existing practices and ensure quality control. For instance, independent assessments of its avian reporting system may be conducted to ensure effectiveness, or to invest in research on the effectiveness of different techniques and technologies used to prevent collisions, seasonal mortality, problem sites, areas where electrocutions occur on frequent or periodic basis, and problem nests.

With time, new methods to reduce and avoid negative impacts to avian and bat species may surface, and this plan may be amended to address issues and concerns utilizing those new methods. Further, data collected during operational monitoring may help to further inform wind farm environmental staff and wildlife agencies about the interplay of wind farms with avian species. Therefore, Black Oak and Getty Wind will continue to review and update this plan annually as needed to assist environmental staff in implementing the directives of the plan. This document will be maintained and made available at the operations facility for each project.

The Projects may consider adaptive management measures based on the results from formal monitoring. If results indicate that reevaluation is necessary, the reevaluation will first focus on adherence to the WIRS plan, as well as with this document. It will reexamine all human activities occurring on site and continue to seek improvement on study protocols and mitigation approaches. If corrective action plans appear warranted, the Projects will consult with a wildlife biologist and relevant environmental agencies such as DNR and USFWS to discuss the type of additional study or action that is recommended.

Additional adaptive management measures will be designed to resolve any issue that arises on a case-by-case basis. Some examples of adaptive management are as follows:

- Procuring habitat conservation easements
- Improving wildlife habitat

- Installing nest boxes
- Installing more avian flight diverters along transmission line
- Modification of wind turbine operations
- Additional training of wind farm staff
- Regular clearing of road kill around project site to remove scavenger food sources

10.5 KEY RESOURCES

This ABPP identifies key resources to address avian protection issues including area USFWS and DNR biologists, engineers, planners, and operation personnel who have been trained on avian interaction problems. External organizations such as the National Wind Coordination Committee (NWCC) and APLIC can also serve as helpful resources by providing guidance, workshops, materials, and contacts. An understanding of bald eagles, marbled godwits, and bat behavior can influence how and when avian and bat protection should be utilized. The Projects will attempt to connect regulators and wildlife experts with project decision makers to reduce avian and bat injury or mortality and maintain project reliability. The site manager will be responsible for enforcement of BMPs that focus on reducing impacts to birds and bats, as well as the implementation of this document. Operations and maintenance staff will be trained on this document and training on avian protection planning. Practices external to this document are highly encouraged by the Projects.

In the event of permit non-compliance issues during construction, the construction contractor will take the measures necessary to correct the situation and maintain compliance. A stop work order may be issued if an emergency occurs, or if a violation is not corrected in a reasonable timeframe. The contractor will designate a project representative responsible for notifying and documenting issues of non-compliance with the permit.

Table 5 lists contacts that will serve as key resources during the construction and operations phases of both Projects. These include contacts for Black Oak Wind, and Getty Wind Company, area biologists, rehabilitation centers, etc.

TABLE 5: LIST OF KEY RESOURCES

Organization Type	Name	Address	Phone
Rehabilitation Center	The Raptor Center / College of Veterinary Medicine, University of Minnesota	1920 Fitch Avenue St. Paul, MN 55108	612.624.4745
Rehabilitation Center	Wildlife Science Center	5463 West Broadway Avenue Forest Lake, MN 55025	651.464.3993
Government Agency	Minnesota Dept. of Natural Resources	500 Lafayette Road St. Paul, MN 55155	651.296.5484
Government Agency	U.S. Fish & Wildlife Service Twin Cities Field Office	4101 American Boulevard East Bloomington, MN 55425	612.725.3548
Government Agency	Minnesota Department of Commerce / Energy Facility Permitting	85 7th Place East, Suite 500 St. Paul, MN 55101	800.657.3794
Developer	Black Oak Wind, LLC	Address TBD – Operations & Maintenance Facility Building	TBD
Developer	Getty Wind Company. LLC	Address TBD – Operations & Maintenance Facility Building	TBD

11.0 SUMMARY

Table 6 below summarizes the main steps that the Projects have taken, and plan to take, to avoid, minimize and mitigate impacts to wildlife species. This table will be updated during the construction and operations phase of the Projects.

TABLE 6: SUMMARY OF ABPP COMPONENTS

ABPP Component	Project Action	Status and Notes
Training	Train appropriate personnel, including managers, supervisors, engineers, wildlife biologists, dispatchers, and operations and maintenance personnel in avian and bat issues related to wind farm operation.	Construction and Operation Phases.
Permit Compliance	Ensure compliance with siting and pre-construction regulations such as WTGAC, ESA, BGEPA, MBTA and state requirements. Obtain salvage, monitoring, recovery, and transportation permits for post construction operations	Conducted pre-construction Tier 2 & 3 studies, Developing additional Tier 3 monitoring of eagles. Have identified contacts and salvage permit requirements.
Construction Design Standards	Minimize the areas of construction and temporary ground-disturbance activities, incorporate avian and bat-safe structures and protocols.	Pre-Construction Phase. The Projects have instituted siting designs that have avoided high use flight paths between WMA's and WPA's on the site.
Nest Management	Train appropriate personnel to ensure uniform treatment of avian nest issues and procedures.	Construction and Operation Phases.

ABPP Component	Project Action	Status and Notes
Wildlife Incident Reporting	Institute Wildlife Incident Reporting procedures and maintain database for quarterly reporting to regulating agencies.	Construction and Operation Phases. The Projects have developed the Wildlife Incident Reporting forms and procedures to monitor wildlife interaction.
Risk Assessment	Assess available data addressing areas of high avian/bat use, avian/bat mortality, nesting problems, established flyways, adjacent wetlands, prey populations, perch availability, evidence of perching on utility structures by large birds, effectiveness of existing procedures, institute remedial actions and other factors that can reduce avian and bat contacts with project facilities.	Pre-Construction Phase.
Mortality Reduction Measures	Identify retrofit or rectification efforts, and where new construction warrants, pay special attention to bald eagles, marbled godwits, and other wildlife issues where mortality or injuries are being documented.	Operation Phase.
Quality Control	Review existing practices and ensure quality control. Update this plan annually	Construction and Operation Phases.
Key Resources	Identify area USFWS and DNR biologists, engineers, planners, and operation personnel who are trained in avian interaction problems.	Construction and Operation Phases. Identified agency personnel and rehabilitation centers for injured wildlife.

ABPP Component	Project Action	Status and Notes
Risk Assessment	Assess available data addressing areas of high avian/bat use, avian/bat mortality, nesting problems, established flyways, adjacent wetlands, prey populations, perch availability, evidence of perching on utility structures by large birds, effectiveness of existing procedures, institute remedial actions and other factors that can reduce avian and bat contacts with project facilities.	Pre-Construction Phase.
Mortality Reduction Measures	Identify retrofit or rectification efforts, and where new construction warrants, pay special attention to bald eagles, marbled godwits, and other wildlife issues where mortality or injuries are being documented.	Operation Phase.
Quality Control	Review existing practices and ensure quality control. Update this plan annually	Construction and Operation Phases.
Key Resources	Identify area USFWS and DNR biologists, engineers, planners, and operation personnel who are trained in avian interaction problems.	Construction and Operation Phases. Identified agency personnel and rehabilitation centers for injured wildlife.

12.0 REFERENCES

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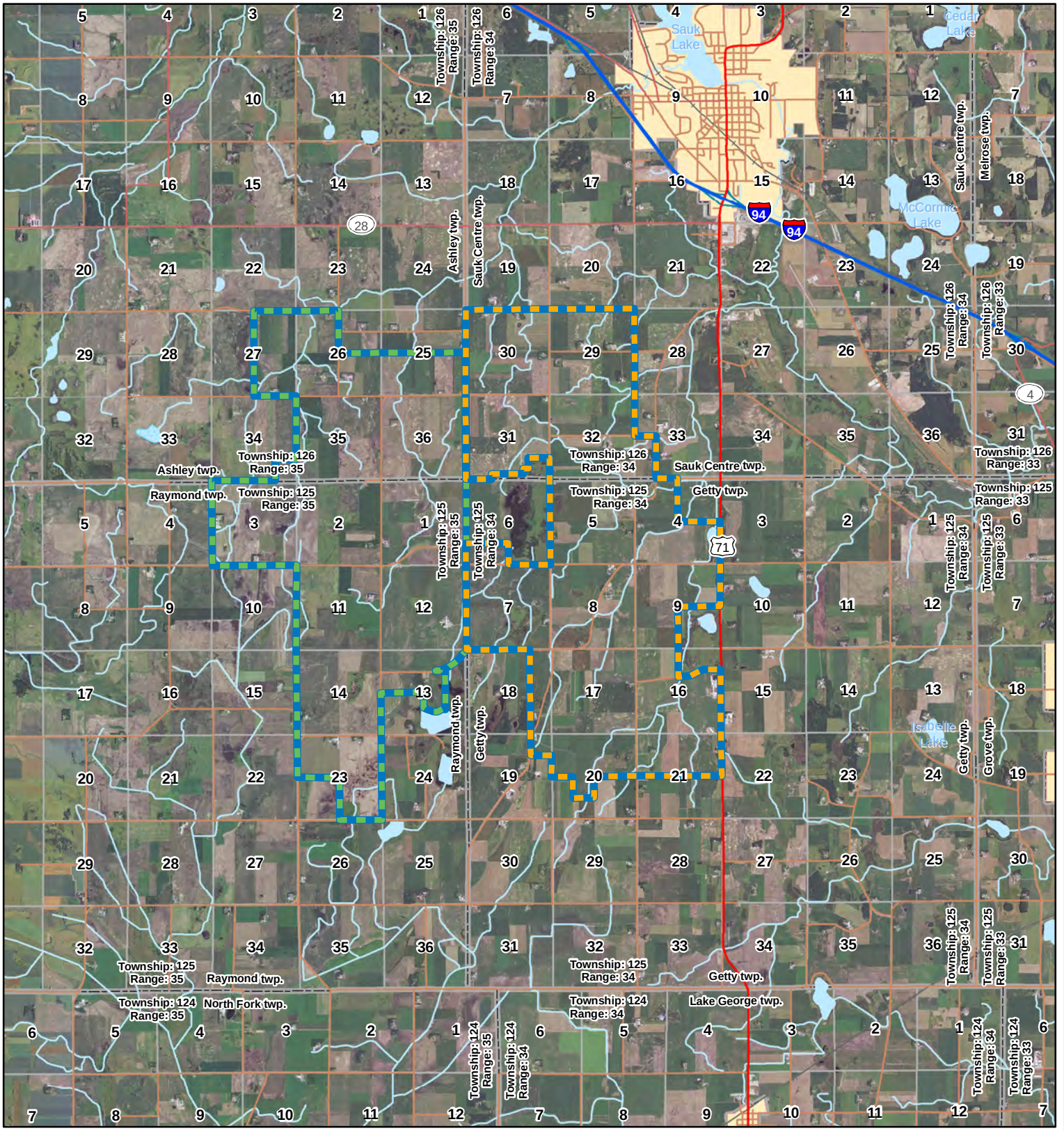
FIGURE 1: *DRAFT* PROJECT VICINITY



LEGEND

Black Oak | Getty | Municipal Boundaries | County Boundaries

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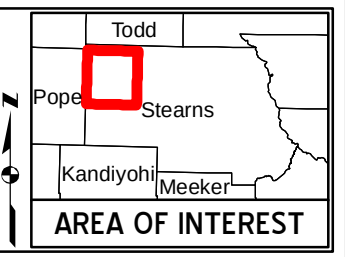
Miles

DATA SOURCES:
GERONIMO WIND ENERGY
USDA/NRCS
ESRI

Map Date:
2/8/2012

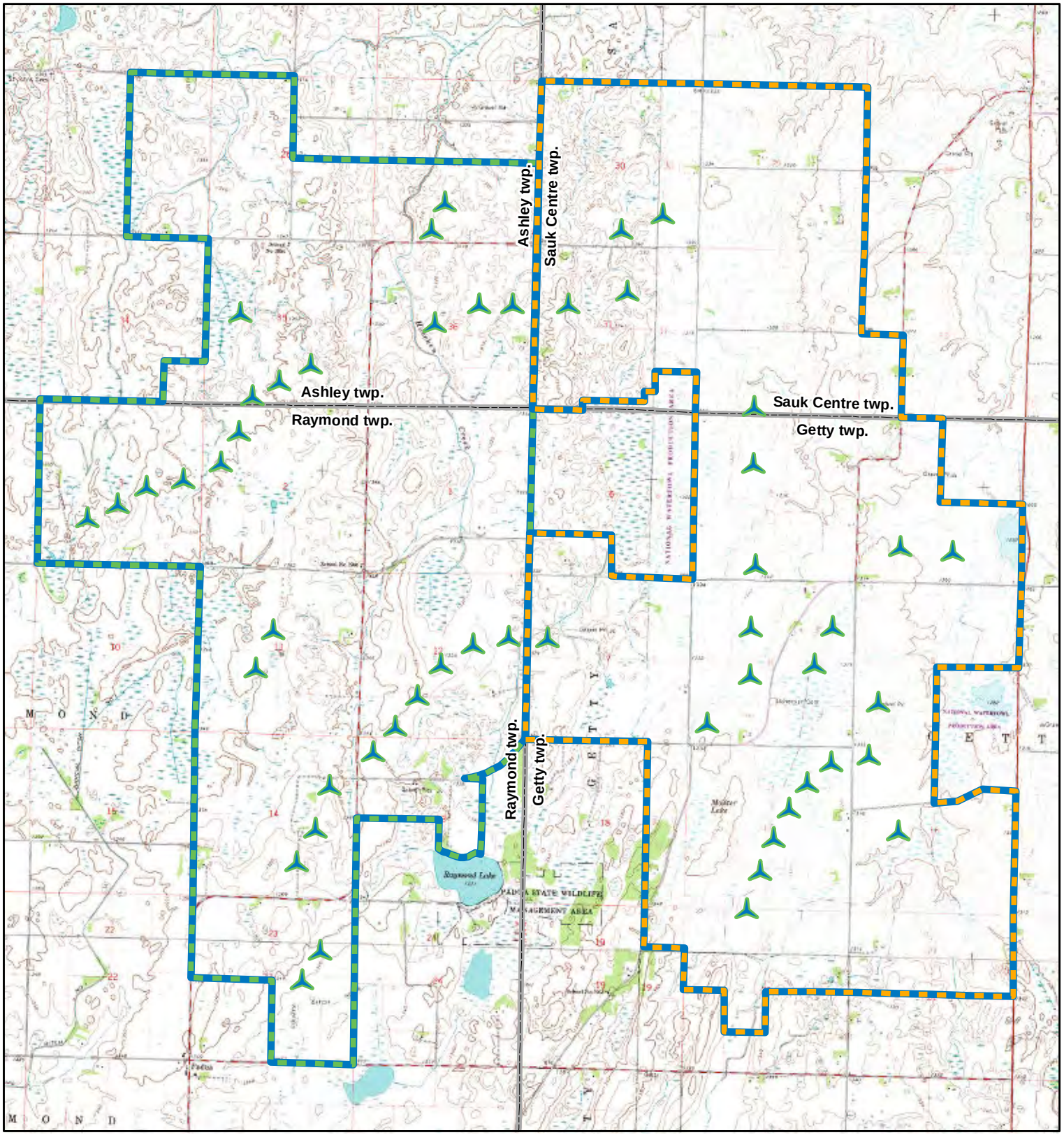
BLACK OAK WIND FARM
Stearns County, MN

GETTY WIND FARM
Stearns County, MN



DG 12/4/2009

FIGURE 2a: *DRAFT* GOLDWIND GW-87 LAYOUT



LEGEND

Turbine Layout | Black Oak | Getty | Municipal Boundaries

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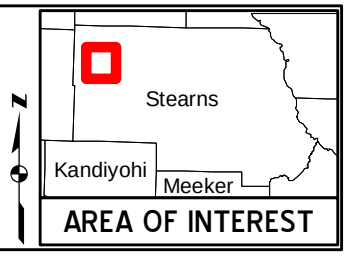
Miles

DATA SOURCES:
GERONIMO WIND ENERGY
ESRI

Map Date:
2/7/2012

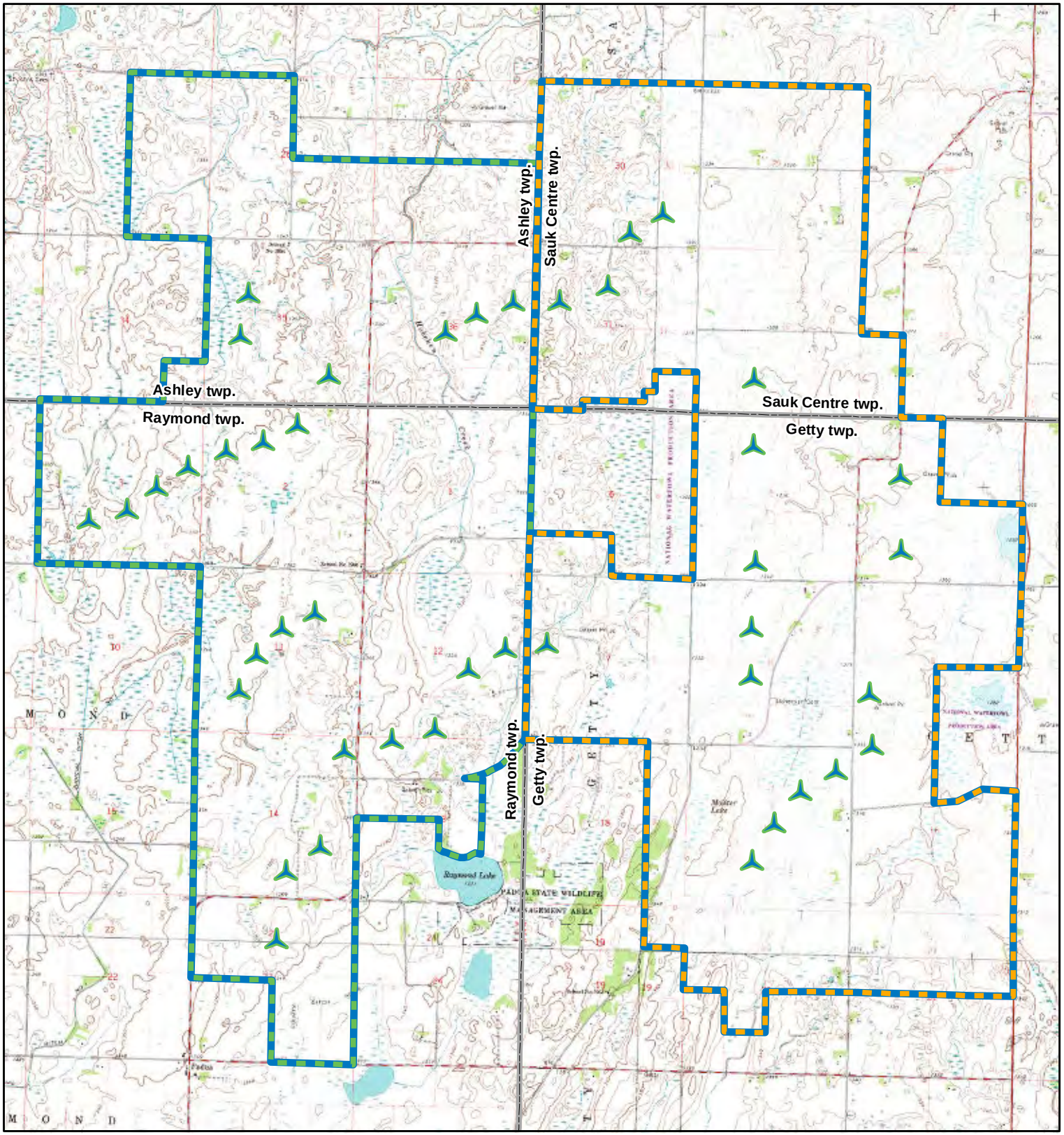
BLACK OAK WIND FARM
Stearns County, MN

GETTY WIND FARM
Stearns County, MN



DG 12/4/2009

FIGURE 2b: *DRAFT* REPOWER MM100 LAYOUT



LEGEND

Turbine Layout | Black Oak | Getty | Municipal Boundaries

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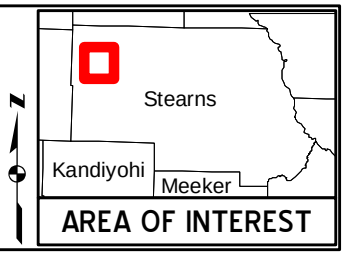
DATA SOURCES:
GERONIMO WIND ENERGY
ESRI

