

## **Grande Prairie Wind Farm American Burying Beetle Survey**

Hoback Consulting, July 7, 2014

### **Introduction**

A wind energy development project is being instigated in northeastern Holt County, Nebraska extending to the border of Knox County. The Grande Prairie Wind Farm project area covers approximately 54,000 acres and has a mixture of center-pivot row-crop and rangeland. The area of the proposed project lies outside the known range of American burying beetle (*Nicrophorus americanus* [ABB]); however, the beetles occur in high numbers in western and central parts of Holt County. Within the project area, the rangelands appear to comprise suitable habitat with areas containing sub-irrigated wet meadows with little human disturbance. This type of habitat supports ABB in the Nebraska Sandhills, but also occurs in areas where no ABB have been detected. Thus, baited pitfall surveys are the best indicators of ABB occurrence. In 2012, a baited pitfall survey was conducted in accordance with USFWS guidance in the area of the Grande Prairie Wind Farm project and no ABBs were detected. In the northern portions of the project area, soils are either very sandy or have glacial till consisting of fine gravel approximately 12 cm (5 inches) beneath the surface. Because USFWS guidance indicates that survey results are only valid for one year, a second, more extensive survey was conducted in 2014.

### **American Burying Beetle Survey**

Following USFWS survey guidelines, W. Wyatt Hoback (permit # TE-045150) and Kerri M. Farnsworth conducted a baited pitfall trap survey within the Grande Prairie Wind Farm project area in habitats that visually appeared most suitable for ABB occurrence. Traps were spaced a minimum of 1 mile apart and checked daily before noon. Four additional traps were placed near Chambers, Nebraska in an area where ABB occur in relatively large numbers and served as controls. The control site is used to confirm ABB activity during the survey period.

Twenty traps were placed on June 20 on road right-of-ways in the proposed project area and were baited with previously frozen laboratory rats that had been rotted 4-5 days. Traps were checked each morning before 12:00 and all carrion beetles were identified and released. Traps were checked for 5 consecutive nights and were re-baited after 3 trap nights. Because of captures of two ABBs, two additional traps were added on June 23 and were checked for two nights. Although, the additional two traps do not meet the 5 day requirement for ensuring absence of ABB, the catch of other carrion beetles is correlated with the likelihood of ABB occurrence.

Traps were placed at the coordinates listed in Table 1 (NAD 83, UTM Zone 14). Each trap has an expected effective trap radius of 0.5 miles and all areas of the project site that were rated as

good or prime were surveyed. Traps were placed in areas with the best habitat where access was possible from public roads. Each trap attracts ABBs from an approximately 0.5 mile radius. Trap locations were recorded with a GPS unit.

Weather was monitored during trapping and all survey dates were suitable for ABB activity with midnight temperatures  $> 55^{\circ}\text{F}$  and rainfall  $< 0.2$  inches between the hours of 10 PM and 2 AM (see Table 2).

