

TECHNICAL MEMORANDUM

Date: July 30, 2014

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(WEST)

Subject: Aerial Nest Survey Results for the Grande Prairie Wind Farm

INTRODUCTION

The purpose of this memorandum is to summarize the results of 2014 aerial surveys for raptor nests and nesting status conducted for the Grande Prairie Wind Farm (GPWF) located in Holt County, Nebraska. The objective of the aerial survey was to locate bald eagle (*Haliaeetus leucocephalus*) and other raptor nests to assist in evaluating siting options and help assess potential effects of the GPWF on breeding eagles. Surveys were conducted to gather information on raptors nesting in the area, including nest locations, nesting status, and spatial distribution of nest locations.

METHODS

Aerial surveys were conducted on April 4, 2014. This was a period before leaf-out during the season where there is the highest probability of detecting bald eagles incubating eggs, or adults tending young, based on knowledge of egg laying/incubation chronology for bald eagles in the region (see U.S. Fish and Wildlife Service's *National Bald Eagle Management Guidelines*, May 2007). The eagle nest survey included the GPWF boundary and a two- to seven- mile buffer area, for a total survey area of 198,108 acres (801.7 square kilometers; Figure 1). The two mile buffer encompassed the majority of the GPWF, while the seven mile buffer extended north approximately seven miles to include the area between the GPWF boundary and the Niobrara River – an area where there is known or suspected eagle nesting in the region (Jorgensen & Dinan 2012, 2013; Jorgensen et al. 2010). Depending on the habitat and prey density, breeding bald eagles defend territories of variable shape and size but averaging 0.4-0.8 square miles (MNDNR 2014). Similarly, the average distance between nests might be 0.1 to 1.9 miles (Buehler 2000). As such, we expect this survey covered potential eagle nesting territories that could overlap turbine locations. The surveys recorded other non-eagle species out to at least one mile from the GPWF boundary. Non-eagle raptors include kites, accipiters, buteos, harriers, falcons, and owls.

Pre-flight planning included relevant background review of previously recorded nest locations provided by the Nebraska Game and Parks Commission (NGPC), Natural Heritage Program, a review of topographic maps and aerial photographs, and the creation of cartographic figures and Geographic Information Systems (GIS) files for conducting the surveys.

WEST contracted Skyway Helicopters, LLC, to provide air support for the aerial survey. A Robinson R44 helicopter was used to conduct surveys, following guidance provided in the USFWS Eagle Conservation Plan Guidance (April 2013) and standard raptor research techniques (Anderson 2007). An experienced raptor ecologist and a helicopter pilot skilled at this type of survey were used. Efforts were made to minimize disturbance to breeding raptors; the greatest possible distance at which the species could be identified was maintained, with distances varying depending upon nest location and wind conditions. Datasheets were used to record attribute data when a nest was detected and was later transcribed into a spreadsheet.

In general, all potential bald eagle and raptor nest habitat was surveyed by flying meandering transects between 0.25 and 0.5 mile (0.4 and 0.8 km) apart between 0800 hours and 1700 hours; flying at speeds of 60-75 mph throughout the GPWF boundary and associated buffers. The eagle nest survey focused on locating eyries (large, stick nest structures) in suitable eagle nesting habitat and structures (large trees, transmission line structures, etc.) within the GPWF boundary and associated buffers (Figure 1). The locations of all potential bald eagle and raptor nests were recorded using a hand-held Global Positioning System (GPS); coordinates were set at Universal Transverse Mercator (UTMs) North American Datum (NAD) 83 unit. This included all potential nests regardless of their activity status. To determine the status of a nest, the biologist relied on clues that included behavior of adults and presence of eggs, young, whitewash, or nesting material, as described in more detail in the Terminology section below. . Raptor species, nest type, nest status, nest condition, and substrate, were recorded at each nest location (Table 1).

One additional ground survey was conducted on May 29, 2014 at the potential bald eagle nest to the southeast of the GPWF along Lamb Creek to survey for occupancy. This potential bald eagle nest location will be revisited once more during the summer for a status update, with at least 30 days in between the previous survey effort.

Terminology

Included below are descriptions of terms used during the documentation of nests (see Results section).

Nest ID

WEST assigned a unique nest identification number for each nest documented.

Species

A species was assigned to each nest where possible; when a nest could not be identified to species it was classified as an unknown raptor nest. Nests documented as unknown raptor

species are defined as any stick nest that did not have an occupant associated with it at the time of the survey. Many times nests will become abandoned or no longer used, and over time, may become a historic nest site. Additionally, an unknown number/type of stick nests are used by corvid (ravens and crows) or owl species and may not have been detected as such during aerial raptor surveys based on differences in nesting chronology. Unknown raptor nests, including old nests or nests that could become suitable for raptors, are documented in order to populate a nest database to ensure that future surveys include all potentially suitable nest sites.

