

**Raptor Nest Survey Results for the
Crocker Wind Farm
Clark County, South Dakota**

Final Report



Prepared for:

Geronimo Energy
7650 Edinborough Way, Suite 725
Edina, MN 55425

Prepared by:

Western EcoSystems Technology, Inc.
1710 Douglas, Suite 283
Golden Valley, MN 55422

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STUDY PARTICIPANTS

Western EcoSystems Technology

Joyce Pickle	Project Manager
Derek Klostermeier	Research Biologist
Adam Kreger	GIS Specialist
Sofia Agudelo	Research Biologist

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INTRODUCTION

Crocker Wind Farm, LLC (Project), a wholly owned subsidiary of Geronimo Energy, LLC (Geronimo) is a proposed wind energy project located in Clark County, South Dakota (Figure 1). Geronimo requested that Western EcoSystems Technology, Inc. (WEST) conduct an aerial based raptor nest survey to estimate the impacts of construction on nesting raptors. This report provides results of the general raptor nest survey conducted at the Project on April 4-5, 2016.

STUDY AREA

The Project is located in Clark County, in northeast South Dakota, approximately 33 miles ([mi]; 53.6 kilometers [km]) west of Watertown (Figure 1). The Project is located in the eastern South Dakota Prairie Coteau Level IV Ecoregion, within the Northern Glaciated Plains Level III Ecoregion, which covers much of eastern North and South Dakota (US Environmental Protection Agency [USEPA] 2016a). The Northern Glaciated Plains Ecoregion is characterized by a flat to gently rolling landscape composed of glacial drift. The climatic characteristics of the region foster a grassland transitional between tall and shortgrass prairie, known as the mixed-grass prairie. High concentrations of temporary and seasonal wetlands (prairie potholes) create favorable conditions for waterfowl nesting and migration. Although the till soils are very fertile, the northern mixed-grass prairie is greatly influenced by wet-dry cycles; agricultural output in the region is subject to these annual climatic variations (U.S. Environmental Protection Agency 2016b).

METHODS

Aerial Raptor Nest Survey

One aerial survey was conducted from a helicopter in early April (April 4-5, 2016), a period before leaf out when raptors are actively tending to a nest or incubating eggs. Aerial surveys were conducted in accordance with the guidance provided in the U.S. Fish and Wildlife Service (USFWS) *Eagle Conservation Plan Guidance: Module 1 – Land-based Wind Energy, Version 2* (ECPG; USFWS 2013) and the USFWS Inventory and Monitoring Protocols (Pagel et al. 2010). An experienced raptor biologist and a skilled helicopter pilot conducted the survey. Raptors are defined here as kites, accipiters, buteos, harriers, eagles, falcons, and owls; however, the main focus of the survey was to identify bald eagle (*Haliaeetus leucocephalus*) nests. Bald eagle nest surveys focused on locating eyries (large, stick nest structures) in suitable eagle nesting substrate (trees, transmission lines, cliff faces, etc.) within and around the proposed Project (Figure 1), considering two different buffer areas: a 1-mi (1.6 km) buffer and a 10-mi (16.1 km) buffer (Figure 1). Note that the Project boundary that was used for the aerial nest survey (grey polygon on Figure 1) has since been updated and expanded (red outline on Figure 1); the 1-mi survey buffer does not cover all of the expansion areas so it is possible that there are non-eagle raptor nests in those area that were not recorded.

Surveys within the 1-mi boundary documented all potential raptor nests, while the surveys outside of the 1-mi boundary focused only on identifying potential bald eagle nests. 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.

In general, all potential bald eagle and raptor nest habitat was surveyed by flying meandering transects between 0.25 and 0.5 mi (0.4 and 0.8 km) apart, flying at speeds of 60 to 75 mi per hour (mph; 97 to 121 km per hour) throughout the proposed Project and associated 1- and 10-mi buffers, respectively. Surveys were typically conducted between 08:00 hours and 17:00 hours. The locations of all potential 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 confirmed and 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, chicks, or whitewash. Attempts were made to identify the species of raptor associated with each active nest. Raptor species, nest type, nest status, nest condition, and substrate, were recorded at each nest location to the extent possible.