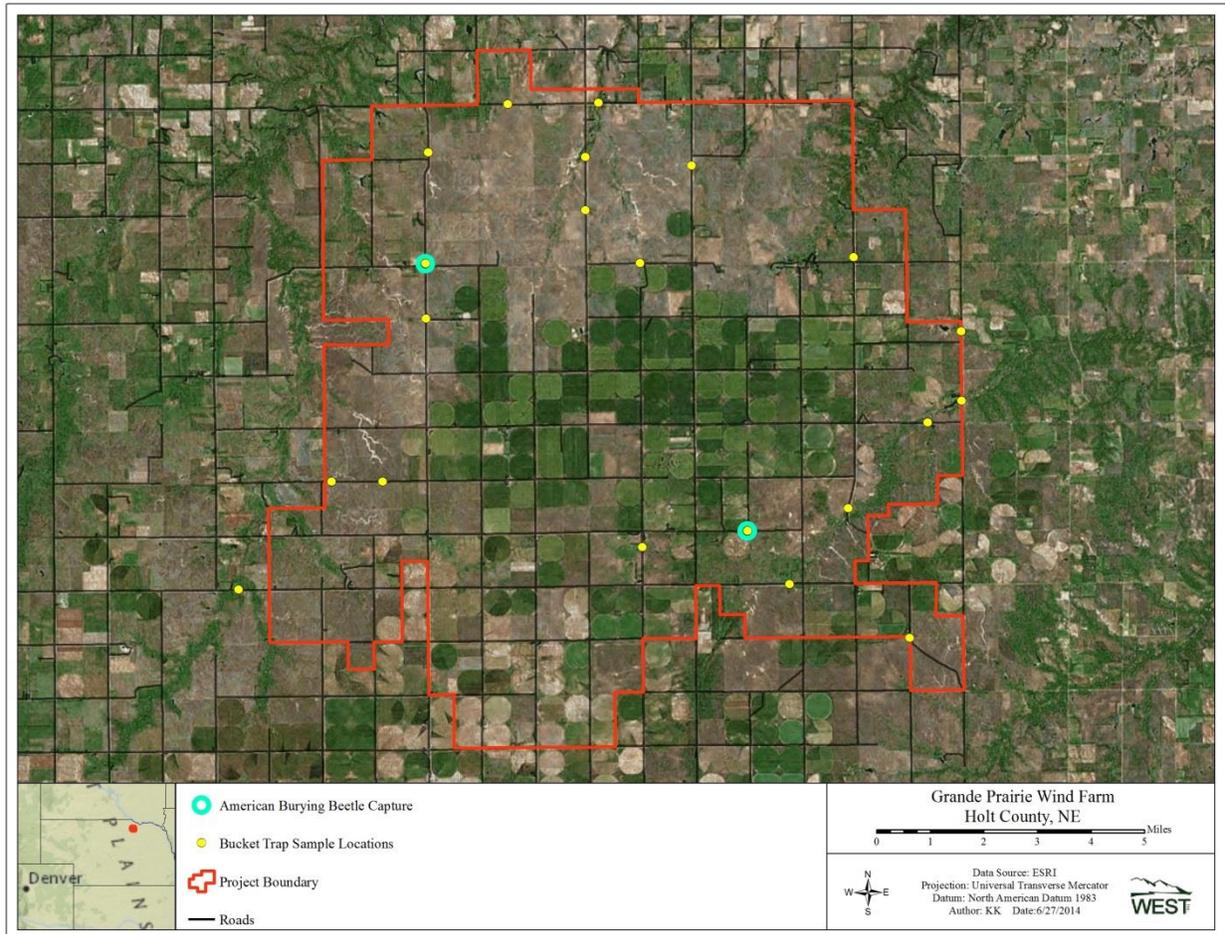
Site ID	UTM zone	Northing	Easting	Elev. (feet)	Soil	Vegetation			
GP1	14	4711200	535256	2058	loamy sand	pivot 1/4 mile to south			
GP2	14	4714443	538043	1969	loamy sand	cottonwoods to west, pivot 1/4 mile			
GP3	14	4714445	539582	2033	loam over course sand	pasture			
GP4	14	4719345	540881	1953	sand	cottonwoods to west, pivot 1/4 mile			
GP5	14	4720997	540867	1974	sandy loam	trees to east			
GP6	14	4724332	540955	1866	loose sand	cottonwoods east and west			
GP7	14	4725792	543334	1848	loose sand	mixed trees within 1.4 mile in 3 directions			
GP8	14	4725825	546075	1752	clay	oak/ cedar/ sumac			
GP9	14	4724197	545670	1824	sand	cottonwood, choke cherry			
GP10	14	4722593	545678	1950	hard loam	cottonwoods, range with brome			
GP11	14	4721012	547319	2020	loam over course sand	cedars/ cottonwoods, corn 0.1 mile east			
GP12	14	4723936	548869	1938	clay	cottonwoods, native prairie			
GP13	14	4729433	550445	1863	loose sand	trees near, sub-irrigated meadow			
GP14	14	4721183	553737	1907	clay	cottonwoods in distance			
GP15	14	4718964	556967	1888	loose sand	grazed, some yucca			
GP16	14	4716869	556978	1816	sandy loam	trees, smooth brome and musk thistle			
GP17	14	4716219	555960	1840	loamy sand	yucca, cedars, cottonwood. Pond to south			
GP18	14	4713636	553572	1831	sand	yuccas, mullein, cheatgrass, stream nearby			
GP19	14	4712964	550552	1909	sand	large cottonwoods, pivot to NE and NW			
GP20	14	4712468	547383	1997	sandy loam	windbreak of cedars NW, house with ag w/ 1/2 mile			
GP21	14	4711362	551814	2048	loamy sand	wet meadow, cottonwood			
GP22	14	4709747	555422	1952	soft sand	range with brome, shrubs and cacti			