Nest Condition

Nest condition was categorized using descriptions ranging from poor to excellent. Although the determination of nest condition can be subjective and may vary between observers, it gives a general sense of when a nest or nest site may have last been used. Nests in poor to fair condition are typically in disrepair, sloughing, or sagging heavily, and would require some level of effort to rebuild in order to be suitable for successful nesting. Nests in good to excellent condition are those that appear to have been well maintained, have a well-defined bowl shape, are not sagging or sloughing, and appear to be suitable for nesting.

Substrate

The substrate in which a nest was observed was recorded to provide observers a visual reference. Nest substrates used by eagles can range from manmade structures to rock ledges and conifer and deciduous tree species.

Nest Status

WEST categorizes basic nest use consistent with definitions from the USFWS *Eagle Conservation Plan Guidance* (April 2013). Nests were classified as occupied if any of the following were observed at the nest structure: (1) an adult in an incubating position, (2) eggs, (3) nestlings or fledglings, (4) occurrence of a pair of adults (or, sometimes sub-adults), (5) a newly constructed or refurbished stick nest in the area where territorial behavior of a raptor had been observed early in the breeding season, or (6) a recently repaired nest with fresh sticks (clean breaks) or fresh boughs on top, and/or droppings and/or molted feathers on its rim or underneath. Occupied nests were further classified as active if an egg or eggs had been laid or nestlings were observed, or inactive if no eggs or chicks were present. A nest that does not meet the above criteria for “occupied” was classified as “unoccupied”.

RESULTS

WEST’s biologists detected a total of 10 nests of three known species during aerial surveys conducted on April 4, 2014 (Figure 1; Table 1). In addition to the nests associated with three known species, 28 unoccupied nests of unknown species were recorded as “unknown raptor”, and two unoccupied, possible eagle nests were also recorded. The recorded nests included the following:

- Five bald eagle – three occupied-active (two within survey boundary; one just east of the survey boundary); two possible eagle, unoccupied-inactive
- Five red-tailed hawk (*Buteo jamaicensis*) – all occupied-active
- Two great horned owl (*Bubo virginianus*) – both occupied-active
- 29 unknown raptor – all unoccupied-inactive

Additionally, roosting bald eagles were noted in two locations, both on the north bank of the Niobrara River. One roosting location (ID 004; Table 1; Figure 1) included three adults perched on a rock ledge; the other roosting location (ID 002; Table 1; Figure 1) included two adults, two second year eagles, and one sub-adult all roosting in a tree.

Three of the red-tailed hawk nests and 14 of the unoccupied unknown raptor nests were located within the GPWF boundary. The two great horned owl nests, one red-tailed hawk nest, one unoccupied possible eagle nest and 14 unoccupied unknown raptor nests were located within one mile of the GPWF boundary; one red-tailed hawk nest and one unoccupied unknown raptor nest were located within two miles of the GPWF boundary. The two recorded eagle roosting locations, along with the three occupied eagle nests and one unoccupied possible eagle nest were located along the Niobrara River, approximately six to seven miles north of the GPWF boundary; one of the occupied eagle nests (ID 001) was noted just outside of the survey buffer, as shown on Figure 1. Table 1 provides more information on the nests observed, and Figure 1 shows the locations.

The unoccupied potential bald eagle nest to the southeast of the GPWF along Lamb Creek was documented as remaining unoccupied during the second observation by foot the end of May.

It should be noted that an occupied bald eagle nest (not detected in the original aerial survey) was observed within the northeast portion of the GPWF and reported to WEST on June 13. WEST biologist visited the nest, located near the headwaters of Steel Creek (a tributary to the Niobrara River), on June 14 to confirm occupancy and documented that the nest was indeed occupied and observed two bald eagle fledglings by the nest (see Figure 1). WEST has developed a robust monitoring schedule to document utilization determination of bald eagle activity within the GPWF. This increased effort was initiated on June 21 and will continue through mid-August. The results of this monitoring effort will be discussed in detail in a separate report.

CONCLUSIONS

Bald eagles typically require large nest structures which in turn require a substantial substrate to support such a nest. In Nebraska, these substrates are typically large cottonwood trees with open flight paths in proximity to river or lake shorelines. Very few suitable nesting structures or substantial shoreline habitats exist within the GPWF boundary, limiting the potential for bald eagles to utilize the site for nesting purposes. Within the two mile buffer of the GPWF

boundary, several potential nesting trees are associated with some of the larger drainages outside of the boundary, in the general area of the unoccupied possible eagle nest (ID 011). However, as NGPC data shows and the aerial survey confirms, more suitable eagle nesting habitat existing approximately seven miles north of the GPWF along the Niobrara River.

