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TECHNICAL MEMORANDUM

Date: September 12, 2014

To: Ingrid Schwingler, Grande Prairie Wind, LLC

From: Sandra Simon and Todd Mattson, Western EcoSystems Technology, Inc. (WEST)

Subject: Bald Eagle Nest Monitoring Results at the Grande Prairie Wind Farm

DRAFT

INTRODUCTION

Grande Prairie Wind, LLC (Grande Prairie), a wholly owned subsidiary of Geronimo Wind Energy, LLC, d/b/a Geronimo Energy, LLC (Geronimo), is considering the development of the Grande Prairie Wind Farm (GPWF), a 400-megawatt (MW) wind energy facility in Holt County, Nebraska. The GPWF's project boundary encompasses 76,405 acres (30,920 hectares [ha]) and will include up to 266 utility scale wind turbines. To support project development, Grande Prairie contracted Western EcoSystems Technology, Inc. (WEST) to conduct pre-construction baseline surveys in the GPWF to document raptor nest locations and estimate levels of use by bald eagles (*Haliaeetus leucocephalus*), golden eagles (*Aquila chrysaetos*), and other large bird species. Additional pre-construction survey efforts included the monitoring of an occupied bald eagle nest within the GPWF as discussed below.

The purpose of this memorandum is to summarize the results of the bald eagle nest monitoring at an occupied bald eagle nest located in the northeast portion of the GPWF (Figure 1). An occupied bald eagle nest was discovered by a landowner after WEST's initial aerial bald eagle and raptor nest survey, which occurred on April 4, 2014. WEST was notified of an occupied bald eagle nest on June 13 in the northeast portion of the GPWF located near the headwaters of Steel Creek. A WEST biologist confirmed occupancy on June 14 and documented two bald eagle fledglings. WEST developed a robust monitoring schedule to document bald eagle activity associated with the occupied nest within the GPWF. Below is a description of survey methodology and results for this survey effort.

METHODS

The bald eagle nest monitoring surveys were initiated on June 21 and continued through August 15, 2014. Monitoring frequency was greatest at the beginning of the survey effort (June 21), with the greatest amount of observation hours recorded in July; and least amount of monitoring hours conducted as the effort progressed until August 15. On average survey efforts consisted

of a minimum of an eight hour day observing the bald eagle nest, with survey duration and frequency decreasing as bald eagle observations became less frequent.

The bald eagle nest monitoring survey consisted of four 800 meter (m) radius fixed-points established in all cardinal directions around the occupied bald eagle nest, following methods similar to Reynolds et al. (1980); and consistent with recommendations outlined in the *Eagle Conservation Plan Guidance: Module 1 – Land-based Wind Energy, Version 2* (USFWS 2013) for completing Eagle Conservation Plans. Each monitoring plot was approximately a quarter to half a mile from the bald eagle nest (Figures 1 and 2). The nest monitoring plots were established to attempt to document flight paths of the bald eagles in an effort to determine the nesting territory and surrounding use area within the GPWF.

The occupied bald eagle nest was monitored from private lands with land access provided by the landowner. All eagles seen during each survey were recorded, regardless of distance to the observer. Estimated distance to each bird observed was recorded to the nearest five meters. Landmarks were located to aid in estimating distances to each bird. Point count duration was for approximately one hour at each point, and points were rotated clockwise throughout the day (i.e., during an eight hour monitoring effort, each of the four points would have been monitored for a minimum of two hours). The date, start, and end time of observation period, plot number, number of individuals, sex and age class (if possible), distance from plot center when first observed (in meters [m]), closest distance (m), height above ground (m), activity, and habitat were recorded.

Eagle behavior and habitat were recorded for each eagle observation during each one-minute interval the bird was within view, per the USFWS Eagle Conservation Plan Guidance. Behavior categories included soaring flight, flapping-gliding, hunting, kiting-hovering, stooping/diving at prey, stooping or diving in an antagonistic context with other bird species perched, being mobbed, undulating/territorial flight, auditory, and other (noted in comments). The initial flight patterns and habitat types (at first observation) were uniquely identified on the data sheet and subsequent patterns and habitats were also recorded. The flight directions of observed bald eagles were recorded on the data sheet map. Approximate flight height at first observation was recorded to the nearest five meters; the approximate lowest and highest flight heights observed were also recorded. Any comments or unusual observations were noted in the comments section. Weather information recorded for each survey point included temperature, wind speed, wind direction, precipitation, and cloud cover.