Table 2. Weather data obtained from weatherunderground.com for the O'Neill Nebraska airport weather station.

Trap Night	High temp	Low temp	Temperature (at 12am)	Precipitation (10-2am)
21-Jun	91	58	68	0.03 inches
22-Jun	86	64	68	0.00 inches
23-Jun	79	63	67	0.15 inches
24-Jun	80	63	63	0.00 inches
25-Jun	81	54	65	0.00 inches

Table 1. Trap locations.

Figure 1. Trap locations.



## Survey Results

Two individual ABBs were captured during the survey at trap locations GP5 and GP19 (Table 3). Traps that captured ABB are highlighted in blue. Trap GP5 is in the northwest of the project and trap GP19 is in the southeast. Both traps with ABB were associated with moist sandy soil conditions. At GP-19, row crop agriculture is within  $\frac{1}{4}$  mile to the north and west. Additional center pivots occur within a mile to the south. Good habitat consisting of sub-irrigated wet meadow occurs directly south of the trap and further east.

Trap GP5 was near the corner of 500 and 884 Rd. The trap was near a stand of cottonwood trees and has pasture land to the north and west. Additional apparent habitat lies to the north and west; however, the soil represents a mixture of sandy loam and glacial till with small gravel.

Although both ABB were marked, neither was recaptured. Other traps near GP5 did not attract ABB during the survey.

The most common carrion beetle (subfamily Silphinae) was *Thanotopholes ramosa* (Ramo). Other than ABB, the most important species in a survey are other nocturnal carrion beetles which are *N. orbicollis*, *N. pustulatus*, and *Necroides surinimensis* because they indicate that weather conditions were suitable for nocturnal beetle activity. In the Nebraska Sandhills higher numbers of *N. carolinus* and *N. marginatus* occur in areas not occupied by ABB while *N. orbicollis* often occur in the same areas as ABB.

Table 3. American burying beetles captured during the Grande Prairie Wind Farm survey June 20-25, 2014

Site ID	Date	Sex	Pronotal width	Age	Tags
GP-19	21-Jun	F	11.27	mature	Upper right
GP-5	23-Jun	M	7.49	mature	Upper left

A total of 1,000 carrion beetles were captured during the survey encompassing 12 species. As with most June surveys in eastern Nebraska, the most commonly captured burying beetles were *N. marginatus* (marg) and *N. tomentosus* (tomen) with 377 and 255 respectively (Table 4).