Table 1. Grande Prairie Wind Farm aerial nest survey results April 4, 2014

Nest ID		Nest Condition	Substrate ²	Accuracy	UTM NAD83		Nest Status 2014
WEST Inc	Species ¹				Easting	Northing	
001	BAEA	Good	DTL	GPS-Aerial	558098.5	4734493.6	Occupied-Active
002	BAEA	NA	RL	GPS-Aerial	538873.3	4736695.0	NA - Roost
003	BAEA	Good	DTL	GPS-Aerial	535292.3	4736925.4	Unoccupied-Inactive
004	BAEA	NA	CT	GPS-Aerial	539374.2	4736631.0	NA - Roost
005	BAEA	Good	DTL	GPS-Aerial	542155.6	4735223.7	Occupied-Active
006	BAEA	Good	DTL	GPS-Aerial	547795.3	4735684.3	Occupied-Active
007	RTHA	Good	DTL	GPS-Aerial	552835.6	4726469.7	Occupied - Active
008	UNK	Fair	DTL	GPS-Aerial	548311.8	4727699.7	Unoccupied-Inactive
009	UNK	Fair	DTL	GPS-Aerial	547308.6	4727398.7	Unoccupied-Inactive
010	UNK	Good	DTL	GPS-Aerial	553857.9	4709546.6	Unoccupied-Inactive
011	BAEA	Good	DTL	GPS-Aerial	558033.6	4708977.7	Unoccupied-Inactive
012	UNK	Fair	DTL	GPS-Aerial	556875.1	4710677.9	Unoccupied-Inactive
013	RTHA	Good	DTL	GPS-Aerial	552581.9	4711366.3	Occupied - Active
014	UNK	Good	DTL	GPS-Aerial	544078.8	4709108.7	Unoccupied-Inactive
015	UNK	Good	DTL	GPS-Aerial	540222.9	4709097.4	Unoccupied-Inactive
016	UNK	Fair	DTL	GPS-Aerial	557216.0	4713041.0	Unoccupied-Inactive
017	UNK	Good	DTL	GPS-Aerial	556090.2	4713568.1	Unoccupied-Inactive
018	UNK	Good	DTL	GPS-Aerial	553195.3	4712969.6	Unoccupied-Inactive
019	UNK	Good	DTL	GPS-Aerial	534687.4	4713481.0	Unoccupied-Inactive
020	UNK	Good	DTL	GPS-Aerial	534688.1	4713528.0	Unoccupied-Inactive
021	UNK	Good	DTL	GPS-Aerial	550469.3	4715366.0	Unoccupied-Inactive
022	RTHA	Good	DTL	GPS-Aerial	555124.4	4717045.9	Occupied - Active
023	UNK	Good	DTL	GPS-Aerial	552396.3	4716999.6	Unoccupied-Inactive
024	UNK	Good	DTL	GPS-Aerial	552161.7	4716858.0	Unoccupied-Inactive
025	UNK	Good	DTL	GPS-Aerial	550595.5	4717068.5	Unoccupied-Inactive
026	RTHA	Good	DTL	GPS-Aerial	549636.6	4716977.5	Occupied - Active
027	UNK	Good	DTL	GPS-Aerial	549091.5	4716972.4	Unoccupied-Inactive
028	UNK	Good	DTL	GPS-Aerial	548367.9	4715820.4	Unoccupied-Inactive
029	UNK	Good	DTL	GPS-Aerial	544076.1	4716286.2	Unoccupied-Inactive
030	GHOW	Good	DTL	GPS-Aerial	536600.6	4716448.8	Occupied - Active
031	UNK	Fair	DTL	GPS-Aerial	558347.1	4718438.2	Unoccupied-Inactive
032	UNK	Fair	DTL	GPS-Aerial	558208.0	558208.0	Unoccupied-Inactive
033	UNK	Good	DTL	GPS-Aerial	552817.7	4718540.7	Unoccupied-Inactive
034	UNK	Good	DTL	GPS-Aerial	538334.4	4724123.4	Unoccupied-Inactive
035	UNK	Good	DTL	GPS-Aerial	553680.9	4723582.6	Unoccupied-Inactive
036	RTHA	Good	DTL	GPS-Aerial	555459.2	4724225.6	Occupied - Active
037	UNK	Good	DTL	GPS-Aerial	555033.8	4724180.5	Unoccupied-Inactive
038	UNK	Good	DTL	GPS-Aerial	554450.8	4724144.0	Unoccupied-Inactive
039	UNK	Good	DTL	GPS-Aerial	554085.9	4724233.7	Unoccupied-Inactive
040	UNK	Good	DTL	GPS-Aerial	539178.8	4724665.0	Unoccupied-Inactive
041	UNK	Good	DTL	GPS-Aerial	550579.1	4725187.7	Unoccupied-Inactive
042	UNK	Good	DTL	GPS-Aerial	545919.1	4725918.6	Unoccupied-Inactive
043	GHOW	Good	DTL	GPS-Aerial	541227.1	4726598.0	Occupied - Active