Map Date:
2/7/2012

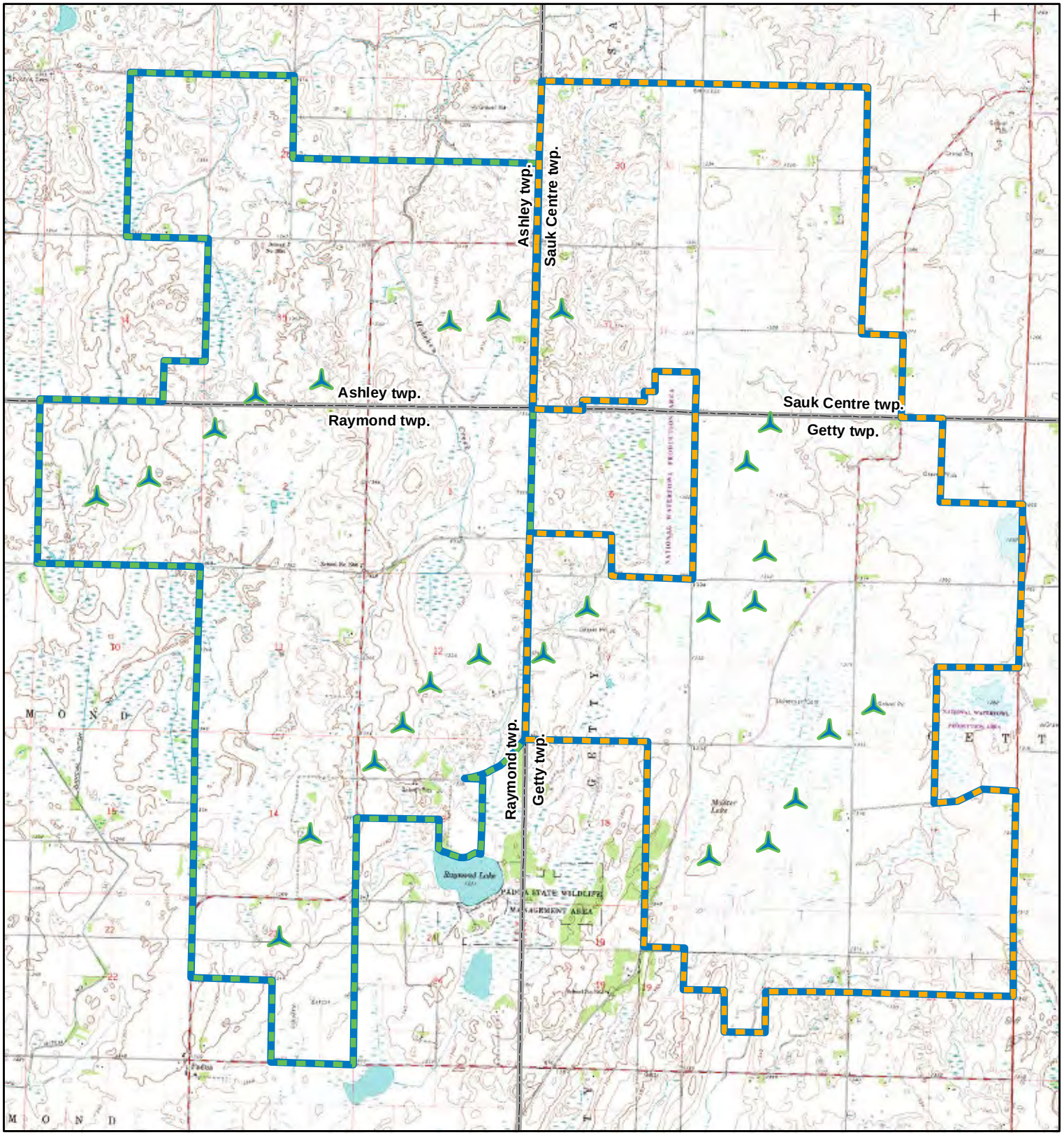
BLACK OAK WIND FARM
Stearns County, MN

GETTY WIND FARM
Stearns County, MN



DG 12/4/2009

FIGURE 2c: *DRAFT* VESTAS V112 LAYOUT



LEGEND

Turbine Layout | Black Oak | Getty | Municipal Boundaries

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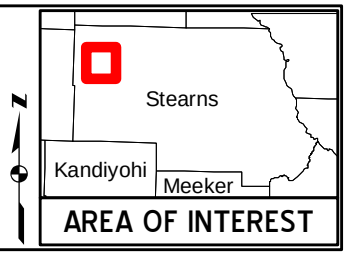
Miles

DATA SOURCES:
GERONIMO WIND ENERGY
ESRI

Map Date:
2/7/2012

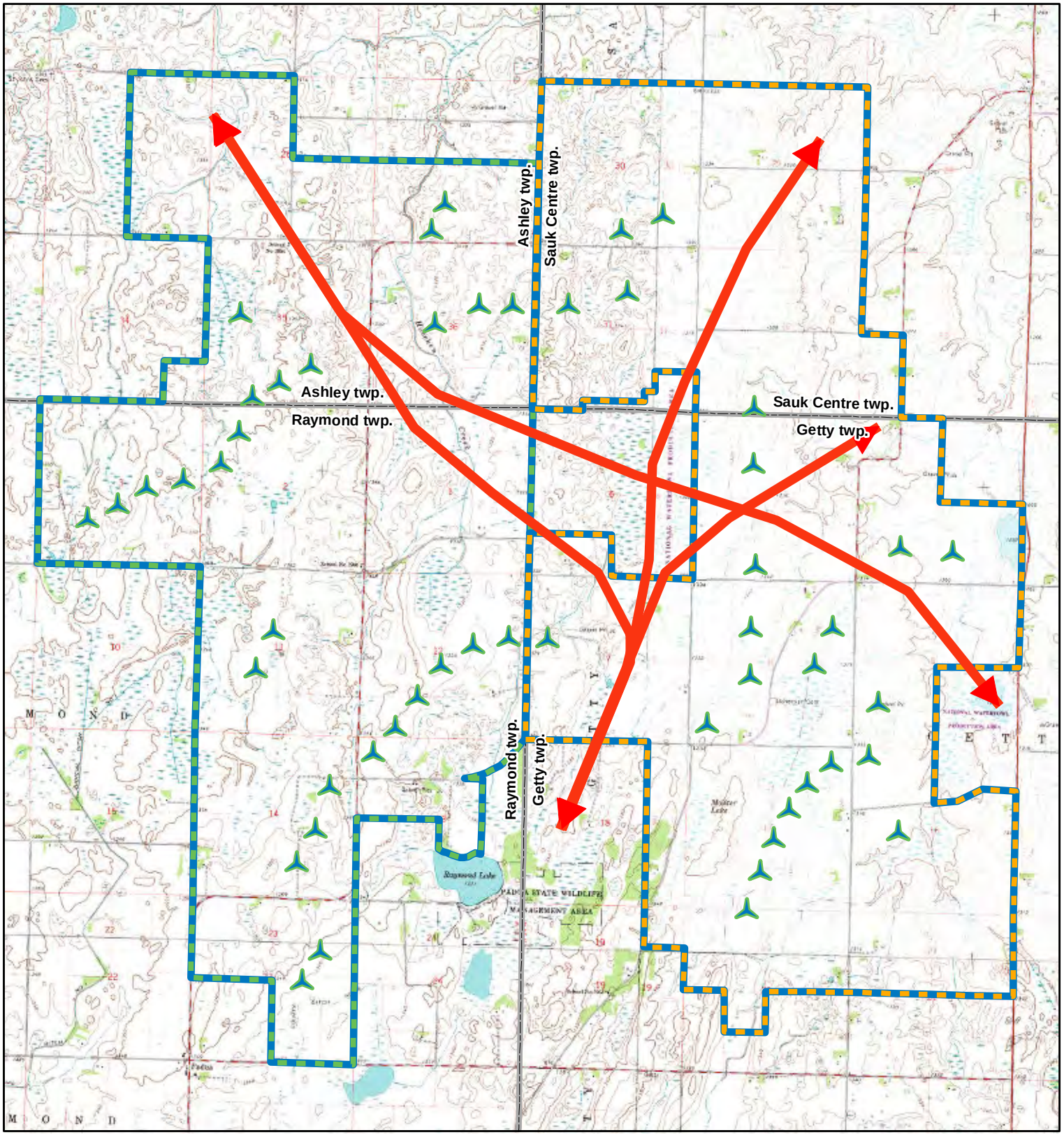
BLACK OAK WIND FARM
Stearns County, MN

GETTY WIND FARM
Stearns County, MN



DG 12/4/2009

FIGURE 3a: *DRAFT* AVIAN FLIGHT PATHS



LEGEND

Turbines, Goldwind GW87 | Black Oak | Getty | Common Avian Flight Paths

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Miles

DATA SOURCES:
GERONIMO WIND ENERGY
ESRI

Map Date:
2/7/2012

BLACK OAK WIND FARM
Stearns County, MN

GETTY WIND FARM
Stearns County, MN

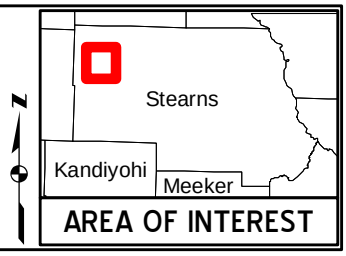
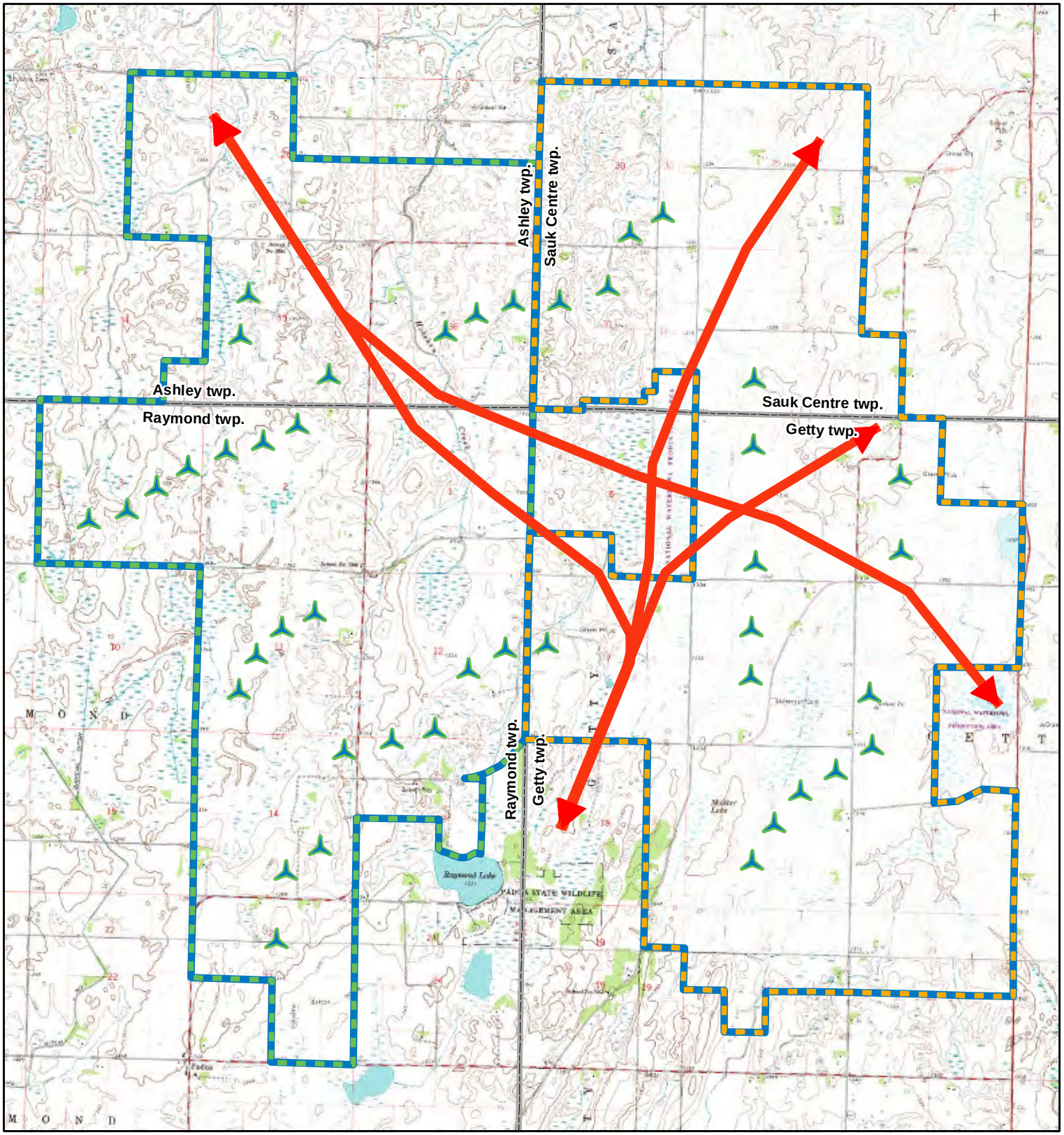


FIGURE 3b: *DRAFT* AVIAN FLIGHT PATHS



LEGEND

Turbines. RePower MM100 | Black Oak | Getty | Common Avian Flight Paths

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DATA SOURCES:
GERONIMO WIND ENERGY
ESRI

Map Date:
2/7/2012

BLACK OAK WIND FARM
Stearns County, MN

GETTY WIND FARM
Stearns County, MN

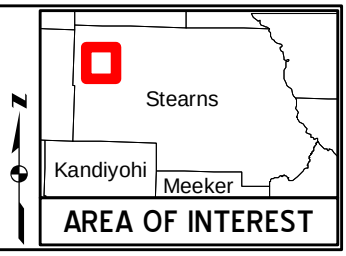
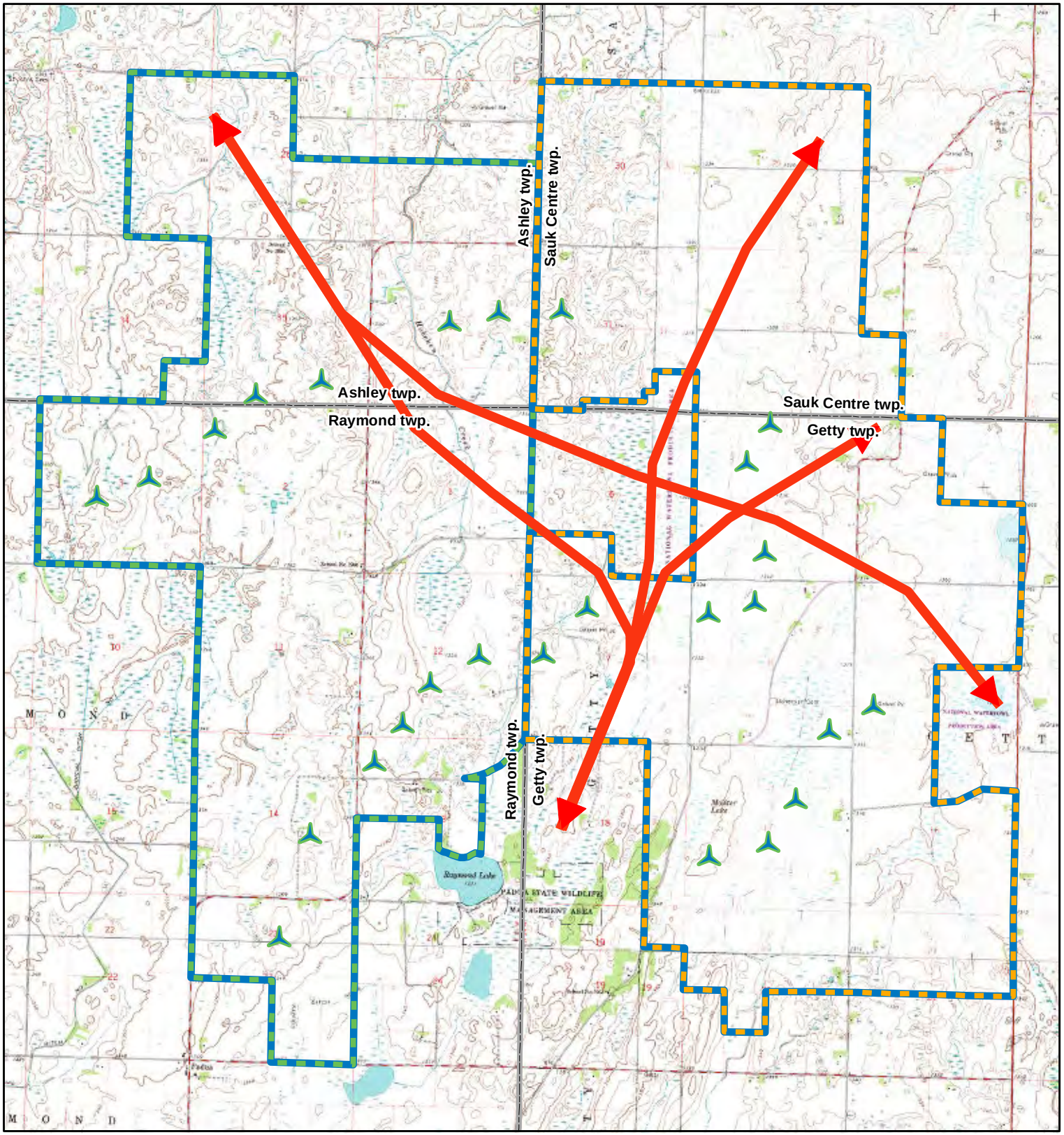


FIGURE 3c: *DRAFT* AVIAN FLIGHT PATHS



LEGEND

Turbines. Vestas V112 | Black Oak | Getty | Common Avian Flight Paths

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DATA SOURCES:
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BLACK OAK WIND FARM
Stearns County, MN

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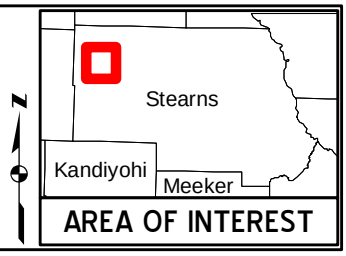

APPENDIX A
AVIAN USE ASSESSMENT

Avian Use Assessment Report on the Black Oak/Getty Wind Development Sites

Stearns County, Minnesota
August 2011

Prepared by
HDR Engineering, Inc.