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 when possible, otherwise, 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. 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. Substrates range from manmade structures (such as power lines, nest platforms, and dock hoists) to biological and physical structures (conifer and deciduous tree species, cliff faces).

Nest Status - WEST categorizes basic nest use consistent with definitions from the ECPG. 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

Aerial Raptor Nest Survey

A WEST biologist detected a total of 54 raptor nests representing three raptor species (Table 1), during aerial surveys conducted on April 4-5, 2016. Two occupied bald eagle nests, six occupied great-horned owl (*Bubo virginianus*) nests, twelve red-tailed hawk (*Buteo jamaicensis*) nests and 34 unoccupied, inactive unknown raptor nests were identified (Table 1; Figure 1).

No occupied or potential bald eagle nests were located within the Project. Two occupied bald eagle nests were located within the 10-mi buffer (Figure 1). No bald eagles were observed during the survey within the Project or the 1-mi buffer. No federal or state-listed threatened or endangered raptor species were observed nesting within the Project or associated buffers. The following section provides a description of the bald eagle nests that were identified; the referenced distances to the Project boundary refer to the current (May 2016) Project boundary. Table 1 summarizes the data collected at all observed raptor nests.

Nest 1 – this nest is located approximately 5.4 mi (8.69 km) northeast of the Project boundary. The nest was in excellent condition (no photo available). Two adult bald eagles were observed on the nest, one perched and one in incubating position, and two eggs were observed. The nest is therefore considered occupied and active in 2016.

Nest 2 – this nest is located approximately 6.2 mi (9.98 km) north of the Project boundary. The nest was in excellent condition. An adult bald eagle was observed on the nest in incubating position. The nest is therefore considered occupied and active in 2016. Photo 1 depicts Nest 2.



Photo 1. Nest 2 at Crocker Ridge Wind Farm – occupied and active bald eagle nest.