¹ BAEA = bald eagle; RTHA = red-tailed hawk; UNK = unknown raptor; GHOW = great horned owl

² DTL = deciduous tree - live; RL = Rock Ledge; CT = coniferous tree

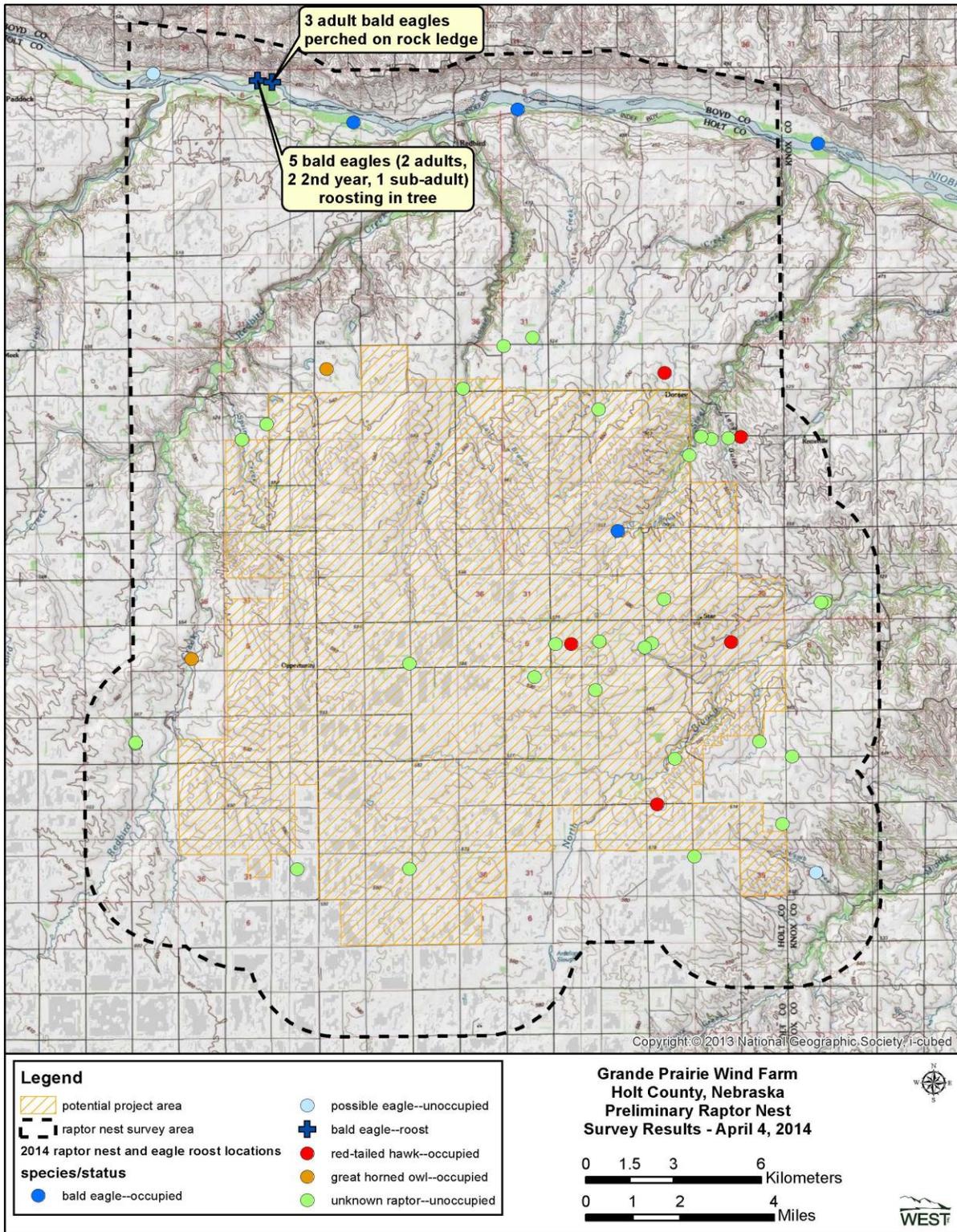


Figure 1. Grande Prairie Wind Farm aerial nest survey locations, April 4, 2014. Note that this figure also shows the occupied bald eagle nest within the GPWF, which was identified on June 13, 2014 after the aerial effort occurred.

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