Summary

The proposed Black Oak and Getty Wind Farms Projects (collectively, the Projects) occupy approximately 20 square miles of cropland, grassland, isolated wetland, and small woodlots. Within the boundaries of the Projects (collectively, the Sites) are numerous lakes, wetlands, and ditches that attract waterfowl and waterbirds. Several Waterfowl Production Areas (WPAs) and Waterfowl Management Areas (WMAs) also occur near or within the project boundaries. Many Project area wetlands are ephemeral in nature and express surface water only early in the spring or after a heavy rain. In order to facilitate row cropping, some ephemeral basins within the Sites have been ditched or tiled to remove surface water quickly.

Avian issues with wind projects have increasingly drawn concern from agencies and interest groups. Under the guidance of the US Fish and Wildlife Service (USFWS), the Minnesota Department of Commerce Energy Facility Permitting (EFP), and the Minnesota Department of Natural Resources (DNR), HDR Engineering, Inc., (HDR) developed biological survey protocols to address concerns about avian/wind turbine collisions, the disruption of avian flights, and wind project site use by bald eagles, marbled godwits, waterfowl, and other avian species of concern. These protocols characterize risks to avian species at wind development sites.

For the Projects, specific issues of concern included the present and historic use by bald eagles, marbled godwits, trumpeter swans, loons, and other selected Species of Greatest Conservation Need (SGCN). HDR was retained to evaluate avian use within a study area comprising the Sites and adjacent lands (Figure 1). The resulting surveys included a spring Avian Use/Flight Path survey, an Avian Wetland Utilization survey, Marbled Godwit nesting surveys, and a Bald Eagle Nest monitoring effort.

HDR biologists conducted Avian Use/Flight Path surveys to document all avian species and their associated flight paths at 11 survey points from April 1 through June 29, 2011. HDR estimated flight height, flight direction, distance from the survey point, and flight behavior of more than 106 different species during these surveys. An additional 10 species were observed during the three other surveys. HDR plotted flight paths on aerial photographs then digitized them using ArcGIS software to analyze flight information. No distinct flight corridors were identified for any particular species within the Project boundaries. However, grouping the data according to broad categories (i.e. waterfowl, waterbirds, raptors, passerines, etc.) may facilitate planning, micro-siting, minimizing impacts to sensitive species, and avoiding impacts to avian concentration areas or other high use areas that occur on the site during certain times of the year.

HDR biologists documented 22,863 individual birds made up of 116 different species during 23 separate monitoring dates. Four species identified by the DNR as endangered, threatened, or special concern (ETSC), and 22 species designated as a SGCN were documented within the

study area during the spring of 2011. An additional three ETSC species were observed outside Sites but within the study area. The seven ETSC species and the SGCN species together are referred to as sensitive species throughout the remainder of the document. Flight heights varied between species and individuals but biologists assessed flight trends by establishing a Mean Flight Height for each species observed. HDR also analyzed observation and flight data for four sensitive species avian groupings that included waterfowl, waterbirds, raptors, and passerines. The percentage of observed flights within the Rotor Swept Zone (RSZ, between 28 and 150 m above ground level (AGL)) was 24.0 percent for raptors, 33.1 percent for waterbirds, 37.6 percent for waterfowl, and 3.3 percent for passerines. However, a bias does exist toward birds that fly closer to the ground as they are more easily detected by observers.

HDR staff also monitored four wetlands near or within the project boundaries for waterfowl and waterbird use on nine separate occasions from April 1 through May 26, 2011. Use by 36 species and 1,472 individuals was documented in the four selected wetland complexes. The most commonly observed species were the American coot (50 percent of all observations) and ring-necked duck (8 percent of all observations). These surveys also documented the presence of breeding marbled godwits adjacent to the Projects' southern boundaries.

Biologists conducted marbled godwit surveys on April 19, May 10, and June 9, 2011, at the Kenna WPA, Trisko WPA, and Behnen WPA. The three WPAs are located immediately adjacent to or within the Sites. The purpose of this survey was to detect the presence or absence of breeding marbled godwits within the Black Oak/Getty Wind Farms. The DNR and USFWS requested the surveys based on historic records for this species on grassland habitats in the Project vicinity. No marbled godwits were detected during these surveys.

An active Bald Eagle nest discovered during the first week of Avian Use/Flight Path surveys was monitored weekly from April 7 through July 12, 2011. Raptors were present in low numbers at the site throughout the survey period. However, six different raptor species were observed using land on or adjacent to the Black Oak/Getty Wind Farms. Of the six raptor species observed, the red-tailed hawk and American kestrel are known to be susceptible to increased mortality rates from wind development due to flight behavior. Horned larks and vesper sparrows were abundant and are considered potentially sensitive to habitat displacement and higher mortality rates from wind development. During the breeding season, the vesper sparrow occurred in cropland habitat. Horned larks were present at all Avian Use/Flight Path observation points throughout the survey period.

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Introduction

Geronimo Wind Energy, LLC, is developing the Black Oak Wind Farm, a 42 megawatt wind energy project located on a site of approximately 7,064 acres in northwestern Stearns County. Getty Wind, LLC, is developing the Getty Wind Farm on a site of approximately 7,630 acres immediately west of the Black Oak Wind Farm (Figure 1). Because of the proximity of the Black Oak and Getty Wind Farms (collectively, the Sites) Geronimo Wind, LLC and Getty Wind, LLC, retained HDR to conduct biological surveys for the Projects. During the spring of 2011, HDR biologists conducted Avian Use/Flight Path surveys, Wetland Utilization surveys, Marbled Godwit surveys, and large bird/raptor nest surveys that later became an Eagle Nest Monitoring effort. This report summarizes the methods employed and results obtained during the spring season surveys, evaluates avian risk and implications of these surveys, and summarizes avian risks from the development of the Black Oak/Getty Wind Farms Project.

The Projects will be built on lands dominated by agricultural uses southwest of the city of Sauk Centre. While the turbine models have not yet been selected, they are expected to fall in the range of 1.5 to 3.0 Megawatts (MW), with tower heights of 80-100 meters (m) and rotor diameters between 82.5 and 112 m. Given these general specifications, the upper and lower limits of the rotor sweep zone (RSZ) would be between 28 and 150 m above ground level (AGL).

Habitats and Land Types

The Sites are located at the transition between the Minnesota River Prairie Ecological Subsection of the Prairie Parkland Province and the Hardwood Hills Ecological Subsection of the Eastern Broadleaf Forest Province (MDNR 2005). Historically, the predominant land cover in these sections and subsections was treeless, fire-dependent grassland and brushland types interrupted by lakes, streams, marshes, and pothole wetlands. Current land uses at the Sites are primarily croplands with numerous drained and undrained wetlands, along with pasture, homesteads, small woodlots, and fencerows to a lesser extent. Just outside the Site, several WPAs and WMAs harbor restored prairie, grassland, and lake habitats.

The Minnesota River Prairie Subsection of the North-Central Glaciated Plains of Stearns County is considered to be the heart of the Minnesota Cornbelt and the prairie pothole region, which hosts the most productive breeding habitat for North American waterfowl and other waterbird species.

The Hardwood Hills Subsection lies within the heart of the Mississippi flyway and harbors a large number of wetlands. Despite drainage of many of the historic wetland habitat, this part of Minnesota is also part of the prairie pothole region. This ecological subsection formed along the historic shores of Glacial Lake Agassiz, and rolling moraines deposited during the last

glaciations characterize the landscape. Level farmland, rivers, lakes, and wetlands of various sizes characterize the project area and glacial outwash land features. Land use within this subsection is predominantly agricultural, including corn and soybean production. Other land uses include pastured land, single-family homes, farmsteads, and WMAs or WPAs.

Regulatory Framework

Endangered Species Act

The federal Endangered Species Act (ESA) protects listed endangered and threatened species and their habitats. The ESA provides a mechanism to grant permission for incidental takings of listed species. At the state level, Minnesota Statutes, Section 84.0895, requires the Minnesota Department of Natural Resources (DNR) to adopt rules designating species meeting statutory definitions of endangered, threatened, and special concern (ETSC). The resulting list of ETSC species is codified as Minnesota Rules, Chapter 6134. The Endangered Species Statute also authorizes the DNR to adopt rules that regulate treatment of species designated as endangered and threatened. These regulations are further codified as Minnesota Rules, Parts 6212.1800 to 6212.2300. ETSC species are defined by the DNR as:

- **Minnesota Endangered Species:** A plant or animal species that is threatened with extinction throughout all or a significant portion of its range in Minnesota.

- **Minnesota Threatened Species:** A plant or animal species that is likely to become endangered within the foreseeable future throughout all or a significant portion of its range in Minnesota.

- **Minnesota Special Concern Species:** Species that are not endangered or threatened, but are extremely uncommon in Minnesota, or have unique or highly specific habitat requirements and deserve careful monitoring of their status. Species on the periphery of their range that are not listed as threatened may be included in this category along with those species that were once threatened or endangered but now have increasing or protected, stable populations.

Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act (BGEPA) was established in 1940 and assigns legal authority to USFWS to protect bald and golden eagles from takings and disturbance. Rules published on September 11, 2009, and finalized on November 10, 2009 (USFWS 2009), outline the issuance of take permits under the BGEPA. Permitted activities do not distinguish between lethal and non-lethal takes. Regulated activities also include those that disturb individual eagles by causing injury, decreasing eagle productivity, or by substantially interfering with normal breeding, feeding, or sheltering behavior.

Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) assigns legal authority to the USFWS Office of Law Enforcement to protect migratory birds from takings. The MBTA protects 1,006 species of birds, including waterfowl, shorebirds, songbirds, raptors, wading birds, and seabirds. Unlike the ESA and the BGEPA, MBTA regulates direct takings or nest destruction, and not habitat modifications. The level of direct take by a wind energy production facility that would invoke prosecution under the MBTA has not been established. There is currently no permitting process to protect a project developer from prosecution for incidental takings under the MBTA. The USFWS is actively developing a process similar to the BGEPA's under the MBTA that is specific to migratory birds other than bald and golden eagles (USFWS 2011).

Wind Advisory Committee Guidelines

The USFWS Wind Turbine Guidelines Advisory Committee (WTGAC) completed its recommended guidelines to mitigate impact to wildlife and their habitats related to land-based wind energy facilities on March 4, 2010. The WTGAC outline a tiered approach to evaluating and quantifying the affects of wind development on resident wildlife resources. This document recommends voluntary compliance with the guidelines and development of communication with USFWS personnel as part of due diligence to avoid and minimize effects to species regulated under the ESA, BGEPA, and MBTA. The WTGAC also recommends the adoption of best management practices during the development and construction of wind energy production sites. The WTGAC recommendations identifying species of concern to include those protected under the ESA, BGEPA, MBTA, or any that "(i) is designated by law, regulation or other formal process for protection and/or management by the relevant agency or other authority, or that has been shown to be significantly adversely affected by wind energy development, and ii) is determined to be possibly affected by the project."

Several WPAs and WMAs also occur adjacent to, or within 1 mile of the Sites. The USFWS established guidelines for considering wind turbine siting on WPA lands that may directly influence development of wind energy at this site. One of the guidelines directs USFWS refuge managers and district managers to avoid obvious "duck passes" between large, semi-permanent wetlands or sloughs and known migratory bird corridors or flight paths, especially in areas such as colonial bird nesting areas.

At the state level, the DNR has developed post-construction monitoring recommendations for wind developments. Additional state guidelines exist for setbacks from WMAs, Conservation Reserve Program, Board of Water and Soil Resources conservation easements, Conservation Reserve Enhancement Programs, Reinvest in Minnesota-Wetland Reserve Programs, Shoreland, and Public Waters.

Study Methods

Combining guidance provided by the DNR in their January 13, 2011, draft survey methodology, and information provided in direct consultations with the DNR, USFWS, and EFP, HDR developed a survey protocol for spring 2011 avian surveys. Survey methodologies for avian use implemented on the Project site included the following analyses: (1) Preconstruction Avian Use/Flight Paths, (2) Bald Eagle Nesting Activity, (3) Wetland Utilization and, (4) Marbled Godwit Surveys. The objectives of these surveys was to sample avian use of the site during the spring migratory period, identify breeding species within the site, develop data on habitat use patterns, and document flight paths used. USFWS, EFP, and DNR staff reviewed and approved the survey methods prior to implementation.

Preconstruction Avian Use/Flight Path Surveys

HDR conducted fixed-radius point counts to provide baseline data regarding the temporal and spatial use of the Sites by birds. Staff conducted point count surveys once per week for 13 weeks beginning April 1, 2011, and continuing through June 29, 2011. Standardized point count techniques were used to reduce methodological variance between observers or points (Ralph et al. 1995). The spring survey incorporated 11 fixed points in the study area (Figure 2) to address habitat use and document flight paths of migratory and breeding species. Points were established at locations that provided unobstructed sight lines to potential avian concentration areas such as wetlands, grasslands, and agricultural land. USFWS and DNR provided comment and suggestions on survey point selection. HDR staff monitored survey points within the study area for 30 minutes each monitoring period. Sometimes all eleven survey points could not be completed in one day and were monitored during consecutive days. In these instances, each day was counted as a separate survey.

Biologists documented information on species observed, flight height, flight direction, and behaviors within 200 meters beginning one-half hour before sunrise to 11 a.m., or for three hours before sunset. In addition, aerial photographs, landmarks, and standardized objects were measured using a laser rangefinder to standardize flight height estimates and to document the distance of flights taken by raptors and other large birds within 1 mile of each point. Avian flight height, flight direction, behavior, species, and time of day were recorded for each species observed during monitoring periods on data sheets and on aerial photographs. Surveys were conducted during all weather conditions and points were established with GPS technology capable of sub-meter accuracy to standardize sampling locations.

HDR used existing information prepared by the DNR and USFWS to compare data and to place observed data in context with trends detected by the Breeding Bird Survey (BBS), Minnesota Breeding Bird Atlas project, and historic records of sensitive species use. The BBS route at New London provided information about species composition in a similar habitat type and provided

an index of population trends in the same region of the state. Species richness was calculated for each observation point and for the site as a whole.

Bald Eagle Nest Activity Surveys

Recent developments involving the BGEPA in relationship to wind energy projects are creating a need for detailed information on bald eagle nests and eagle activity on and near wind energy project sites. Based on comments received from the USFWS and the proximity to known nest locations and potential habitat, HDR conducted an Eagle Nest Activity survey to identify nest locations and use areas in the Project vicinity. Experienced avian biologists conducted eagle and other stick-nest activity surveys within 5 miles of the Sites to identify current bald eagle and other raptor breeding use at current and historic nest sites. The biologists conducted searches for new nests from public roads by scanning forested areas and woodlots for stick nests and eagle activity. They observed raptor nests, and documented all raptor observations, and behavioral information.

Wetland Utilization Surveys

HDR biologists conducted wetland utilization surveys at open water wetlands within 1 mile of the project site to document waterfowl and waterbird use (Figure 2). They documented observations of waterfowl and waterbirds from publicly accessible sites at four wetland locations within or near the Sites, recording the number and species of waterfowl and waterbirds present at each site during a stay of 10-15 minutes. Wetland observations occurred weekly from April 7 through May 20, 2011.

Marbled Godwit Surveys

HDR biologists conducted transect surveys on the adjacent publicly owned Behnen, Trisko, and Kenna WPAs (Figure 2). The Behnen WPA contains historic breeding season records of marbled godwits and the WPAs in aggregate contain most of the suitable grassland habitat within the Project boundaries for this species.

Field investigations focused on the presence of marbled godwits but also documented the presence and behavior of other species at these sites. HDR used two different survey methods: pedestrian transect surveys and observation point surveys. Transects were established at each of the three WPAs and surveys were conducted once each in April, May, and early June. An HDR biologist walked each transect (starting from approximately 30 to 120 meters from adjacent roads and continuing as far into the WPA as practicable) stopping to listen for 3 minutes every 50 m for the presence of marbled godwits. A 30-minute point count occurred from one centrally located point at each WPA. HDR biologists used binoculars and spotting scopes to observe bird activity at each site. Information on all species observed, flight directions, behaviors, flight heights, weather information and time of day were recorded. When marbled godwits were seen,

notes on behavioral information, habitat use, and location were collected using a hand-held GPS capable of sub-meter accuracy.

Data Analysis

Data were analyzed to determine which species utilize airspace within the RSZ, where flight paths occurred, and where birds were concentrated. Relative abundance (the number of birds of a particular species as a percentage of the total observations in a given area) was calculated for each species. Flight frequency within the RSZ was also calculated for each of the four species groups observed during the Avian Use/Flight Path Surveys based upon the number of times a species was observed per 30 minutes of observation. Those species with the highest relative abundance occurring within the RSZ theoretically have a higher chance of experiencing mortality as a result of collisions with turbine blades. However, recent studies suggest that exposure in the RSZ is not always a good predictor of bird mortality because bird behavior also affects mortality (e.g., Erickson et al. 2002, Smallwood et al. 2009). Sensitive species flight data were further evaluated by species to assess risk and utilization of flights within the RSZ.

Waterfowl data were divided into Migratory (April 7 to May 5, 2011) and Breeding (May 5 to June 29, 2011) periods in order to evaluate utilization. Those species that breed on the site are expected to incur higher utilization rates due to their presence throughout the survey period than species that are present for a few days or weeks at a time during spring migration.