	Species	ABB	Carol	Gutt	Marg	Obscur	Orbic	Pust	Tomen	Ramo	Surin	Necro	Inaequ	Nova	Lappo	Trunc	
Trap #	Trap night																
GP-1	21-Jun	0	0	0	5	0	0	0	0	0	0	0	0	0	0	1	0
GP-1	22-Jun	0	0	0	3	0	0	0	1	0	0	0	0	0	0	2	0
GP-1	23-Jun	0	0	0	4	0	0	0	2	0	0	0	0	0	0	3	0
GP-1	24-Jun	0	0	0	7	0	0	0	1	0	0	0	0	0	0	5	0
GP-1	25-Jun	0	0	0	8	0	0	0	2	0	0	0	0	0	0	5	0
		0	0	0	5.4	0	0	0	1.2	0	0	0	0	0	0	3.2	0
GP-2	21-Jun	0	0	0	4	0	0	0	3	0	0	0	0	0	0	0	0
GP-2	22-Jun	0	0	0	4	0	0	0	3	0	0	1	0	0	0	0	0
GP-2	23-Jun	0	0	0	2	0	0	0	2	0	0	1	0	0	0	1	0
GP-2	24-Jun	0	0	0	3	0	0	0	2	0	0	0	0	0	0	0	0
GP-2	25-Jun	0	0	0	2	0	0	0	0	0	0	1	0	0	0	1	0
		0	0	0	3	0	0	0	2	0	0	0.6	0	0	0	0.4	0
GP-3	21-Jun	0	0	0	8	0	0	0	0	0	1	0	0	0	0	0	0
GP-3	22-Jun	0	0	0	14	0	0	0	0	0	0	0	0	0	0	0	0
GP-3	23-Jun	0	0	0	3	0	0	0	0	0	0	0	0	0	0	1	0
GP-3	24-Jun	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
GP-3	25-Jun	0	0	0	9	0	0	0	1	0	0	0	0	0	0	0	0
		0	0	0	6.8	0	0	0	0.4	0	0.2	0	0	0	0	0.2	0
GP-4	21-Jun	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0
GP-4	22-Jun	0	0	0	2	0	0	0	3	0	2	0	0	0	0	0	0
GP-4	23-Jun	0	0	0	2	0	0	0	0	1	0	0	0	0	0	2	0
GP-4	24-Jun	0	0	0	1	0	0	0	1	2	0	0	0	0	0	2	0
GP-4	25-Jun	0	0	0	7	0	0	0	1	0	2	0	0	0	0	0	0
		0	0	0	2.8	0	0	0	1.4	0.6	0.8	0	0	0	0	0.8	0
GP-5	21-Jun	0	0	0	0	0	0	0	1	1	0	0	0	0	0	2	0
GP-5	22-Jun	0	0	0	0	0	0	0	4	0	0	0	0	0	2	0	0
GP-5	23-Jun	1	0	0	0	0	0	0	2	1	0	0	0	0	1	1	0
GP-5	24-Jun	0	0	0	0	0	0	0	2	0	0	0	0	0	2	0	1
GP-5	25-Jun	0	0	0	0	0	2	0	1	1	0	0	0	0	0	1	0
		0.2	0	0	0	0	0.4	0	2	0.6	0	0	0	0	1	0.8	0.2
GP-6	21-Jun	0	0	0	8	0	0	0	1	0	1	0	0	0	0	0	0
GP-6	22-Jun	0	0	0	8	0	0	0	2	1	0	0	0	0	0	0	0
GP-6	23-Jun	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
GP-6	24-Jun	0	0	0	7	0	0	0	0	2	0	0	0	0	0	0	0
GP-6	25-Jun	0	0	0	11	0	0	0	2	1	0	0	0	0	0	0	0
		0	0	0	7	0	0	0	1	0.8	0.2	0	0	0	0	0	0
GP-7	21-Jun	0	0	0	16	0	0	0	1	1	1	0	0	0	0	1	0
GP-7	22-Jun	0	0	0	6	0	0	0	1	1	0	0	0	0	0	0	0
GP-7	23-Jun	0	5	0	10	0	0	0	1	2	0	0	0	0	0	0	0
GP-7	24-Jun	0	1	0	22	0	0	0	5	4	1	0	0	0	1	2	0
GP-7	25-Jun	0	1	0	15	0	0	0	3	0	0	1	0	0	0	2	0
		0	1.4	0	13.8	0	0	0	2.2	1.6	0.4	0.2	0	0.2	1	0	
GP-8	21-Jun	0	1	0	0	0	1	1	2	9			14	0	2	1	0
GP-8	22-Jun	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0
GP-8	23-Jun	0	0	0	0	0	0	0	0	0	0	4	0	0	0	1	0
GP-8	24-Jun	0	0	0	0	0	0	0	0	3	0	3	0	2	0	0	0
GP-8	25-Jun	0	0	0	1	0	0	0	4	3	0	8	0	5	2	0	0
		0	0.2	0	0.2	0	0.2	0.2	1.2	3.2	0	6	0	1.8	0.8	0	
GP-9	21-Jun	0	2	0	3	0	0	0	0	8	1	1	0	0	0	1	0
GP-9	22-Jun	0	0	0	1	0	0	0	1	7	0	0	0	0	0	1	0
GP-9	23-Jun	0	0	0	0	0	1	0	1	6	0	1	0	1	0	0	0
GP-9	24-Jun	0	0	0	0	0	0	0	1	12	0	1	0	1	1	1	0
GP-9	25-Jun	0	0	0	0	0	4	0	1	4	0	0	0	0	0	2	0
		0	0.4	0	0.8	0	1	0	0.8	7.4	0.2	0.6	0	0.4	1	0	
GP-10	21-Jun	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0
GP-10	22-Jun	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
GP-10	23-Jun	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1	0
GP-10	24-Jun	0	0	0	0	0	0	0	2	1	0	0	0	0	0	1	0
GP-10	25-Jun	0	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0
		0	0	0	0.8	0	0.2	0	0.8	0.4	0	0	0	0	0	0.4	0
GP-11	21-Jun	0	0	0	7	0	0	0	7	0	0	0	0	0	0	0	0
GP-11	22-Jun	0	0	0	3	0	0	0	7	0	0	0	0	0	0	0	0
GP-11	23-Jun	0	0	0	4	0	0	0	7	1	0	0	0	0	0	0	0
GP-11	24-Jun	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0
GP-11	25-Jun	0	0	0	2	0	0	0	11	2	1	0	0	0	0	1	0
		0	0	0	4.4	0	0	0	6.4	0.6	0.2	0	0	0	0	0.2	0
GP-12	21-Jun	0	0	0	1	0	0	0	1	0	1	0	0	0	0	0	0
GP-12	22-Jun	0	0	0	3	0	0	0	4	0	1	0	0	0	0	0	0
GP-12	23-Jun	0	0	0	2	0	1	0	3	0	0	0	0	0	0	0	0
GP-12	24-Jun	0	0	0	3	0	0	0	3	0	0	0	0	0	0	1	0
GP-12	25-Jun	0	0	0	5	0	0	0	5	0	2	0	0	0	0	0	0
		0	0	0	2.8	0	0.2	0	3.2	0	0.8	0	0	0	0	0.2	0