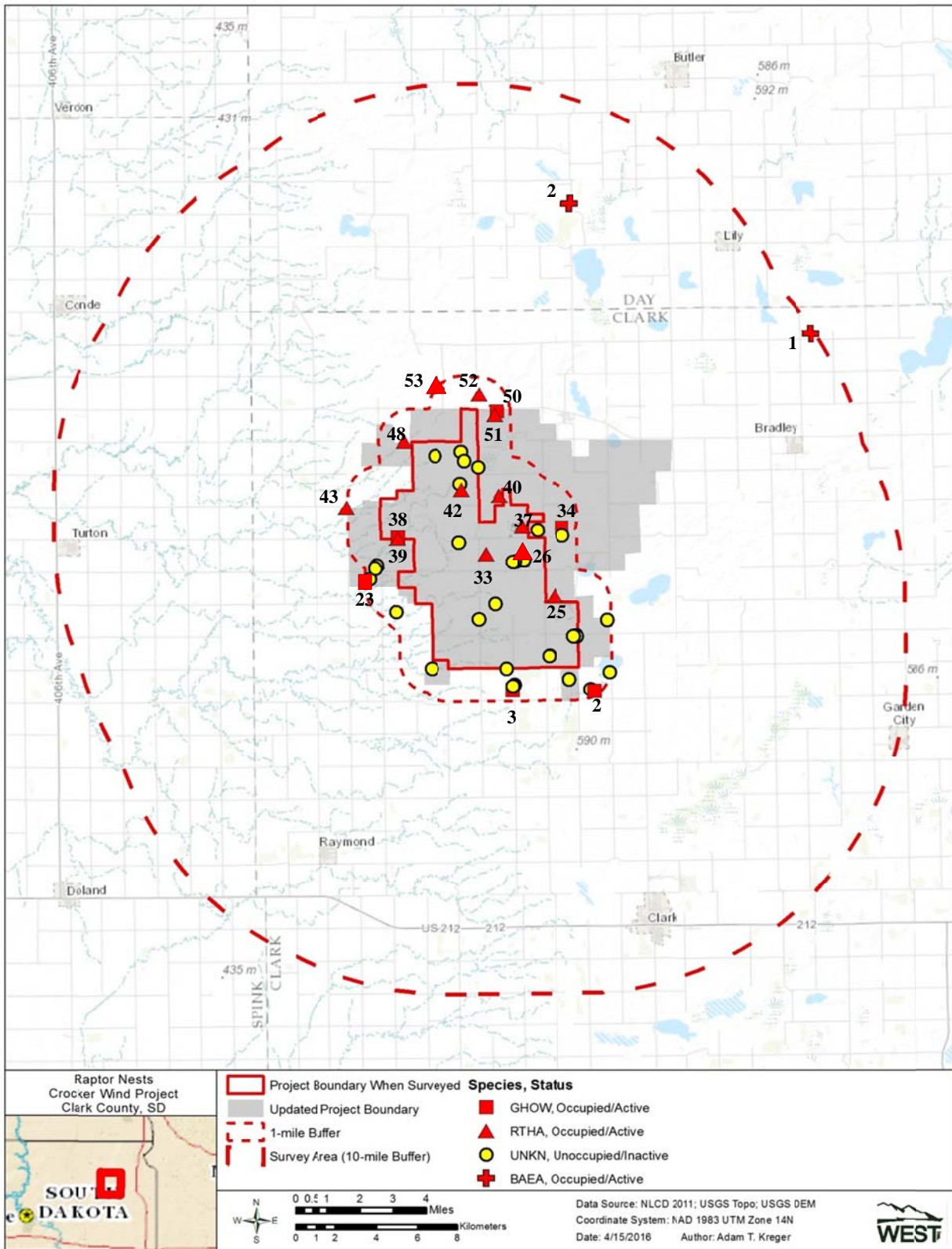


Figure 1. Overview of the Crocker Wind Farm, Clark County, South Dakota, and associated buffers, nest locations during raptor nest surveys conducted April 4-5, 2016 survey. Nests with species ID'd are labeled per Table 1.

Table 1. Raptor nest Unique ID (Nest ID), locations (NAD83, Zone 14) and features for identified nests during the April 4-5, 2016 survey for the Crocker Wind Farm, Clark County, South Dakota. Red-tailed hawk (RTHA), great-horned owl (GHOW), bald eagle (BAEA), and unknown raptor (UNKN) nests were located. All nests with species ID'd are labeled on Figure 1.

Nest ID	Species	Nest Substrate	Easting	Northing	Status at time of survey	Condition
1	BAEA	Tree	4999394	607659	Occupied, Active	Excellent
2	BAEA	Tree	5005858	595775	Occupied, Active	Excellent
3	GHOW	Tree	4981767	592967	Occupied, Active	Excellent
4	Unknown	Tree	4982006	593045	Unoccupied, Inactive	Good
5	Unknown	Tree	4981935	592960	Unoccupied, Inactive	Excellent
6	Unknown	Tree	4982288	595775	Unoccupied, Inactive	Good
7	Unknown	Tree	4981797	596822	Unoccupied, Inactive	Good
8	GHOW	Tree	4981726	597014	Occupied, Active	Excellent
9	Unknown	Tree	4982644	597751	Unoccupied, Inactive	Good
10	Unknown	Tree	4983454	594777	Unoccupied, Inactive	Good
11	Unknown	Tree	4983425	594762	Unoccupied, Inactive	Excellent
12	Unknown	Tree	4982819	592662	Unoccupied, Inactive	Good
13	Unknown	Tree	4982808	588949	Unoccupied, Inactive	Excellent
14	Unknown	Tree	4984902	597865	Unoccupied, Inactive	Excellent
15	Unknown	Tree	4984461	596114	Unoccupied, Inactive	Good
16	Unknown	Tree	4984423	596149	Unoccupied, Inactive	Poor
17	Unknown	Tree	4984405	595962	Unoccupied, Inactive	Poor
18	Unknown	Tree	4985630	587224	Unoccupied, Inactive	Excellent
19	Unknown	Tree	4985291	591305	Unoccupied, Inactive	Good
20	Unknown	Tree	4986045	592121	Unoccupied, Inactive	Good
21	Unknown	Tree	4985248	597619	Unoccupied, Inactive	Poor
22	Unknown	Tree	4984858	597873	Unoccupied, Inactive	Excellent
23	GHOW	Tree	4987249	585518	Occupied, Active	Excellent
24	Unknown	Tree	4987264	585919	Occupied, Inactive	Excellent
25	RTHA	Tree	4986573	595169	Occupied, Active	Excellent
26	RTHA	Tree	4988334	593513	Occupied, Active	Excellent
27	Unknown	Tree	4988192	593518	Occupied, Active	Excellent
28	Unknown	Tree	4988117	593103	Unoccupied, Inactive	Excellent
29	Unknown	Tree	4988099	592957	Unoccupied, Inactive	Excellent
30	Unknown	Tree	4987923	586275	Unoccupied, Inactive	Fair
31	Unknown	Tree	4987804	586215	Unoccupied, Inactive	Fair
32	Unknown	Tree	4989058	590317	Unoccupied, Inactive	Good
33	RTHA	Tree	4988589	591763	Occupied, Active	Good
34	GHOW	Tree	4989797	595375	Occupied, Active	Excellent
35	Unknown	Tree	4989422	595411	Unoccupied, Inactive	Good