Literature Review

HDR conducted a literature review to assess potential impacts to waterfowl, grassland birds, or birds of conservation concern at the Project site. Literature referring to avian impacts due to collisions, habitat fragmentation, and behavioral avoidance was reviewed for relevance to the proposed Project. HDR reviewed several peer-reviewed studies, consultant studies for wind energy developers, and government agency studies, and incorporated the relevant conclusions into the study design, data review, and resulting conclusions.

Results and Discussion

Habitat and Land Use

According to GAP land cover data (Figure 3), the Sites are primarily cropland with scattered patches of grassland. Table 1 estimates the acreages of each land cover type based on GAP data.

Table 1: GAP Land Cover Data within Sites

Cover Type	Study Area (Ac)	Percent of Study Area
Aquatic	22	0.2
Cropland	12,130	82.5
Grassland	2,340	15.9
Forested	9	<0.1
Marsh	121	0.8
Shrubland	76	0.5
Total	14,699	100

Based on HDR's site observations, most of the mapped grassland areas are cropped, plowed, or converted to cropland. The few parcels of grassland that exist within the Sites consist of pasture or wetlands. Substantially less grassland exists within the Study Area than suggested by the GAP land cover.

Observation Effort

HDR conducted 22 Avian Use/Flight Path surveys at 11 stations on the Sites between April 1, 2011, and June 29, 2011. Each station was surveyed for 30 minutes every week for a total preconstruction Avian Use/Flight Path survey time of 4,290 minutes (71.5 hours total observation time or 6.5 hours of observation per station). Three additional 30-minute point counts were conducted three times during the Marbled Godwit Surveys. Additional observation time was logged during Bald Eagle Nest Activity surveys and Wetland Utilization surveys for a total of 180 additional minutes (3 hours) of observation at the Project site.

Detection Data

A total of 22,863 individual birds, representing 106 different species, were documented during the spring visits to the 11 point count stations. An additional 4,880 individual birds were documented that were either too far away to identify to species level, too abundant to identify individually, or were only observed for a moment and critical identification characteristics were missed. An additional 1,897 individual birds were counted during Wetland Utilization (Appendix A) and Marbled Godwit (Appendix B) surveys, adding 10 more species to the overall species richness of the site.

The observation point with the highest species richness (60) was observation point 161027-4, situated on the eastern boundary of the Trisko WPA. Habitat associated with point 161027-4 included a large grassland/wetland complex to the west of the point and a mixture of cropland, wetland, and planted trees to the east, north, and south. Avian use in this area reflected species associated with wetland nesting and foraging as well as grassland species and some woodland species utilizing the patchy woodlands. Observation points 113816-3 and 113816-4 had the next highest richness totals with 54 and 52, respectively. Both of these points likely had higher species richness due to the presence of trees, which harbored many woodland species that were not present at most of the remaining observation points. Both points are also situated north of a wetland complex that harbored marbled godwits and a variety of waterbirds and waterfowl.

Survey points with the lowest richness totals (29, 34, and 35) were located in areas that were predominantly cropland with little habitat diversity and that were relatively isolated from larger waterbodies associated with WMAs and WPAs.

The Project Snapshot (Appendix C) provides a list of species documented at the Sites site along with a summary of species richness by point, species richness by habitat, mean abundance by point, mean abundance by habitat, mean flight-height, mean flight-height by point, mean flight-height by species, overall mean abundance, mean abundance by point, total abundance, and a list of sensitive species and their abundance. Species richness is the number of different species observed at a given point. The mean abundance is the average abundance at a given point and was also calculated for each species' flight heights.

Comparison of Use Data

Comparisons of avian use data between the Black Oak/Getty Project study area and other wind projects were conducted by calculating mean use. Mean-use rates were measured by dividing the number of birds observed within 800 m from each point during 20 minutes of survey (i.e. birds/plot/20 min. survey/800 m). Although surveys were conducted for 30 minutes at each point in the study area, observations were recorded in 10-minute intervals that allow a comparison between projects with shorter survey periods. HDR eliminated the last ten minutes of the 30-minute survey period to compare the Black Oak/Getty Wind Farms with 20-minute surveys at other sites. Eliminating the last 10-minute interval resulted in 14,575 birds being counted as one of 93 species at the Black Oak/Getty Wind Farms study area. HDR calculated use-rates by combining species into the following groups: waterfowl (all ducks, geese, and swans), waterbirds (loons, herons, terns, pelicans, bitterns, and cranes), and raptors (hawks, eagles, falcons, and harriers). Mean-use rates for passerine (all songbirds, perching birds, or landbirds) were not widely available so only general abundance and flight data information was calculated for the Project. Additionally, species listed as ETSC/SGCN were also grouped to analyze flight paths and assess risk.

HDR analyzed flight data for each species and for waterfowl, waterbirds, raptors, and passerines. Flight height was analyzed to assess the relative collision risk for each species considered sensitive (i.e. species designated as ETSC and those considered SGCN) and species groups that were detected during the spring surveys. Relative risk was calculated by estimating the number of individuals of each species group that flew through the likely RSZ (Table 2). Four turbine designs are currently being considered for the Projects. The RSZ for project turbines ranges from approximately 28 meters to 150 meters. Those species whose mean flight-height was below or above the RSZ would incur relatively lower risk than those species whose mean flight-height was within the RSZ.

Table 2: Relative Risk by Species Groups Observed During Avian Use/Flight Path Surveys

Species Group	Number of Flights Observed	Percentage of Flights Observed in RSZ
Waterfowl	379	37.6
Waterbirds	181	33.1
Raptors	129	24.0
Passerines	1792	3.3

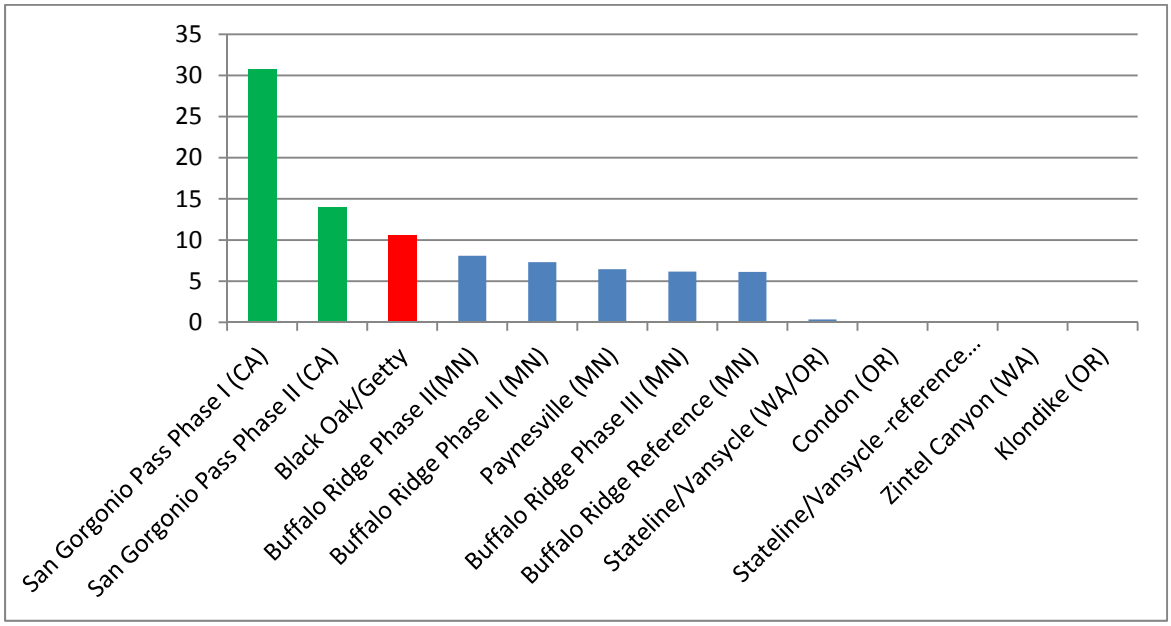
Waterfowl/Waterbird Use Comparison

Waterfowl/waterbird use at the Black Oak/Getty Wind Farms study area was compared to the Paynesville Wind Resource Area (6.46 birds/survey) also located in Stearns County, Minnesota (Hamer Environmental, 2010). The higher waterfowl/waterbird use at the Black Oak/Getty Wind Farms study area (10.59 birds/survey) is likely due to the presence of numerous large waterbodies associated with Padua WMA, Trisko WPA, Kenna WPA, and Raymond Lake, as well as other nearby marsh systems that harbor suitable nest habitat associated with the wetlands. The avian use report for an additional Stearns County wind farm, Lake Country Wind Farm, was also reviewed for comparison (Malcolm Pirnie, 2010). The study revealed similar species composition and migration timing, but mean use numbers were calculated based upon a different sample period. Therefore, dissimilar use results were reported and could not be directly compared. Erickson et al. (2002) analyzed overall avian use and compared it to observed mortality at several wind farm sites throughout the country. This study concluded that for waterfowl, mortality appear to be very low compared to use of the site. It also concluded that those sites with year-round use have exhibited the highest levels of mortality.

Avian use rates at the Black Oak/Getty Wind Farms study area were compared to other agricultural wind resource areas across the country based on data from the Erickson report. However, it was necessary to modify the data analysis to make the use-data comparable (e.g. using only 20 minutes of data instead of the full 30-minute data set). Mean use by waterfowl and

waterbirds was higher at the Black Oak/Getty Wind Farm study area than at any of the other 10 wind resource areas evaluated by Erickson in an agricultural landscape. However, two other wind resource areas located in a natural landscape with significant water resources had higher rates (San Gorgonio Pass Phase I and II, with 30.771 and 13.973 birds/survey, respectively).

Chart 1. Mean Waterfowl/Waterbird Use

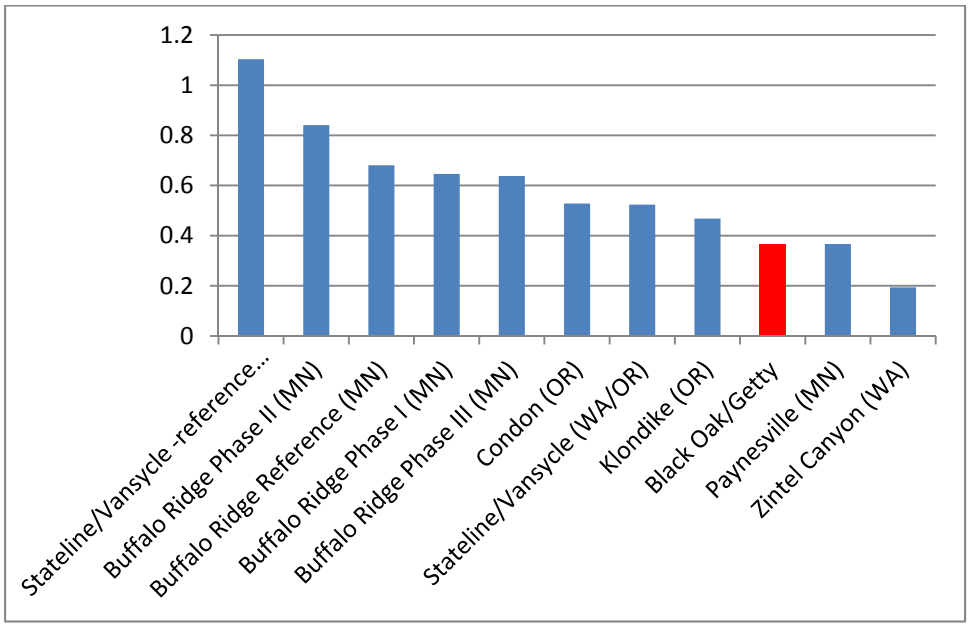


Note:
Mean Use was compared to ten wind resource areas located in agricultural landscapes (Blue) and two located in native landscapes with significant water features (Green). Mean Use was calculated using (Birds/20 Minute Survey/under 800 meters)

Raptor Use Comparison

Raptor use at the Black Oak/Getty Wind Farms study area was 0.36 birds/survey which is similar to the Paynesville Wind Resource Area (0.36 birds/survey) in Stearns County, Minnesota. HDR also used Erickson et al. (2002) who analyzed overall raptor use and compared it to observed raptor mortality at several wind farm sites throughout the country. This study concluded that for raptors, use may not be a good predictor for mortality when considering newer generation wind turbines. Raptor use rates at the Black Oak/Getty Wind Farms study area were compared to other agricultural wind resource areas across the country based on data from the Erickson report. However, some data analysis modifications were necessary to make the use-data comparable (e.g. using only 20 minutes of data instead of the full 30-minute data set). Mean use by raptors at the Black Oak/Getty Wind Farms study area was in the lowest quartile (0.36 birds/survey) of the other 10 wind resource areas evaluated by Erickson in an agricultural landscape (Chart 2).

Chart 2. Raptor Utilization at Black Oak/Getty Wind Farms



Note:
Mean Use was compared to ten wind resource areas located in agricultural landscapes (Blue). Black Oak/Getty use is depicted in red. Mean Use was calculated using (Birds/20 Minute Survey/under 800 meters)

Passerine Comparison

A comparison of the most frequently recorded Passerine species at the New London BBS routes in Stearns County, and those observed at the Black Oak/Getty Wind Farms study area, indicate the species most frequently observed are very similar. As a comparison, Table 3 lists the 10 most commonly observed species along the New London BBS route and at the Black Oak/Getty Wind Farm study area.

Table 3: Ten Most Frequently Observed Passerine Species at the New London BBS Route and Black Oak/Getty Wind Farms Study Area

New London BBS Route	Common Name	Scientific Name	Black Oak/Getty	Common Name	Scientific Name
1	Red-winged blackbird	*Agelaius phoeniceus*	1	Red-winged blackbird	*Agelaius phoeniceus*
2	Common grackle	*Quiscalus quiscula*	2	Common grackle	*Quiscalus quiscula*
3	Common yellowthroat	*Geothypis trichas*	3	Lapland longspur	*Calcarius lapponicus*
4	Mourning dove	*Zenaida macroura*	4	Brown-headed cowbird	*Molothrus ater*
5	European starling	*Stunus vulgaris*	5	Horned lark	*Eremophila alpestris*

New London BBS Route	Common Name	Scientific Name	Black Oak/Getty	Common Name	Scientific Name
6	Horned lark	*Eremophila alpestris*	6	American crow	*Corvus brachyrhynchos*
7	American robin	*Turdus migratorius*	7	Brewer's blackbird	*Dolichonyx aryzivorus*
8	Cliff swallow	*Petrochelidon pyrrhonota*	8	Barn swallow	*Hirundo rustica*
9	Grasshopper sparrow	*Ammodramus savannarum*	9	American Robin	*Turdus migratorius*
10	Ring-necked pheasant	*Phasianus colchicus*	10	American goldfinch	*Spinus tristis*

Conservation Priority Species

No species currently listed under the federal ESA was detected during the spring 2011 surveys. However, seven species listed by the State of Minnesota as endangered, threatened, or special concern were detected at the Sites during spring 2011 surveys. Observations of state-listed sensitive species include; marbled godwit (*Limosa fedoa*, SPC), Wilson's phalarope (*Phalaropus tricolor*, T), trumpeter swan (*Cygnus buccinator*, T), horned grebe (*Podiceps auritus*, T), Forster's Tern (*Sterna forsteri*, SPC), American white pelican (*Pelecanus erythrorhynchos*, SPC), and bald eagle (*Haliaeetus leucocephalus*, SPC). Special concern species are not provided the same statutory protection as endangered or threatened species, but are protected from indiscriminant taking by the MBTA and state wildlife laws (i.e. hunting regulations). The bald eagle is also protected from taking and disturbance by the BGEPA.

Additionally, species that are experiencing population declines or are considered to be particularly susceptible to wind development (i.e. species listed as ETSC or SGCN that are cited in research reports such as Erickson et; al.) were also noted during the spring 2011 survey period. Species designated as SGCN or that are experiencing local or regional declines by the BBS were documented on the Sites. While neither an SGCN or BBS declining-species designation confers legally protected status, they are protected from indiscriminate taking by the MBTA and were noted as a concern by the DNR or USFWS during review of survey methods or preconstruction meetings.

State Listed Species

Trumpeter Swan

The trumpeter swan is currently a state-listed threatened species. A forthcoming update of the endangered species list will downgrade this species to special concern due to the success of restoration efforts exceeding population goals. During the breeding season, trumpeter swans

typically select small ponds, lakes, or bays within larger lakes with extensive beds of cattails, bulrush, sedges, and/or horsetail. Coffin and Pfannmuller (1988) state that "Muskrat houses and beaver lodges are frequently used for nesting platforms." They are known to protect large territories during the nesting period and are intolerant of crowding by other species. They have been known to kill perceived competitors such as pelicans while protecting breeding territories (Mathisen pers. com.). Trumpeter swan nesting territories range from 6 to 150 acres. They use large, shallow wetlands 1-3 ft deep where a diverse mix of emergent vegetation and open water offer ideal habitat. Such locations support a rich variety of submerging (underwater) plants used for food, such as pondweed and water milfoil.

Trumpeter swans were observed during the Wetland Utilization Survey on May 19, 2011. Two feeding adult swans were observed at Wetland Point #3 in a wetland south of County Road 22 adjacent to the southern limit of the Sites. Numerous lakes and wetlands in this area display suitable nesting characteristics. However, no additional trumpeter swan observations were noted during Avian Use/Flight Path surveys and no nests were found within or near the Project on subsequent visits to this same wetland or surrounding waterbodies.

Horned Grebe

Horned grebes are a state- listed threatened species. Historically this species has bred throughout the Prairie Parkland Province of Minnesota. Horned grebes inhabit lakes with a mix of open water and wetland vegetation during the breeding season. Nests are built over water on large water bodies (over 10 hectares (ha.)) where bays and inlets provide protection from wind action (Coffin and Pfannmuller 1988). Nests are constructed in shallow water, usually within emergent vegetation. Coffin and Pfannmuller state that "On larger wetlands and water bodies, they tend to lose out in competition with other grebes and probably also with loons. As a result, they are usually found on small water bodies that often have little emergent vegetation." The horned grebe is a summer resident that is now primarily restricted to Roseau, Marshall, and Pennington Counties in northwestern Minnesota (Janssen 1987).

The one observation of a horned grebe occurred on April 14 during Wetland Utilization surveys at Wetland Point #1 and was recorded during the migratory period for this species. No additional observations of any kind were documented in subsequent surveys. Although suitable habitat does occur within the Padua WMA and other WPAs near the Sites, an isolated observation of this species during the migratory period seems to indicate that this species is a migrant and not a breeding species at this location.