RESULTS

Approximately 187 survey observation hours were documented at the four points surrounding the bald eagle nest from June 21 – August 15, 2014 (Table 1). Two bald eagle fledglings and two adult bald eagles were documented at the occupied nest within the GPWF during the survey duration. Figures1 and 2 reflect perch locations and flight paths documented for both juvenile and adult bald eagles. The majority of juvenile bald eagle activity was documented within the 400 m survey point buffers for each point, with most of juvenile flight paths consisting

of clumsy, low height flights from the nest tree to nearby trees. During the majority of survey efforts the adult bald eagles were not present at the nest, with departing and returning patterns not documented. However, when adult bald eagles were documented, the majority of observations were of a single adult perched near the nest tree or conducting short flights between trees near the nest. The general flight observations for adult bald eagles, when documented at a greater distance from the nest, were observed to the east and southeast of the nest, potentially utilizing Steel Creek (a tributary to the Niobrara River) to forage. Several adult flight paths were documented departing to or coming from north of the nest. The majority of flight activity for bald eagles was documented within the 400 m buffer of point six to the north, which was the point in the closest proximity to the nest, had the best viewshed to the nest, and had the greatest number of observation hours (52.2; Table 1; Figures 1 and 2). The least amount of activity was documented at point five to the west of the nest location. July 30th was the first survey session (eight hour duration) when no auditory or visual data was documented for juvenile or adult bald eagles, with the juveniles likely practicing hunting skills and sustaining greater flight distances from the nest around this time. Observations became less frequent after July 30th through the end of the survey effort on August 15.

Table 1. Total bald eagle nest observation hours per month and point at the Grande Prairie Wind Farm.

	June	July	August	Total Hours Per Point
Point 1	14	27	4	45
Point 3	14.2	26.9	4	45.1
Point 5	16	26.1	3	45.1
Point 6	22.5	27.7	2	52.2
Total Hours Per Month	66.7	107.7	13	187.4

DISCUSSION/CONCLUSIONS

The bald eagle nest monitoring conducted at the GPWF confirmed that a majority of observations were located within 800 m buffers of survey points surrounding the nest. Given the observation work did not begin until late in the nesting season, the numbers of adult eagle observations were somewhat limited. Adult flight paths were recorded to the east and northeast, which may imply that adults are using the forested corridor of Steel Creek to forage. Territory size surrounding bald eagle nests varies depending on habitat density and the opportunity to forage, but is thought to cover 0.6 to 1.2 square miles (Buehler 2000), and there is potential for the bald eagles to forage in waterbodies located within this distance at the GPWF. Given the

potential for bald eagles to reuse the same nest each year (USFWS 2007), it is possible this nesting territory could be used again in the future.

Per the USFWS's Eagle Conservation Plan Guidance, proximity of wind turbines to eagle nests is a risk factor that should be considered in project development. Limited information exists on bald eagle nests located in proximity to wind farms. While information from an entire nesting season might be more instructive, the available data analyzed by WEST, suggests turbines generally located with 3,000 feet of the nest could create higher risk of an eagle-turbine collision. Turbines located between the nest and nearby the river systems to the east or southeast of the nest (i.e., Steel Creek) might also have greater potential for eagle interactions.

REFERENCES

Buehler, D. A. 2000. Bald Eagle (*Haliaeetus leucocephalus*), Number 506 *in* A. Poole and F. Gill, editors, The Bird of North America. The Birds of North America, Inc. Philadelphia, Pennsylvania

USFWS. 2007. Bald Eagle Fact Sheet: Natural History, Ecology, and History of Recovery. Available online at: http://www.fws.gov/midwest/eagle/recovery/biologue.html

USFWS. 2013. Eagle Conservation Plan Guidance, Module 1 – Land-based Wind Energy, Version 2 (April 2013). USFWS Division of Migratory Bird Management.