Table 1. Raptor nest Unique ID (Nest ID), locations (NAD83, Zone 14) and features for identified nests during the April 4-5, 2016 survey for the Crocker Wind Farm, Clark County, South Dakota. Red-tailed hawk (RTHA), great-horned owl (GHOW), bald eagle (BAEA), and unknown raptor (UNKN) nests were located. All nests with species ID'd are labeled on Figure 1.

Nest ID	Species	Nest Substrate	Easting	Northing	Status at time of survey	Condition
36	Unknown	Tree	4989673	594193	Unoccupied, Inactive	Fair
37	RTHA	Tree	4989982	593544	Occupied, Active	Excellent
38	GHOW	Tree	4989343	587290	Occupied, Active	Excellent
39	RTHA	Tree	4989363	587384	Occupied, Active	Excellent
40	RTHA	Tree	4991487	592419	Occupied, Active	Excellent
41	Unknown	Tree	4991980	590351	Unoccupied, Inactive	Fair
42	RTHA	Tree	4991820	590569	Occupied, Active	Excellent
43	RTHA	Tree	4990887	584888	Occupied, Active	Excellent
44	Unknown	Tree	4992803	591287	Unoccupied, Inactive	Good
45	Unknown	Tree	4993561	590411	Unoccupied, Inactive	Good
46	Unknown	Tree	4993110	590585	Unoccupied, Inactive	Fair
47	Unknown	Tree	4993377	589121	Unoccupied, Inactive	Fair
48	RTHA	Tree	4994189	587706	Occupied, Active	Excellent
49	Unknown	Tree	4994916	586509	Unoccupied, Inactive	Good
50	GHOW	Tree	4995568	592183	Occupied, Active	Good
51	RTHA	Tree	4995491	592200	Occupied, Active	Good
52	RTHA	Tree	4996504	591422	Occupied, Active	Good
53	RTHA	Tree	4996918	589270	Occupied, Active	Good
54	Unknown	Tree	4998196	591006	Unoccupied, Inactive	Poor

DISCUSSION/CONCLUSION

These surveys provided additional information on raptor and eagle use within the vicinity of the Project. Aerial survey results suggest that there are no bald eagle nests within the Project. The Project site is dominated by cultivated and grazed agricultural lands with relatively little forest cover. Additionally, the Project does not include large river or lake systems that might provide substantial foraging opportunities to eagles. It does, however, include large wetland complexes which could provide foraging opportunities, but with few large trees or structures limiting perching/nesting opportunities. Greater density of mature woody habitats and associated wetland complexes exists along Baileys Lake, Round Lake, Reid Lake and Mallard Slough, all within one mile east of the Project, which provide more favorable nesting and foraging habitat for bald eagles.

The inter-nest distance of the two active bald eagle nests observed is 8.4 mi. The ECPG states that eagle pairs at nests within one-half the mean inter-nest distance, in this case 4.2 mi, are susceptible to disturbance take and blade strike mortality. However, it is anticipated that most flight corridors used by nesting bald eagles are located closer than 4.2 mi from the nest. In any case, the Project is located farther than 4.2 mi from the two documented bald eagle nests.

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