Wilson's Phalarope

Wilson's phalaropes are listed as a threatened species by the State of Minnesota. Recent breeding records for this species occur throughout the Prairie Parkland Province in wet meadows or grasslands associated with shallow wetlands (Coffin and Pfannmuller, 1988). This species is

highly aquatic and forages for dipterans and crustaceans while swimming (O'Brien et al. 2006). DeGraaf and Rappole (1995) state that "The primary breeding habitat of Wilson's phalarope is shallow water bodies in disturbed mixed grass prairies and agricultural areas." The species may breed semi-colonially and nests in a variety of wetland types that range from shallow ponds to lakes. Several authors note that it has also been found nesting in shallow swales along streams, in shallow sloughs fringed with short grasses, and in hay meadows or pastures (Colwell and Jehl 1994, DeGraaf and Rappole 1995).

Several areas within and near the Sites provide some of the preferred habitat characteristics of the species. One flock of 16 Wilson's phalaropes was recorded during Avian Use/Flight Path Surveys on May 20, 2011, and up to eight individuals were recorded during Wetland Utilization surveys. Wilson's phalaropes occurred during three consecutive weeks beginning on May 10, 2011, with the last observation occurring on May 27, 2011(Figure 4).

On May 10, eight birds were observed within a wetland/pasture complex in the NW ¼ of Section 25 Raymond Township. Three males and five females foraged in several small, shallow-water wetlands with grassy edges at Wetland Point #3 within 400 m of the Sites. The following week one male and one female were observed engaging in low circling flights around the same wetland/pasture complex in the SW ¼ of Section 24 Raymond Township. Additionally, 16 Wilson's phalaropes were recorded at 113816-3, 1 mile north of the same wetland/pasture complex flying to the northwest during point count surveys. The last observation of this species was recorded at Wetland Point #3 on May 27, 2011 in a flooded grassland one-quarter mile west of the same wetland/pasture complex in the SE ¼ Section 23, Raymond Township.

The multiple observations of Wilson's phalaropes within the same wetland/pasture complex indicate the area is important as a migratory use area but all observations of this species are outside of what is considered a "safe date" for breeding. The Minnesota Breeding Bird Atlas (MBBA) establishes the "safe date" for probable evidence of breeding to begin on June 1 and end on August 1 of a given year. No subsequent Avian Use/Flight Path or Wetland Utilization surveys detected the presence of this species. However, this species has been recorded breeding in Stearns County and the presence of abundant suitable habitat on and near the Sites indicates the species may be a breeding species in some years.

Marbled Godwit

Marbled godwits are listed as a special concern species by the State of Minnesota. Recent breeding records for this species occur in two regions of the Prairie Parkland Province within the state. The primary breeding areas within Minnesota occur along the Glacial Lake Agassiz Beach Ridge of the Red River Valley and northwestern portion of the state. Two smaller populations are centered along the Minnesota River and wet prairie areas of central Minnesota (Melcher et al. 2006). Melcher et al. also suggests that the Minnesota population nests preferentially in sparsely

vegetated native grassland habitats that are often grazed or recently idled from grazing. However, other studies indicate that they will use tame grass habitats, including hayfields and idle pastures if the vegetative structure is similar to native grassland habitats (Ryan et al. 1984). Marbled godwits require large contiguous blocks of grassland/wetland complexes that represent a broad range of sizes and types to breed successfully (Ryan et al. 1984). Records of historic use near the Sites by this species are also recorded in the DNR Natural Heritage Inventory System (NHIS) database.

Areas that exhibit these habitat characteristics are located in Sections 23, 24, and 25 of Raymond Township at the southern end of the Sites (Figure 4). Godwits were documented at Wetland Point #3 in this area every week from April 19 through June 24, 2011, during Wetland Utilization surveys. On several occasions, two male-female pairs could be seen on the north and south sides of a wetland/pasture complex in Sections 24 and 25. Up to three males were seen engaging in aerial displays over this same wetland/pasture complex on April 19 and 29, and May 10, 20, and 26. Observations at Wetland Point #3 continued to note marbled godwit behaviors and to assess breeding evidence beyond May 20. Additionally, marbled godwits were noted during Avian Use/Flight Path counts at Points 1, 2, 3, 4, and 6 from the end of April through June. Most observations were associated with grasslands or pastures. However, three observations were associated with flooded cropland where the birds were seen foraging.

Marbled godwits engaged in two distinct flight types during the spring 2011 surveys. The display/courtship flights consisted of birds observed circling suitable nesting habitat while calling or chasing other godwits. In these flights, the birds were noted flying as high as 70 meters AGL and activity occurred for periods of 3 to 20 minutes. Biologists observed these display flights on five different days and display flights occurred multiple times during some observation periods.

The second flight type was a directional flight, which was noted on two occasions. Flight heights during directional flights ranged from 2 to 20 m. In both instances flights originated in areas north or west of the presumed breeding area at the south end of the Sites. The MBBA establishes the “safe date” for evidence of probable breeding marbled godwits to begin on May 10 and end on July 20 of a given year. The presence of territorial godwits of both sexes in suitable habitat throughout the spring indicate that this species likely breeds on or near the Sites. No godwits were observed during any of the marbled godwit surveys conducted at the Behnen, Trisko, or Kenna WPAs. These WPAs contain abundant grassland/wetland complexes of suitable size, but during the 2011 surveys were characterized by monotypic late season grass species and forbs that did not provide the short stature grassland/wetland interface preferred by this species. The observations of godwits at other locations throughout the project area may indicate that, in addition to using the site for foraging, this species utilizes grasslands throughout the project site

when they provide habitat with the proper structure and vegetative composition in any given year.

Forster's Tern

Forster's terns are listed as a special concern species by the State of Minnesota. Historically this colonial species has bred throughout the western third of the state in the Prairie Parkland Province eastward into the Eastern Hardwood Forest Province. Although this species is known to occupy traditional nesting locations throughout the state, water levels appear to dictate whether a given nest site is occupied during a given year. Nesting colonies are located on the floating vegetation at the interior of marshes or lakes (Scharf 1991). In Minnesota, some studies of Forster's Tern have found that reproductive success was below levels needed to maintain this species at its current size (Cuthbert and Louis, 1986). Habitat utilized by this species consists of extensive areas of emergent vegetation where nests are constructed on emergent vegetation or muskrat houses.

Forster's terns were observed during Wetland Utilization surveys at Wetland Point #4 twice during migration on May 10 and 19, 2011, at the wetland located adjacent to U.S. Highway 71 on the northeast boundary of the Project site (Figure 4). This species was not observed during the Avian Use/Flight Path surveys and no active breeding colonies were found on wetlands within or adjacent to Sites.

American White Pelican

The Minnesota DNR currently lists this species as of special concern and several studies have shown this species' abundance is increasing across its range over the past 20 to 25 years (Wires et al. 2005; Evans and Knopf 1993). This species is a colonial nesting species that selects large, shallow bodies of water that are rich in prey fish. Usually the nesting site is a flat, bare island that is isolated from human disturbance (Coffin and Pfannmuller, 1988).

American white pelicans were observed frequently during both the Avian Use/Flight Path and Wetland Utilization Surveys. They were observed feeding at waterbodies associated with the Kenna, Trisko, and Behnen WPAs and at the Padua WMA adjacent to Raymond Lake. Observations were also documented while this species was flying to other lakes and rivers near the Project. Most of the flight observations were of birds travelling between wetlands, rivers, and the larger lakes and waterbodies to the west and northeast of the Sites (Figure 4). Raymond Lake at the south end of the site was also used frequently by this species.

Bald Eagle

The DNR currently lists the bald eagle as of Special Concern but is proposing to upgrade the species to "no status." The bald eagle breeds across much of North America and is known to have a presence in every U. S. state except Hawaii. Bald Eagles that reside in the northern U. S. and Canada migrate to the warmer southern climates of the U.S. during the winter. However,

nesting pairs have been known to reside near nest sites throughout the winter. Bald eagle characteristic breeding habitat includes super-canopy trees such as red and white pine near lakes and rivers that support an abundant supply of fish. While most nest sites are located in areas with minimal human activity, some eagles have adapted to human presence and nest near human dwellings and other features such as railroads, highways, and boat landings. The annual life of bald eagles can be broadly categorized into nesting and non-nesting periods. The nesting period varies by latitude; in the Midwest, it begins with courtship and nest building in late January and early February and ends when the young fledge by late July. The non-nesting period is thus from August through mid-January.

One nesting pair of eagles occurs in the NW ¼ of Section 18 of Getty Township (Figure 4). Nest observations of this pair throughout the breeding season indicated the pair successfully raised at least one young from this site. A total of 18 bald eagles were observed throughout the migratory season from April 1 through May 5, 2011. These observations were primarily of the resident adults tending to their nest and young, or engaged in foraging forays. Two juvenile birds and a sub-adult bird were also observed perching or following the northward migration of waterfowl. On one occasion, a single adult from the Getty nest shadowed the flight of a sub-adult eagle while it was within 1.5 miles of the active nest. Juvenile eagles were seen conducting feeding forays that originated near waterfowl concentrations or were seen soaring from the northeast to the west end of the Sites. The presence of an active nest, eagle foraging, and migration through the Sites will require further analysis under provisions of the BGEPA. The Draft Eagle Conservation Plan Guidance (USFWS January 2011) indicate that further assessment of eagle use within 10 miles of wind farm projects may be required to identify and quantify risk associated with wind development at this site.

Colonial Nesting Species

Although the species in this group are not protected by federal or state endangered species regulations, their nesting sites are identified and tracked by the DNR NHIS and takings are regulated by the MBTA.

Black Tern

Black terns are a neotropical migratory species that are semi-colonial breeders. Black terns reach their breeding territories in Minnesota in late-April through the beginning of May (Janssen, 1987). Breeding occurs in shallow freshwater marshes with emergent vegetation found along lake margins and occasionally in rivers (Dunn and Argo 1995). Vegetation used for nest platforms can vary, but cattails or bulrushes are characteristically dominant in black tern colonies (Dunn 1979). Vegetation cover can also vary between dense and sparse but nests are usually protected from direct open water to avoid dangers such as wind and wave action (Currier 2000). Nesting locations of 5 ha. or more are thought to be necessary for establishment of nesting colonies. The black tern is found throughout most of the state during the breeding season and

Minnesota is thought to harbor the largest population in the north central United States (Baker and Hines, 1996). Population declines have been noted by National Biological Service's BBS and this decline has resulted in the species being protected in nearby states such as Ohio, Indiana, Illinois, Iowa, and Wisconsin.

A black tern nesting colony was observed at a wetland adjacent to U.S. Highway 71 by Minnesota Breeding Bird atlas volunteers in 2010 and one was noted northwest of observation point 161027-2 during the 2011 surveys. The 2011 colony was located in a large emergent wetland complex north of County Route 28 in Getty Township (Figure 4). Breeding generally occurs in shallow freshwater marshes with emergent vegetation found along lake margins and occasionally in rivers (Dunn and Argo, 1995). Terns from this colony were observed landing in a dense stand of cattails (*Typha* sp.) and giant reed grass (*Phragmites australis*) with areas of open water surrounding the colony. Upland areas around the wetland are used to produce corn, soybeans, and silage. Terns from this colony were also seen flying between the nesting colony and Padua WMA to the south or to Trisko WPA north of the nesting location. The colony observed at this location is estimated to be between 19 and 30 birds based upon numbers of birds seen flying during any one given observation period.

Red-Necked Grebe

Red-necked grebes were observed nesting at Padua WMA during the spring of 2011. Up to five red-necked grebes were observed conducting courtship displays, pair bonding, and nest platform construction on the southeastern portion of the wetland. Breeding for this species generally occurs in shallow, freshwater marshes or protected bays of larger lakes. Nests at this location were constructed of cattails and bulrushes (*Scirpus* sp.) along the eastern edge of the lake where emergent vegetation juts out into the open water portion of the lake.

This species becomes relatively sedentary once arriving on the breeding grounds. The total number of resident red-necked grebes at the Padua WMA appears to be four. Only one nest platform was detected along the east side of the Raymond Lake (Figure 4).

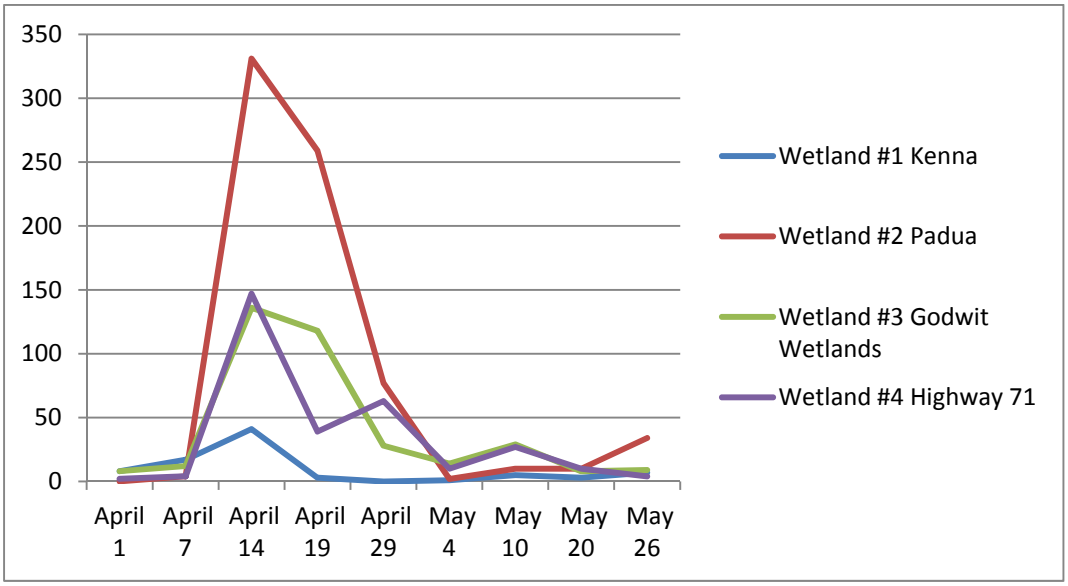
Waterfowl and Waterbirds

The intent of HDR's avian research was to describe the general flight patterns and habitat utilization by migratory waterfowl, water birds, raptors, passerines, and sensitive species across the site. Since wind turbines will be sited on lands currently planted in crops, the analyses focused on identifying flight patterns of target species between concentration areas such as WPAs, WMAs, wetland areas, and other grassland habitats within the study area. Wetland areas are abundant during the spring thaw and waterfowl occur in large numbers where water ponds over a frost layer in the soil on agricultural lands. Waterfowl use of these flooded fields generally subsides once the frost leaves the soil and surface waters recede. WPAs and WMAs such as Padua, Trisko, and Kenna provide more permanent water sources used by waterfowl and water

birds during migration, breeding, and rearing seasons. Waterfowl and other water birds generally concentrate at wetlands or waterbodies for roosting or loafing during the evening hours. Conducting surveys in the early morning or late evening when these species travel to feeding areas is the best way to identify the elevation, duration, and direction of flights so that turbines can be sited to avoid impacts. Scheduling surveys from April to June allowed HDR to assess use patterns during migratory and breeding periods.

A total of 23 species of waterfowl were observed between April and June 2011, during either the Avian Use/Flight Path or Wetland Utilization Surveys. Utilization of the site can be divided into two distinct categories. Many birds utilize the abundant wetlands and lakes in this region as migration stopover points or as staging areas to refuel depleted energy reserves before continuing their migration north. Others utilize the uplands and wetlands in this area for breeding and feeding. For purposes of analysis and risk assessment, the surveys were broken into a migration period running from April 1 to May 5, 2011, and a breeding period from May 5 through June 29, 2011. These categories are based upon observations of the number of waterfowl in the area documented during Waterfowl Utilization Surveys (Chart 3). Of the 23 species observed, 14 were observed flying at one time or another. The remaining species apparently are flying after sunset or before sunrise.

Chart 3. Waterfowl Utilization at Area Wetlands



Raptors

Raptors were found utilizing the study area in relatively low numbers. A total of seven species of raptors/vultures were observed between April and June 2011, during the Avian Use/Flight Path, Eagle Nest Monitoring, or Wetland Utilization Surveys. Utilization of the study area can be divided into two distinct categories. A single sharp-shinned hawk (*Accipiter striatus*) was the

only raptor species observed solely during migration. The remaining observations are presumed to be of breeding individuals because there were repeated observations in the same general areas throughout the spring surveys. Of the seven species observed, six were observed flying at one time or another (Figure 6). The great horned owl (*Bubo virginianus*) was only observed perching near its nest in the Behnen WPA during Marbled Godwit Surveys.

Passerines

Red-winged blackbirds, common grackles, unidentified species of blackbirds, and Lapland longspurs were the most abundant species observed during the Avian Use/Point Count Surveys in the spring of 2011 (Appendix C). These species made up 16,201 of the 22,863 individuals counted, or 71 percent of all observations. Passerines as a group made up 18,807 (82 percent) of all individuals observed. This group also made up 55 percent of the species listed as ETSC or SGCN observed on the Sites. Despite the large numbers of passerine species observed, only 3.3 percent of all flights for this group occurred within the RSZ and the only species within this group with a mean flight-height within the RSZ was a single flock of Smith's longspurs that was first observed at 35 meters AGL. This flock of longspurs was originally detected at this height but quickly dropped to land in a grassy field and then flew away at an elevation below the RSZ at 10 meters. Horned larks were the only passerine species observed regularly utilizing airspace within the RSZ throughout the spring season. Erickson et al. (2001) found that passerines are the most common group of birds killed at new generation wind farms and make up as much as 80 percent of all fatalities reported.

Collision Risk

The most apparent risk to native and sensitive birds from wind energy facilities is collision with turbine blades. Recent studies suggest that bird behavior is a stronger predictor of collision risk than other factors, such as observed flight height or local abundance (de Lucas et al. 2008, Smallwood et al. 2009). However, habitat is important in predicting the location of species. As a result, avoiding habitats supporting concentrations of native birds, especially sensitive species, reduces collision risk for birds that are susceptible due to their behavior.

Members of the family *Icteridae* (blackbirds) were the most abundant group with over 10,000 individuals counted during the spring 2011 Avian Use/Flight Path surveys. *Emberizidae* (sparrows, particularly members of the Genus Calcarius (longspurs)) were the second most abundant group of birds with more than 2,700 individuals counted. Observed flight heights for both of these families of birds were generally below the RSZ and daytime flights would likely not be affected by the construction of wind turbines in this area. The third most abundant group was made up of waterfowl species. All species of waterfowl totaled 3,695 individuals or only 16.1 percent of the individuals observed in surveys across the site during the Avian Use/Flight Path Surveys. Although mortality among waterfowl was found to be low when compared to waterfowl/waterbird use (Erickson et. al.,2001), some individual species may be more

susceptible to collision due to the kinds of behaviors they engage in near wind farm sites. Mortality is predicted to be highest in species such as the mallard, which historically experience higher than average mortality at wind farms (Johnson et al,2000). The higher mortality associated with Mallards may be due to behavioral attributes such as “chase flights” that are engaged in during the breeding season by this species.