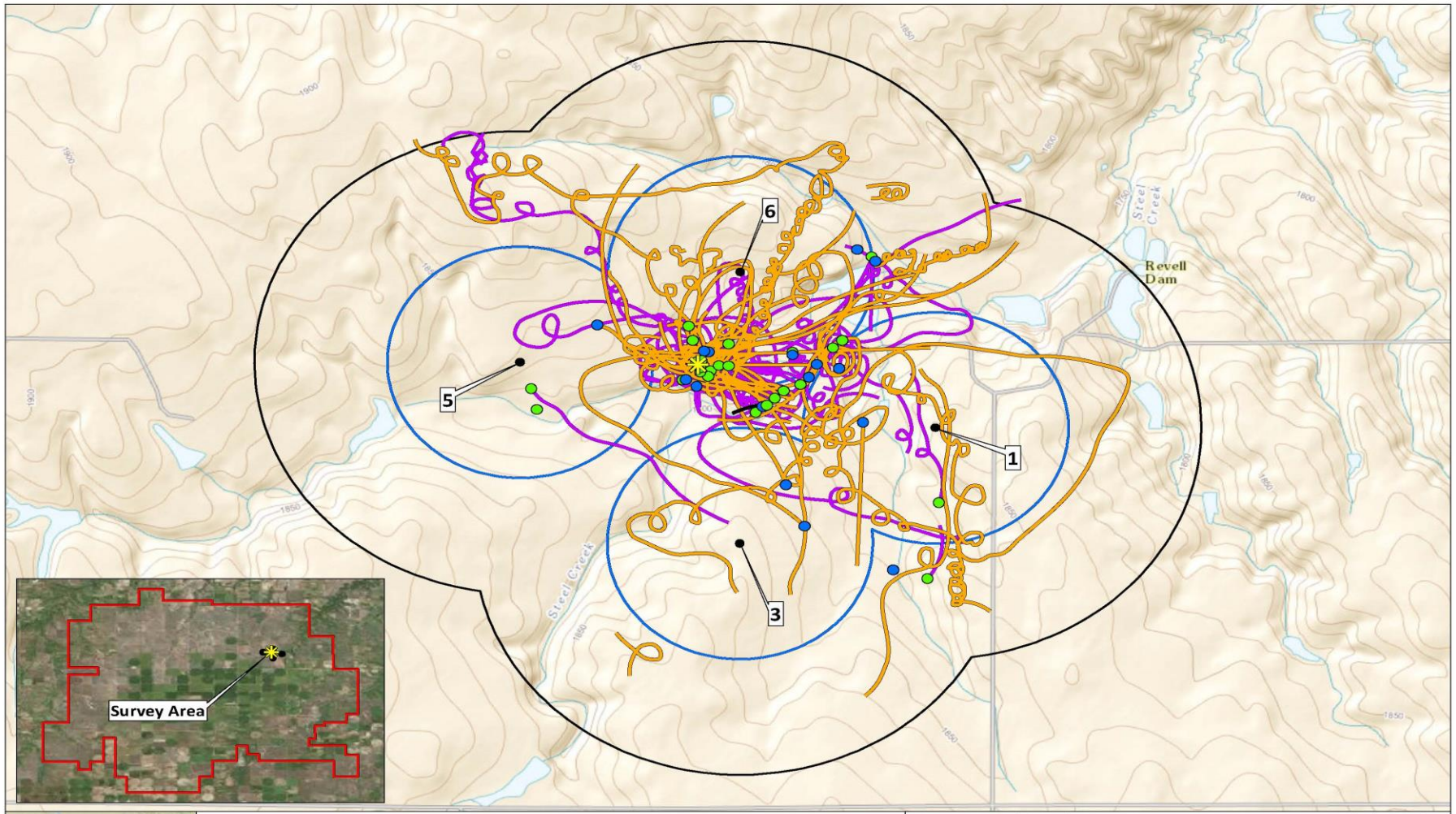
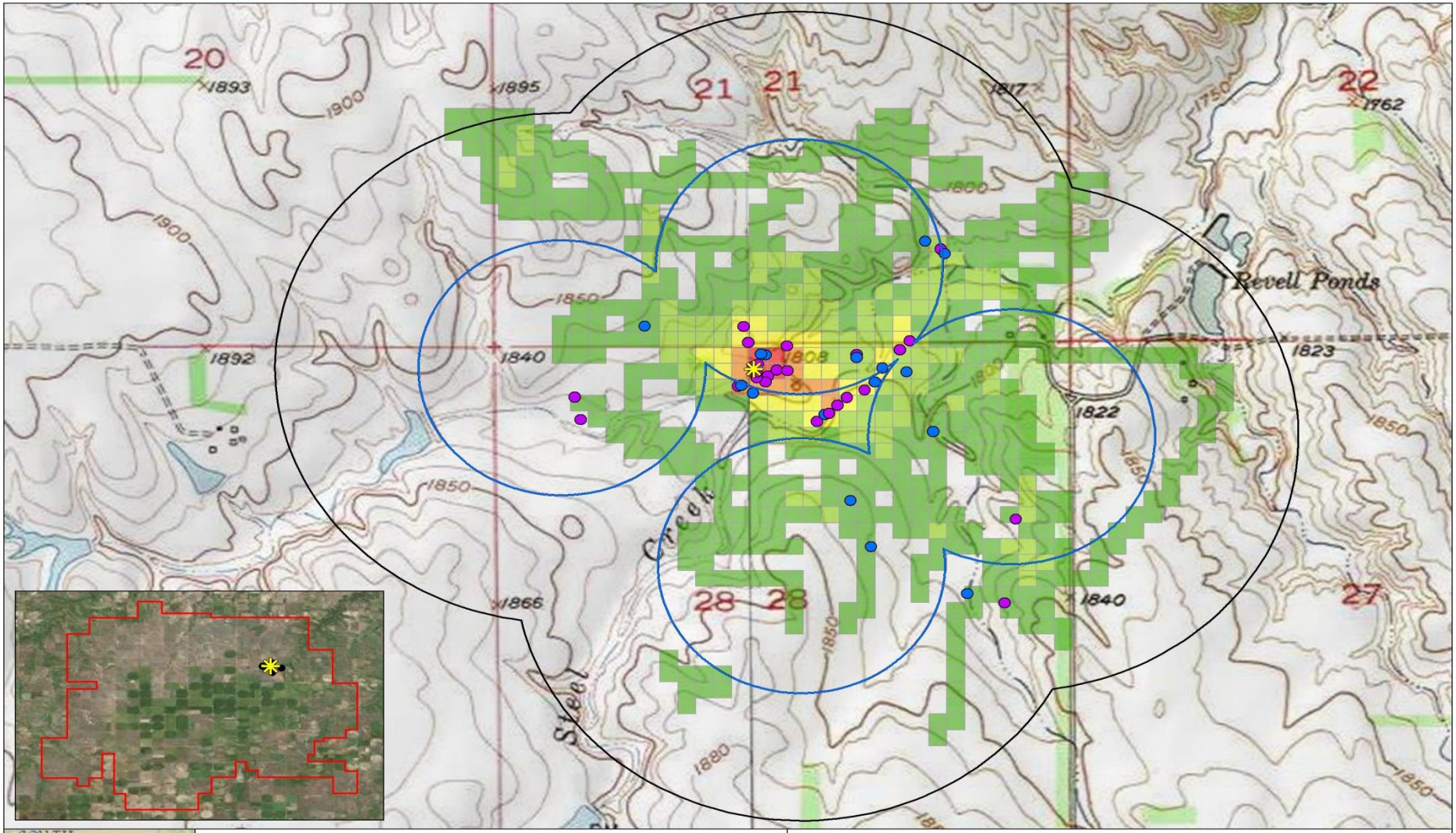


Figure 1. Bald Eagle Nest Survey Point Locations & Flight Paths
Grande Prairie Wind Farm, Holt County, Nebraska



Bald Eagle Nest
400 m Survey Point Buffer
800 m Survey Point Buffer
Perched
Adult Bald Eagle
Juvenile Bald Eagle

Bald Eagle Flight Paths
Number of Flights (50m x 50m Grid)
1 - 2
3 - 6
7 - 13
14 - 21
22 - 31

Figure 2. Bald Eagle Nest Survey Point Locations & Flight Path Heat Map
Grande Prairie Wind Farm, Holt County, NE

0 0.5 Miles

N W E S

Data Source: USA Topo Maps
Projection: Universal Transverse Mercator
Datum: North American Datum 1983
Author: Jeff Fruhwirth Date: 09/09/2014

WEST