Sensitive Bird Species Collision Risk

Turbines would primarily be placed in croplands at the Black Oak/Getty Wind Farms. Collision risk to sensitive species and long-distance migrants is thought to be low in cropland, given the low abundance of these species in point counts. However, the behavior of individual species affects the risk. For instance, Johnson et al. (2000) found that two of 55 avian mortalities at Buffalo Ridge, Minnesota, were vesper sparrows despite observation information indicating that the species did not fly through the RSZ. Of the species considered sensitive to wind farm development at the Project, the horned lark may have the greatest potential for collision fatality due to its higher abundance in croplands, higher documented mortality, and propensity to engage in territorial displays that occur within the RSZ. Other sensitive species of note that occurred within the RSZ included American white pelican (SPC/SGCN), bald eagle (SPC/SGCN), upland sandpiper (SGCN), American bittern (SGCN), black tern (SGCN), marbled godwit (SPC/SGCN), and northern harrier (SGCN). Flights of these sensitive species were associated with waterbodies as flight origination or destination and existing grassland habitats (Figure 4).

Table 4: ETSC/SGCN Species Observed Within the Rotor Sweep Zone (RSZ)

Common Name	Scientific Name	Abundance	% below RSZ (<30 m)	% within RSZ (30-150 m)	% above RSZ (>150 m)
American Bittern	*Botaurus lentiginosus*	1	0.00	100.00	0.00
Common Loon	*Gavia immer*	14	57.14	42.86	0.00
American White Pelican	*Pelecanus erythrorhynchos*	125	6.89	79.32	13.79
Lesser Scaup	*Aythya affinis*	42	66.66	33.33	0.00
Bald Eagle	*Haliaeetus leucocephalus*	18	33.33	66.66	0.00
Northern Harrier	*Circus cyaneus*	60	91.08	8.92	0.00
Marbled Godwit*	*Limosa fedoa*	11	27.27	72.73	0.00
Upland Sandpiper	*Bartramia longicauda*	13	57.15	42.85	0.00
Wilson's Phalarope	*Phalaropus tricolor*	17	50.00	50.00	0.00
Black Tern	*Chlidonias niger*	48	28.58	71.42	0.00
Black-billed Cuckoo	*Coccyzus erythropthalmus*	1	100.00	0.00	0.00
Yellow-bellied Sapsucker	*Sphyrapicus varius*	1	100.00	0.00	0.00
Least Flycatcher	*Empidonax minimus*	1	100.00	0.00	0.00

Common Name	Scientific Name	Abundance	% below RSZ (<30 m)	% within RSZ (30-150 m)	% above RSZ (>150 m)
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*	12	100.00	0.00	0.00
Sedge Wren	*Cistothorus platensis*	4	100.00	0.00	0.00
Marsh Wren	*Cistothorus palustris*	1	100.00	0.00	0.00
Brown Thrasher	*Toxostoma rufum*	5	100.00	0.00	0.00
Rose-breasted Grosbeak	*Pheucticus ludovicianus*	3	100.00	0.00	0.00
Bobolink	*Dolichonyx oryzivorus*	86	100.00	0.00	0.00
Rusty Blackbird	*Euphagus carolinus*	56	100.00	0.00	0.00

** Display flights observations noted at breeding location south of the Project on April 19, May 10, 20, and 26. These displays did not occur at established points.*

Waterfowl, and Waterbird Collision Risk

Several studies have evaluated whether utilization of flights within the RSZ correlate to higher mortality rates at wind farms (Strickland et al. 2001, Hunt 2002, Smallwood et al. 2008). Some of these studies have shown that although general mortality increases across all species, behaviors or visual acuity differentiate a species susceptibility to collisions at wind farms (Smallwood 2008). The Smallwood study indicated that mortality rates did not correlate with utilization rates for most species but did correlate with species such as mallards, American kestrel, and red-tailed hawk. The results of the Smallwood study and others (Strickland et al. 2001, Smallwood and Thelander 2004) indicate that behavior may play a vital role in determining mortality associated with collisions with wind turbines. Mallards have among the highest utilization rates of the waterfowl observed during the breeding season at the study area. The results of several studies indicate that mallards, in particular, exhibit behaviors that may increase the likelihood of collisions with wind turbines. Chase flights by mallards were observed throughout the migration and breeding season during the spring of 2011. These flights may increase mortality rates because birds involved in the chase flight are concentrating on courtship or evasion of courting males and may not be aware of the presence of moving turbine blades. This inattention may result in higher mortality rates at wind farms.

Three different flight behaviors were noted for the 14 waterfowl species observed during the Avian Use/Flight Path Surveys conducted at the study area (Figure 5). The first category observed was migration flights. These flights occurred at higher elevations and involved from 10 to 30 individuals engaging in linear flights that bypassed wetlands, lakes, or potential foraging sites. These groups of waterfowl were observed for long distances and appeared to pass through

the survey area without taking off, landing, turning or stopping. The second category appeared to be foraging flights and was characterized by individual birds or flocks flying at lower altitudes. Biologists at any one of the survey points generally observed the origin or termination of the flight. Several individuals engaging in chase flights characterized a third category. The origins and termination of these flights were generally observed by the biologist at a given survey point and occurred at varying altitudes. Chase flights were never linear but involved looping, diving, or zigzagging flight paths that may have started with at least two individuals and gained or lost individuals as the flight continued.

In summary, waterfowl used agricultural fields extensively during the spring migration, and foraging flights occurred between WPAs, WMAs, and flooded fields where waterfowl congregated to feed (Figure 5). The mean observed flight-height for waterfowl was 19 meters. Once migration ceased, waterfowl use was characterized by fewer flights between wetlands or lakes, and an absence of flights to agricultural fields to feed. Flight paths during both periods generally originated or terminated at Padua WMA, or Trisko and Kenna WPAs. The largest percentage of flights occurred along a broad corridor that connects Padua to Trisko and then on to the Sauk River northeast of the Sites. Large flocks of tundra swans were noted roosting and feeding in flooded fields in Sections 6 and 7 of Getty Township and in Sections 1, 2, 3, 11, 12, and 14 of Raymond Township within the Sites during early April. April and May surveys documented large numbers of waterfowl migrating, and trading between concentration waterbodies and feeding areas.

Raptor Collision Risk

Northern harriers and red-tailed hawks were the two raptors species that occurred with the highest frequency. These two species were often observed soaring over agricultural lands or grassland while foraging. Flight paths recorded during the spring of 2011 show no definite use patterns that would allow micro-siting to reduce potential impacts. The Black Oak/Getty Wind Farms raptor mean-use rates are among the lowest reported at ten sites reporting this metric across the U.S. (Chart 2). Six bald eagles flights were documented during the spring 2011 surveys and consist of four flights for foraging or territorial defense by the resident eagle pair and two by migratory eagles that were present only during April and May. Due to the low use of the Sites and the low frequency of mortality reported from other U.S. wind farms with similar use rates, impacts to raptors are expected to be minimal. Only 30 percent of the red-tailed hawk flights observed within the Sites occur within the RSZ. Total observations of red-tailed hawks were also in the bottom quartile of wind farms with recorded raptor use. The low relative use and reduced percentage of flights within the RSZ indicate that there will be a lower likelihood of red-tailed hawk mortality at this site than on other sites where this index was studied.

Passerine Collision Risk

Passerines were the most abundant group of species observed during the Avian Use/Point Count Surveys in the spring of 2011. These species make up 16,201 of the 22,863 individuals counted, or 71 percent of all observations. Passerines as a group make up 18,807 (82 percent) of all individuals observed. Despite the large numbers of passerine species observed, only 3.3 percent of all flights for this group occurred within the RSZ and the only species within this group with a mean flight-height within the RSZ was a single flock of Smith's longspurs that was first observed at 35 m AGL. Horned larks were the only passerine species observed regularly utilizing airspace within the RSZ throughout the spring season. The skylarking behavior included flights that sometimes lifted horned larks as high as 50 or 60 m. These skylarking flights often occurred while facing into prevailing winds that allowed horned larks to hang in the air for up to 15 minutes of a given survey period. Passerine observations from spring 2011 provide an index of daytime flights at select locations within the Sites. The relative abundance of passerines and mean flight-height assessed for this group during daytime flights, indicate that passerines have a relatively low risk for collision during daytime flights at the Sites. However, most migratory flights from this group occur at night (Richardson 1990) and these flights are not represented in this analysis.

Habitat Displacement Risk

Bird species sensitive to changes to habitat size, composition, or construction of various kinds of infrastructure are thought to be most at risk of habitat displacement. Recent studies to detect habitat effects caused by wind turbines have focused on grassland birds since these seem more sensitive to habitat displacement than forest or water birds and appear to be experiencing greater declines as a group in North America than forest birds (Leddy et al. 1999; Herkert et al. 2003; CEIWEP 2007; Mabey and Paul 2007).

Sensitive Species (ETSC/SGCN) Habitat Displacement Risk

Sensitive species can be used as an indicator of displacement risk because they are often more susceptible to habitat alteration or fragmentation. Species in this group may include species that are area-sensitive, require unique habitat parameters to breed successfully, or are at risk due to habitat availability. Habitats that contain more sensitive species and individuals may be at greater risk of habitat displacement than those with few of these species.

Bird species at Sites that are considered sensitive to habitat displacement include marbled godwit, upland sandpiper, bobolink, and sedge wren. During the breeding season, bobolinks were found at every Avian Use/Flight Path Survey point and were associated with grasslands of various sizes and hay fields, or were observed flying over cropland with little-to-no vegetation. Grasshopper sparrows, bobolinks, and sedge wrens are all examples of species noted as declining in the BBS region and are also considered SGCN species.

In summary, habitat displacement is most likely to occur for grasslands breeders occurring ≤100 m from turbine sites (Johnson et al. 2002) due to the response of grassland birds to tall structures, noise, or human disturbance. The proposed perimeter setbacks per the Stearns County wind ordinance from grassland habitats at the Padua WMA and Trisko, Kenna, Behnen WPAs will be more than adequate to avoid habitat displacement for the majority of grassland habitats on the Sites. The level of displacement assumed on the remaining grassland habitat is thought to pose a low risk to the populations of affected species mainly because turbine placement is expected to be associated with cropland areas and not grassland habitat.

Waterfowl and Waterbird Habitat Displacement Risk

Habitat displacement associated with waterfowl and wind development has not been evaluated in the U.S. However, some European studies have shown disturbance effects to breeding birds is variable, and in some instances, negligible (Peterson and Poulsen 1991). Despite the variety and large numbers of waterfowl utilizing the Sites during the migratory period, relatively low species richness for waterfowl was recorded during the breeding period. The two most abundant species observed during the breeding period were Canada goose and mallard. These species use grasslands and wetlands for nesting but have been known to use croplands adjacent to wetland complexes. The proposed setbacks from wetland/grassland complexes at the Padua WMA and Trisko, Kenna, Behnen WPAs will be more than adequate to avoid habitat displacement for the majority of wetland/grassland habitats on Sites. The level of displacement is assumed on the remaining grassland habitat is thought to pose a low risk to the populations of affected species mainly because turbine placement is expected to be associated with cropland areas and not wetland or grassland habitat.

Raptor Habitat Displacement Risk

Nest displacement may be a factor for raptor species when wind farm development occurs very close to existing nests. Species that nest within one-half mile of wind development sites may be at a higher risk due to disturbance created by wind development, operation, and maintenance. However, Erickson et al. (2002) found that few raptor species targeted in nest surveys were found as fatalities when nests are within 2 miles. Northern harriers and red-tailed hawks are the two most abundant raptors on the Sites. Approximately four different pairs of red-tailed hawks nest throughout the project boundaries and may occur within 2 miles of any project design developed for the site. The northern harriers observed within the project boundaries may represent only one nesting pair and are likely nesting within the Trisko WPA. Nest displacement could be mitigated by the proposed setback requirements relative to the WPA. Despite the relatively proximity of nests to future turbine locations, Erickson et al. (2002) found that although use rates for these two species were relatively high in an agricultural setting, few mortalities were reported at U.S. wind plants.

Passerine Habitat Displacement Risk

The risk of habitat displacement in birds is poorly understood. Some studies have shown that some grassland species appear to nest at lower densities near wind turbines and other tall structures (Johnson et al. 2000). Species such as savannah sparrow, sedge wren, and bobolink exhibited lower than expected use of grassland habitats after wind turbines were in operation. These grassland species may respond negatively to the presence of wind turbines because turbines are vertical structures that may represent potential predator perches and therefore are avoided. Noise also may be an issue because territorial birds, which use song to defend territories, may avoid habitats where wind turbine noise interferes with territorial singing.

Conclusions

Surveys conducted between April 1, 2011, and June 29, 2011, documented sightings of 22,863 individual birds, representing 106 different species. An additional 1,473 individual birds were counted during Wetland Utilization and Marbled Godwit surveys and added 10 more species to the species richness of the site. Members of the Passerine group were the most abundant group observed during the 2011 surveys. No federally listed species were observed during the surveys. Seven species considered state-endangered, threatened, or of special concern were documented using the site for breeding or migration. One active bald eagle nest site is located in the NW ¼ of Section 18 of Getty Township. This nest site produced at least one juvenile eagle during the spring of 2011. Marbled godwits occupied pastured grasslands at the south end of the Sites and at least one nesting pair was present throughout the survey period. Additionally, nesting black terns and red-necked grebes were located at a wetland north of County Road 28 in Section 7 of Getty Township and Section 24 of Raymond Township, respectively.

Twenty-two SGCN species were observed at the Sites. Breeding was also observed or presumed for upland sandpiper, bobolink, sedge wren, marsh wren, northern harrier, common loon, brown thrasher, black-billed cuckoo, rose-breasted grosbeak, and swamp sparrow. Several SGCN are relatively sedentary once they arrive at their breeding grounds while others conduct frequent foraging flights between nests and feeding areas. Collision risk at this site was analyzed due to the location of the proposed wind farm and its relation to abundant wetlands and lakes in the area. The abundance of lakes and wetlands concentrate waterfowl, waterbirds, and other sensitive species and act as an attractant during migration. Several of these species already are experiencing problems that make them a focus of conservation. For this reason, waterfowl, waterbirds, and sensitive bird species are of the greatest interest in risk assessment at this site.

Analysis of flight path data identified significant movement and concentration areas within the Sites. These areas lie in a broad corridor stretching from the Padua WMA south of the Sites, northward through Trisko WPA then northeast or northwest to the Sauk River. Waterbodies associated with the Raymond Lake/Padua WMA are the source or destination of many of the flights that were observed during the spring 2011 studies.

This area also harbors a perennial nest location for bald eagles, nesting red-necked grebes, a black tern colony, occasional use by sandhill cranes, and frequent common loon use. Since collision risk is related to local abundance at some level, and to flight physiology (i.e. wing loading characteristics), with behavior an important additional factor, ETSC, SGCN, waterfowl, and other sensitive species that utilize flight paths between wetland and lake areas should be considered when designing turbine arrays and associated infrastructure. Areas southwest of the Raymond Lake area also harbored probable breeding marbled godwits and potential Wilson's phalarope habitat, and foraging flights of these species were documented during the 2011 Avian Use/Flight Path surveys.

Numerous seasonal and permanent wetlands that occur throughout this broad corridor contributed to additional bird concentration sites that provided seasonal stopover habitat or breeding habitat in the case of the black terns observed at Point 161027-2. A large number of grasslands also occur within the same broad corridor stretching from the Raymond Lakes/Padua WMA area northward through the Trisko WPA, but also included several pastured areas that provided suitable breeding habitat for additional grassland dependant species such as bobolinks, savannah sparrows, western meadowlarks, and a variety of other songbirds and shorebirds.

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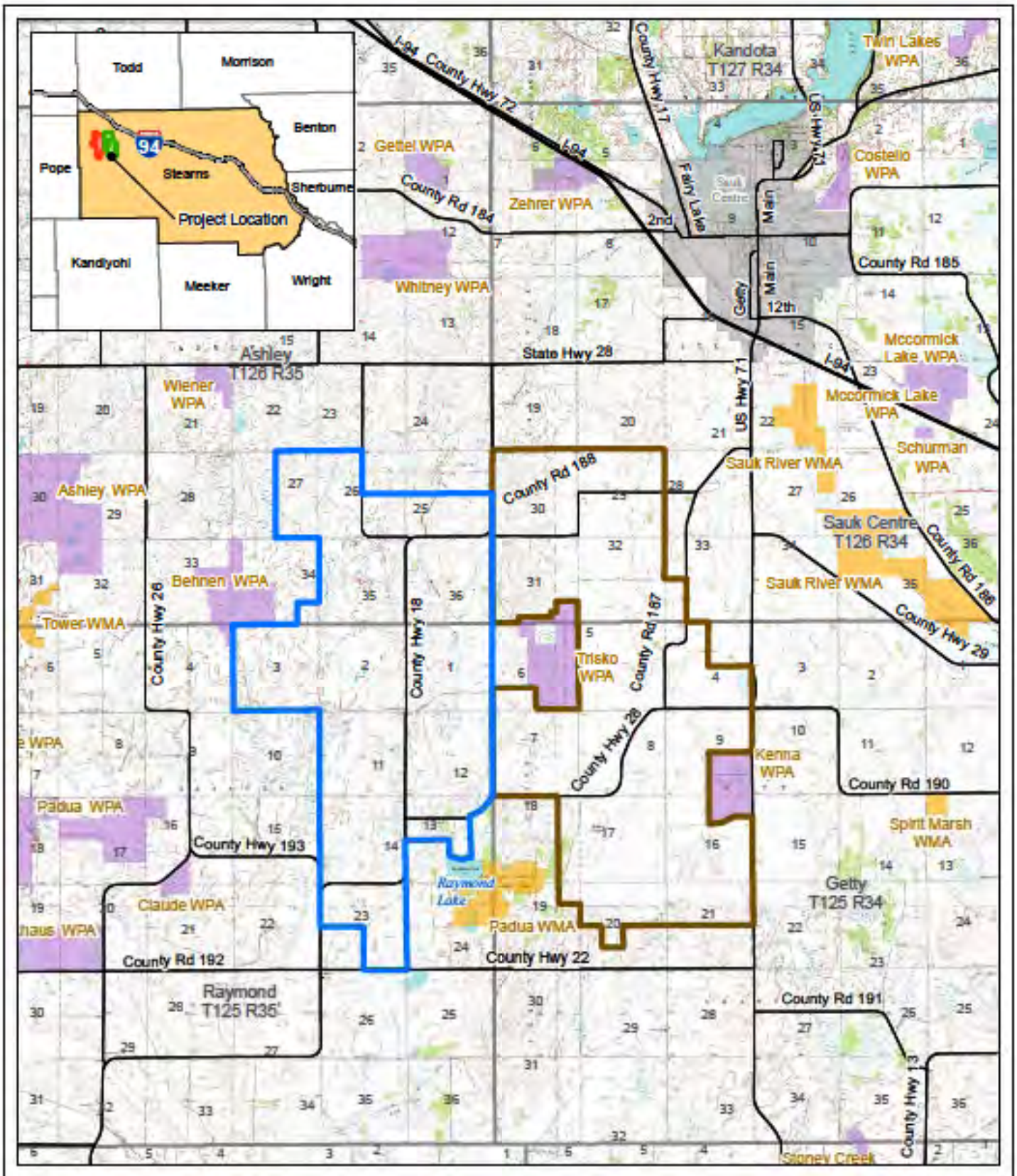

Figure 1
Project Location Map

Black Oak/Getty Wind Farm
Geronimo & Getty Wind

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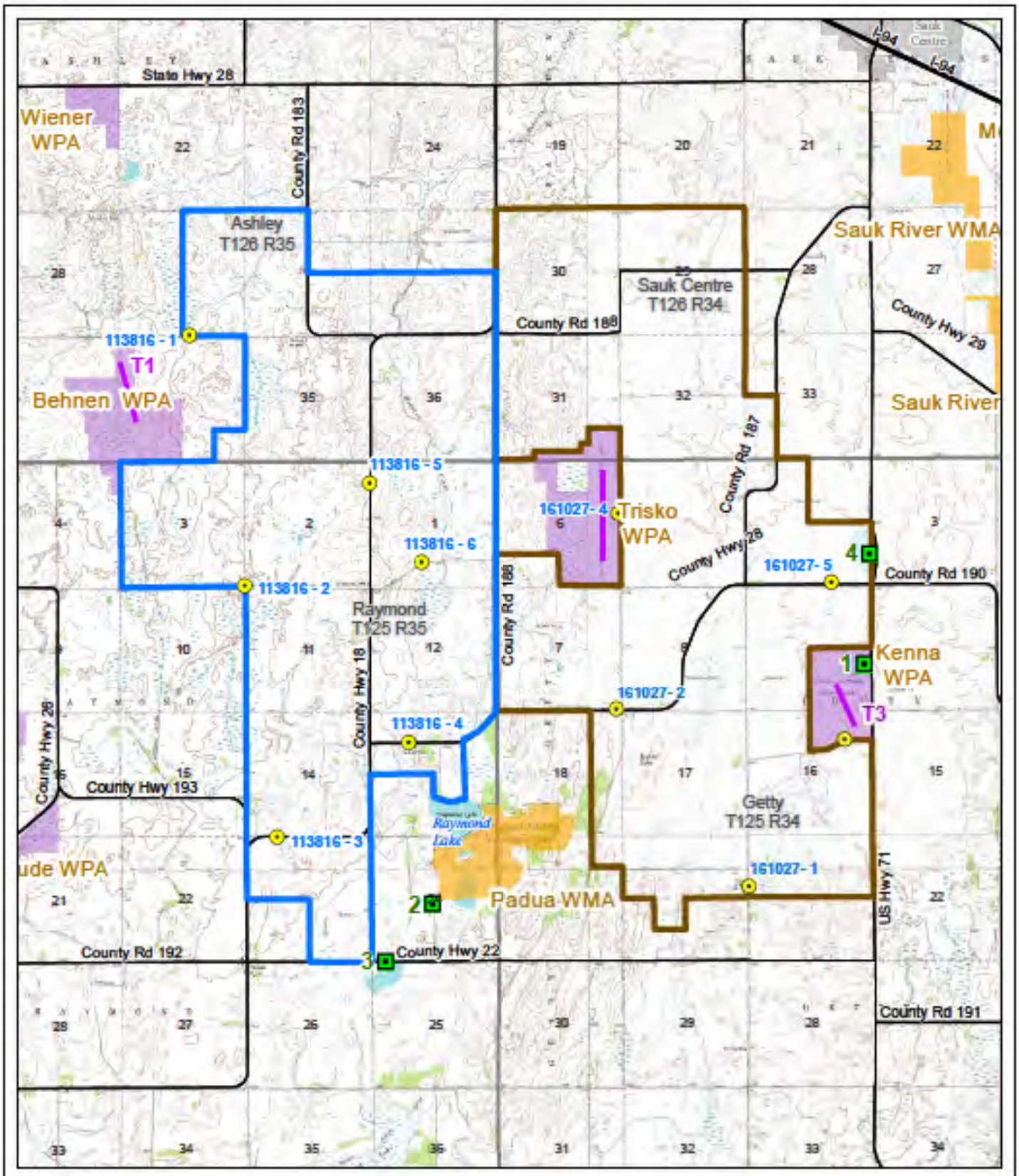

Figure 2
Transect Map

- Black Oak Boundary
- Getty Boundary
- Wetland Points
- Point Count
- Godwit Transects
- Wildlife Management Area (WMA)
- Waterfowl Production Area (WPA)

HDR

0 0.5 1 Miles

Black Oak/Getty Wind Farm
Geronimo & Getty Wind

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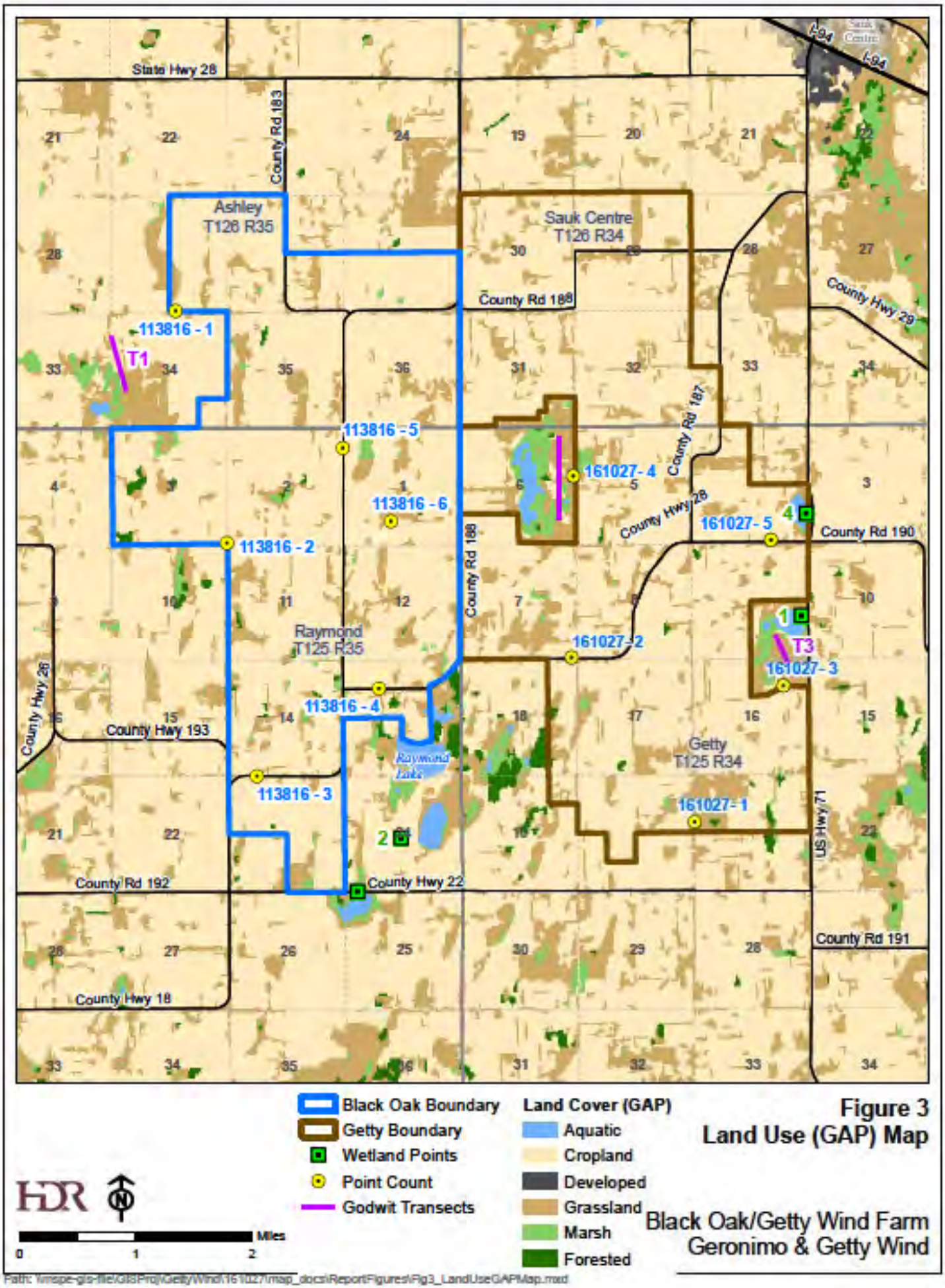

Figure 3
Land Use (GAP) Map

Black Oak/Getty Wind Farm
Geronimo & Getty Wind

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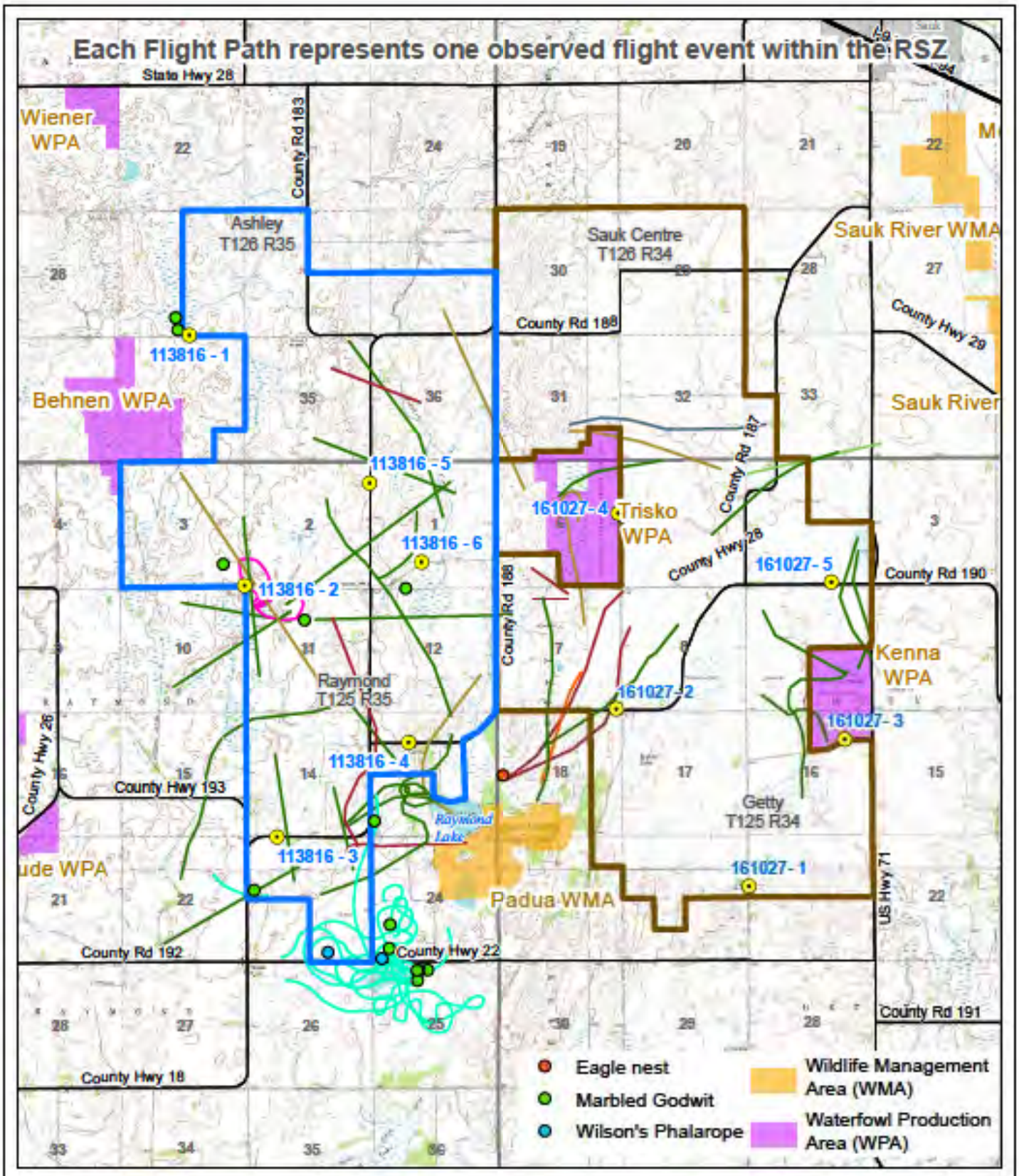

Black Oak Boundary
Getty Boundary
Point Count

Avian Flight Path - Species

- American Bittern (AMBI)
- American White Pelican (AWPE)
- Bald Eagle (BAEA)
- Black Tern (BLTE)
- Common Loon (COLO)
- Marbled Godwit (MAGO)
- Sandhill Crane (SACR)
- Upland Sandpiper (UPSA)

HDR

0 0.5 1 Miles

Figure 4
Sensitive Species Flight Paths Map

Black Oak/Getty Wind Farm
Geronimo & Getty Wind

Path: \\mspe-gis-file\GISProj\GettyWind\161027\map_docs\Report Figures\Fig4_SensitiveSpeciesFlightPath.mxd

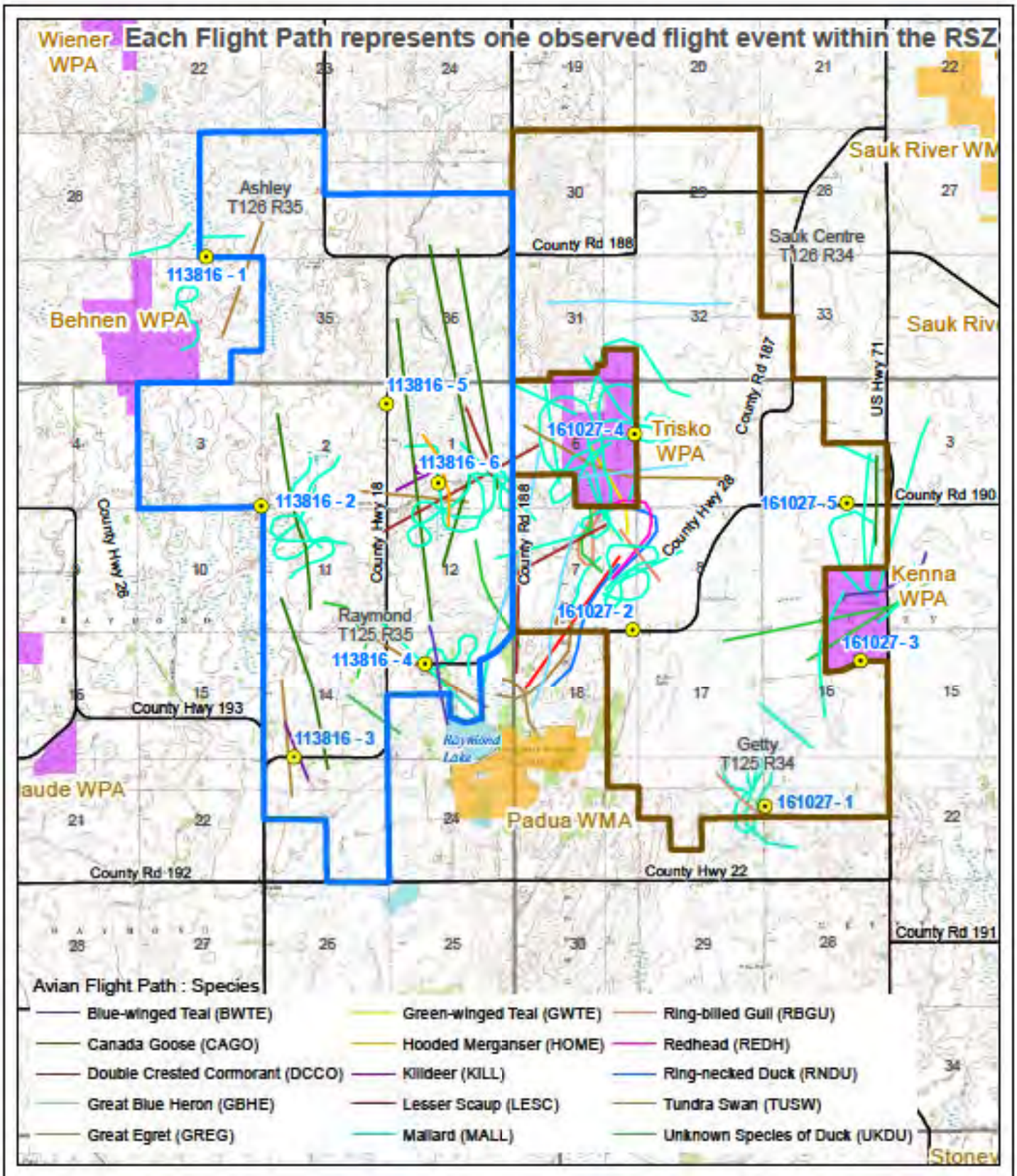

Figure 5
Waterfowl/Waterbird Flight Paths

Black Oak/Getty Wind Farm
Geronimo & Getty Wind

Path: \\mspe-gis-file\GIS\Proj\GettyWind\161027\map_docs\Report Figures\Fig5_WaterfowlFlightPath.mxd

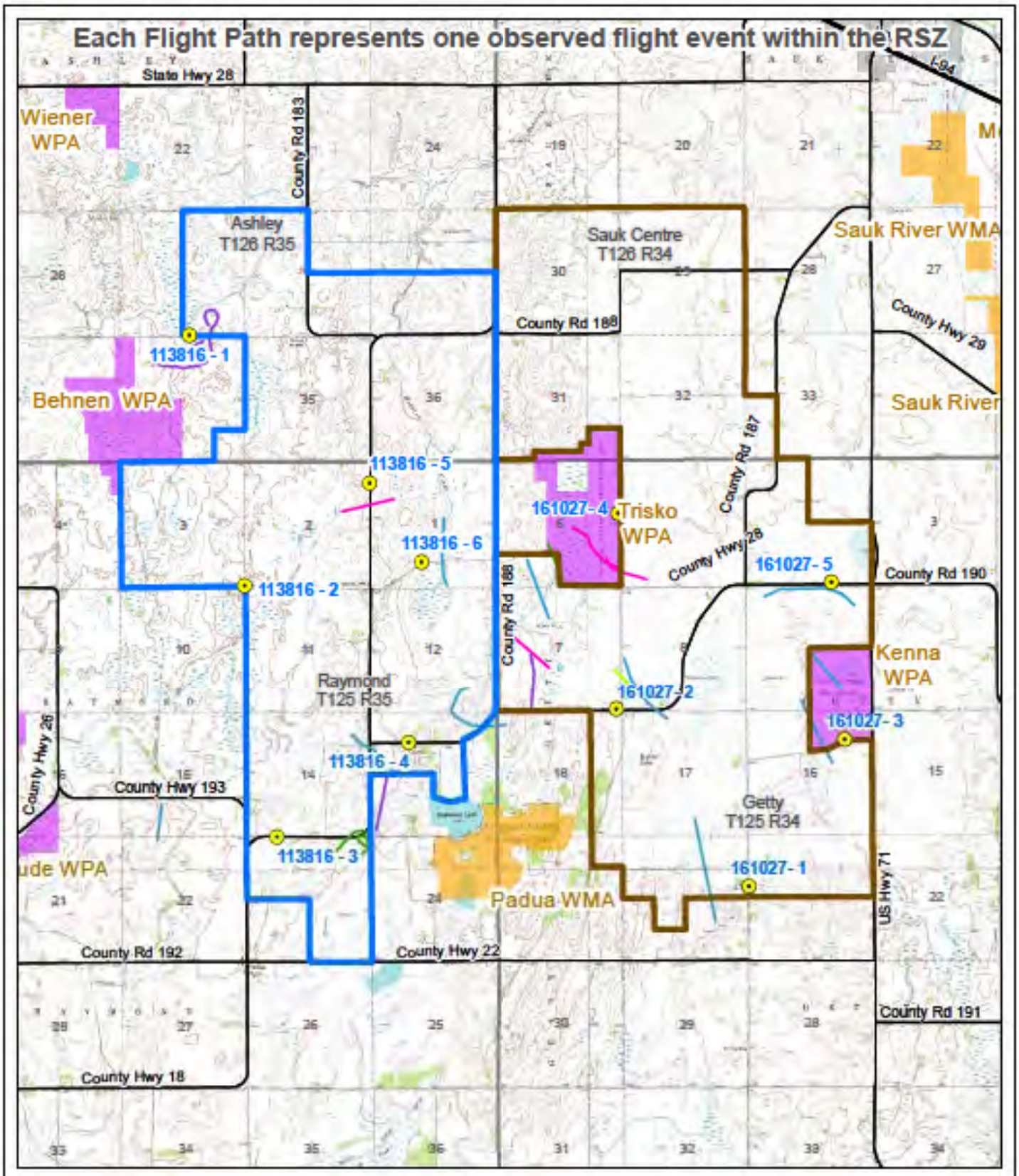

Figure 6
Raptor Flight Paths Map

Black Oak/Getty Wind Farm
Geronimo & Getty Wind

Path: \\mspe-gis-file\GIS\Proj\GettyWind\161027\map_docs\Report Figures\Fig6_RaptorFlightPath.mxd

Appendix A. Species Abundance During Wetland Utilization Surveys

Species	Wetland #1 Kenna									Wetland #2 Padua									Wetland #3 (Godwit Wetlands)									Wetland #4 (Highway 71)									Totals
	T#1 (April 1)	T#2 (April 7)	T#3 (April 14)	T#4 (April 19)	T#5 (April 29)	T#6 (May 4)	T#7 (May 10)	T#8 (May 20)	T#9 (May 26)	T#1 (April 1)	T#2 (April 7)	T#3 (April 14)	T#4 (April 19)	T#5 (April 29)	T#6 (May 4)	T#7 (May 10)	T#8 (May 20)	T#9 (May 26)	T#1 (April 1)	T#2 (April 7)	T#3 (April 14)	T#4 (April 19)	T#5 (April 29)	T#6 (May 4)	T#7 (May 10)	T#8 (May 20)	T#9 (May 26)	T#1 (April 1)	T#2 (April 7)	T#3 (April 14)	T#4 (April 19)	T#5 (April 29)	T#6 (May 4)	T#7 (May 10)	T#8 (May 20)	T#9 (May 26)	
American Coot			33									188	217	36							47	67	21		6					104	3	19					741
American White Pelican							5		7									7															5	17	3	2	46
American Wigeon																						6															6
Bald Eagle												2										1															3
Black Tern																4	6	3							1												14
Blue-winged Teal												11													1					7							19
Bufflehead													4	8							8		3							2		6					31
Canada Goose	8	11	2	2		1		2			4	6	6	6					6	12		11	4		4			2	4	2		2					87
Canvasback												10		2																15	9	7		6			49
Common Goldeneye													1																								1
Common Merganser													6																								6
Common Loon												2				1																					3
Double-crested Cormorant															1		1	2																			4
Forster's Tern																																		2			2
Gadwall				1								14													1												16
Great Blue Heron								1										1																			2
Great Egret																	2	5							1		2						5	2	1	2	20
Green-winged Teal												8		16																							24
Hooded Merganser																						5								7	4						16
Horned Grebe			1																																		1
Lesser Scaup												30	17								8	5								3	10						73
Mallard		6	2									4	6								12			4	4						3						41
Marbled Godwit																			2			2	1	4	3	4	4										20
Northern Pintail																								3													3
Northern Shoveler			2									5																				6					13
Pied-billed Grebe			1																											2	2						5
Red-breasted																					5																5

Appendix A. Species Abundance During Wetland Utilization Surveys

Species	Wetland #1 Kenna									Wetland #2 Padua									Wetland #3 (Godwit Wetlands)									Wetland #4 (Highway 71)									Totals
Merganser																																				
Redhead												19		3									3									7					32
Red-necked Grebe												4	2	2	1	5																1					15
Ring-necked Duck												28								56	18									5	7	11				125
Ruddy Duck																		16																	6		22
Sandhill Crane																								2													2
Sora																	1								2												3
Trumpeter Swan																								2													2
Wilson's Phalarope																									8	2	2										12
Wood Duck														4																		5					9
Total Observations	*8*	*17*	*41*	*3*	*0*	*1*	*5*	*3*	*7*	*0*	*4*	*331*	*259*	*77*	*2*	*10*	*10*	*34*	*8*	*12*	*136*	*118*	*29*	*15*	*29*	*8*	*8*	*2*	*4*	*147*	*39*	*63*	*10*	*27*	*10*	*4*	1473

Appendix B. Species Abundance During Marbled Godwit Surveys

Species	Transect #1 Kenna			Transect #2 Trisko			Transect #3 Behnen			Totals
	(April 19)	(May 10)	(June 9)	(April 19)	(May 10)	(June 9)	(April 19)	(May 10)	(June 9)	
American Crow				4				3		7
American Goldfinch			3							3
American Robin		4			3	1		2		10
American Kestrel	1						1			1
American White Pelican					7					7
American Tree Sparrow	4									4
Barn Swallow		3	7		4	7		5	1	27
Black-billed Cuckoo									1	1
Blue-winged Teal				2	3					5
Blue Jay				2	5					7
Bobolink		2	3		6	15			3	29
Brown-headed Cowbird		3						2		5
Brown Thrasher						1				1
Canada Goose	2				4			6		10
Clay-colored Sparrow		4	1		1	3		2	5	16
Common Grackle	16	6	5	16		7	2	8	9	53
Cooper's Hawk		1								1
Common Yellowthroat			4			5			15	24
European Starling						2				2
Great-horned Owl							3	3		6
House Wren									1	1
Horned Lark								2		2
Indigo Bunting									1	1
Killdeer		1			2					3
Lapland Longspur		3								3

Appendix B. Species Abundance During Marbled Godwit Surveys

Species	Transect #1 Kenna			Transect #2 Trisko			Transect #3 Behnen			Totals
Marsh Wren						3			8	11
Mallard	7	3		5	6		3	3		20
Mourning Dove	1	3				2		2	3	10
Northern Harrier	2	1				2			1	4
Northern Flicker							1			1
Red-tailed Hawk	1								1	1
Red-winged Blackbird	15	8	8	8	7	13	12	5	28	89
Ring-necked Duck					7					7
Ring-necked Pheasant	2	1			1			1		3
Ruddy Duck									1	1
Red-eyed Vireo									1	1
Savannah Sparrow	1	2						2		4
Sandhill Crane							2			2
Sedge Wren		2			3	5			4	14
Sora								1		1
Song Sparrow		2	2		3	1	2		2	12
Swamp Sparrow		2	2		3	5		3	5	20
Tree Swallow		2								2
Vesper Sparrow							2			2
Western Meadowlark							2			2
White-throated Sparrow								3		3
Yellow-headed Blackbird					4	3				7
Yellow Warbler									4	4
Total Observations	*52*	*49*	*32*	*33*	*66*	*74*	*30*	*48*	*94*	426

Project Snapshot

113816 Black Oak

SPECIES DATA

Overall Species Richness

111

Species List

Species	Abundance
Red-winged Blackbird	4958
Common Grackle	4754
Unidentified Blackbird	3750
Lapland Longspur	2739
Unidentified Duck	1056
Canada Goose	1013
Mallard	694
Tundra Swan	452
Brown-headed Cowbird	293
Horned Lark	177
American Crow	174
Brewer's Blackbird	157
Barn Swallow	156
American Robin	148
American Goldfinch	127
American White Pelican	125
European Starling	122
Yellow-headed Blackbird	112
Mourning Dove	107
Bobolink	86
Blue-winged Teal	77
Ring-billed Gull	76
Vesper Sparrow	75
Killdeer	73
Ring-necked Duck	66
Lesser Scaup	65
Unidentified Longspur	65
Northern Harrier	60

Species Richness By Point

Point Number	Species Richness
113816-001	34
113816-002	39
113816-003	54
113816-004	52
113816-005	29
113816-006	45
161027-001	35
161027-002	49
161027-003	37
161027-004	60
161027-005	40

Species Richness By Habitat

Habitat Type	Species Richness
Agriculture - Cropland	111
Grassland-Non-native	31

Sensitive Species

Species	Abundance
American Bittern	1
Bald Eagle	18
Black Tern	48
Black-billed Cuckoo	1
Bobolink	86
Brown Thrasher	6
Common Loon	14
Least Flycatcher	1
Lesser Scaup	65
Marbled Godwit	7
Marsh Wren	1
Northern Harrier	60
Northern Rough-winged Swallow	12
Rose-breasted Grosbeak	3

Species List	
Rusty Blackbird	56
Snow Goose	55
Ring-necked Pheasant	52
Common Yellowthroat	49
Tree Swallow	48
Black Tern	48
Blue Jay	47
Red-tailed Hawk	42
Redhead	42
Savannah Sparrow	41
Green-winged Teal	40
Song Sparrow	37
Greater White-fronted Goose	35
Smith's Longspur	30
Rock Pigeon	26
American Tree Sparrow	25
Gadwall	24
Canvasback	24
Swamp Sparrow	19
House Sparrow	18
Bald Eagle	18
Wilson's Phalarope	17
Common Loon	14
Upland Sandpiper	13
Northern Shoveler	13
Northern Rough-winged Swall	12
Sandhill Crane	12
Wood Duck	12
American Kestrel	12
Double-crested Cormorant	11
Great Egret	11
Chipping Sparrow	10
Cooper's Hawk	9
Great Blue Heron	8
Turkey Vulture	7
Clay-colored Sparrow	7
Hooded Merganser	7
Marbled Godwit	7

Sensitive Species	
Rusty Blackbird	56
Savannah Sparrow	41
Sedge Wren	4
Semipalmated Sandpiper	1
Swamp Sparrow	19
Upland Sandpiper	13
Wilson's Phalarope	17
Yellow-bellied Sapsucker	1

ABUNDANCE DATA

Overall Mean Abundance

9

Total Abundance

22863

Mean Abundance By Point

Point Number	Mean Abundance
113816-001	3
113816-002	7
113816-003	10
113816-004	25
113816-005	5
113816-006	11
161027-001	11
161027-002	16
161027-003	7
161027-004	3
161027-005	3

Mean Abundance By Habitat

Habitat Type	Mean Abundance
Agriculture - Cropland	10
Grassland-Non-native	4

FLIGHT HEIGHT DATA

Mean Flight Height
13 meters

Mean Flight Height By Point

Point Number	Mean Flight Height
113816-001	9 meters
113816-002	16 meters
113816-003	18 meters
113816-004	16 meters
113816-005	13 meters
113816-006	18 meters
161027-001	9 meters
161027-002	18 meters
161027-003	8 meters
161027-004	12 meters
161027-005	14 meters

Mean Flight Height By Species

Species	Mean Flight Height
American Bittern	100 meters
American Crow	7 meters
American Goldfinch	13 meters
American Kestrel	14 meters
American Pipit	20 meters
American Robin	6 meters
American Tree Sparrow	2 meters
American White Pelican	75 meters
American Wigeon	20 meters
Baird's Sandpiper	8 meters
Bald Eagle	62 meters
Baltimore Oriole	15 meters
Bank Swallow	14 meters
Barn Swallow	5 meters
Black Tern	41 meters
Black-and-white Warbler	2 meters
Black-billed Cuckoo	1 meters
Black-capped Chickadee	meters
Blue Jay	14 meters
Blue-winged Teal	11 meters
Bobolink	9 meters
Brewer's Blackbird	9 meters
Brown Thrasher	2 meters
Brown-headed Cowbird	6 meters
Bufflehead	meters
Canada Goose	13 meters
Canvasback	10 meters
Cedar Waxwing	15 meters
Chimney Swift	11 meters
Chipping Sparrow	meters
Clay-colored Sparrow	meters
Cliff Swallow	18 meters
Common Grackle	8 meters
Common Loon	23 meters
Common Snipe	50 meters
Common Yellowthroat	meters
Cooper's Hawk	25 meters

Mean Flight Height by Species

Double-crested Cormorant	31 meters
Downy Woodpecker	20 meters
Eastern Phoebe	6 meters
European Starling	10 meters
Gadwall	18 meters
Great Blue Heron	27 meters
Great Crested Flycatcher	meters
Great Egret	22 meters
Greater White-fronted Goose	meters
Green Heron	10 meters
Green-winged Teal	50 meters
Hooded Merganser	17 meters
Horned Lark	25 meters
House Finch	10 meters
House Sparrow	12 meters
House Wren	meters
Indigo Bunting	10 meters
Killdeer	14 meters
Lapland Longspur	16 meters
Least Flycatcher	meters
Lesser Scaup	22 meters
Mallard	18 meters
Marbled Godwit	10 meters
Marsh Wren	meters
Mourning Dove	8 meters
Northern Cardinal	5 meters
Northern Flicker	7 meters
Northern Harrier	9 meters
Northern Rough-winged Swallow	14 meters
Northern Shoveler	8 meters
Pine Warbler	meters
Red-bellied Woodpecker	10 meters
Redhead	30 meters
Red-tailed Hawk	24 meters
Red-winged Blackbird	8 meters
Ring-billed Gull	24 meters
Ring-necked Duck	18 meters
Ring-necked Pheasant	2 meters
Rock Pigeon	16 meters
Rose-breasted Grosbeak	meters
Ruby-throated Hummingbird	1 meters

Mean Flight Height by Species

Rusty Blackbird	8 meters
Sandhill Crane	17 meters
Savannah Sparrow	8 meters
Sedge Wren	meters
Semipalmated Sandpiper	5 meters
Sharp-shinned Hawk	9 meters
Smith's Longspur	35 meters
Snow Goose	20 meters
Solitary Sandpiper	30 meters
Song Sparrow	3 meters
Sora	meters
Swamp Sparrow	meters
Tree Swallow	9 meters
Tundra Swan	17 meters
Turkey Vulture	43 meters
Unidentified Blackbird	12 meters
Unidentified Diver	40 meters
Unidentified Duck	22 meters
Unidentified Longspur	17 meters
Unidentified Teal	25 meters
Unidentified Warbler	25 meters
Upland Sandpiper	31 meters
Vesper Sparrow	5 meters
Warbling Vireo	meters
Western Meadowlark	0 meters
Wild Turkey	meters
Wilson's Phalarope	20 meters
Wood Duck	15 meters
Yellow Warbler	meters
Yellow-bellied Sapsucker	9 meters
Yellow-headed Blackbird	10 meters
Yellow-rumped Warbler	meters
Yellow-throated Vireo	meters

APPENDIX B
WILDLIFE INCIDENT REPORTING SYSTEM FORM

(This example form completed by onsite personnel with limited biological knowledge. Onsite personnel are not to handle wildlife.)

Wildlife Incident Reporting System Form

SECTION NO. 1 - DISCOVERY DATA

Report Date: _____ (Date on which the animal(s) was found and the report completed)

Injury/Fatality

(Circle appropriate choice)

Complete/Dismembered/Feathers

(Circle appropriate description. Complete would indicate a complete and intact carcass or injured animal. Dismembered would indicate a missing or amputated wing or other appendage. Feathers would indicate that only feathers were found.)

Notification to _____ Date/Time

For Injured Animals, Notify Rehabilitation Center. If the injured animal is found after normal weekday office hours, protect the animal and report it the Rehabilitation Center on the next available working day. Complete this form.

For Fatalities, Notify Site Supervisor and/or Local Wildlife Agency and EPGNA Environmental

Eagle or protected species carcass call _ Site Supervisor, Wildlife Agency and EGPNA

5 carcasses or more call _ Site Supervisor, Wildlife Agency and EGPNA

Non-protected carcass call _ Site Supervisor

Complete this form for all fatalities

SECTION NO. 2 – LOCATION OF FIND

Structure:

(Include turbine number, Pole number, or other landmark feature if nothing is nearby)

Location Remarks:

(Include closest turbine number, distance from turbine, and general direction [for ex, 50 feet south of turbine A-1]. Include any other details, such as –found on the road, power lines overhead, etc.)

SECTION NO. 3 - WILDLIFE IDENTIFICATION

Species:

(If known, write the species. If not sure, write Unidentified.)

Field marks used:_____ (Identification marks that helped you determine the species of the bird, if you are not sure and have an educated guess, put it here. For example, red tail and white chest)

Number of Photos Attached: _____

(At least one photo must be taken. Print digital photos and attach to Wildlife Incident Reporting Form)

SECTION NO. 4 – OBSERVATIONAL DATA

Physical condition:

Describe the physical condition at the time of discovery, including broken wings, all appendages attached?, all pieces found?, skeleton visible?, infested with anything?, etc)

Estimated Time since Death or Injury (days): _____ (<1, <4, <7, <14, <30, >30)

(Use your best judgment. Carcasses less than a few days old will have round, fluid filled eyes and will lack insect infestation. Carcasses with maggots are probably one to two weeks old. If bones are visible, the carcass is probably over 30 days old. Bones visible indicate over 30 days. Keep in mind that in cold weather carcasses will look fresh for much longer than in warmer weather.)

Other Field Notes:

(Note anything else relevant to incident such as presence of other fatalities in the area, evidence of electrocution details, extreme weather conditions, or other details).

Ultimate Disposition of the Bird:

(Taken to rehab center, Left in the field, or Placed in avian freezer)

SECTION NO. 5 - RESPONDENT

Name of Respondent:

Signature: Date:

A Wildlife Incident Reporting Summary should be sent to EFP, USFWS and DNR at the end of each calendar year prior to March 15 of the following year.