GP-13	21-Jun	0	0	0	0	0	0	0	3	8	0	0	0	0	1	0
GP-13	22-Jun	0	0	0	0	0	0	0	1	4	0	1	0	0	1	0
GP-13	23-Jun	0	0	0	0	0	0	0	3	8	0	0	0	1	5	0
GP-13	24-Jun	0	0	0	0	0	0	0	4	7	1	3	0	2	6	0
GP-13	25-Jun	0	0	0	0	0	1	0	6	17	0	4	0	6	3	0
		0	0	0	0	0	0.2	0	3.4	8.8	0.2	1.6	0	1.8	3.2	0
GP-14	21-Jun	0	0	0	1	0	0	0	2	1	1	0	0	0	0	0
GP-14	22-Jun	0	0	0	6	0	0	0	2	0	2	0	0	0	0	0
GP-14	23-Jun	0	0	0	3	0	0	0	3	3	0	0	0	0	0	0
GP-14	24-Jun	0	0	0	2	0	0	0	1	0	0	0	0	0	0	0
GP-14	25-Jun	0	0	0	4	0	0	0	4	0	3	0	0	0	0	0
		0	0	0	3.2	0	0	0	2.4	0.8	1.2	0	0	0	0	0
GP-15	21-Jun	0	0	0	2	0	0	0	1	0	0	0	0	0	0	0
GP-15	22-Jun	0	0	0	0	0	0	0	1	0	1	0	0	0	1	0
GP-15	23-Jun	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0
GP-15	24-Jun	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
GP-15	25-Jun	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0
		0	0	0	0.8	0	0	0	0.8	0	0.2	0.2	0	0	0.2	0
GP-16	21-Jun	0	0	0	0	0	1	0	4	8	1	3	0	0	0	0
GP-16	22-Jun	0	0	0	0	0	0	0	3	5	0	2	0	0	2	0
GP-16	23-Jun	0	0	0	0	0	0	0	2	2	0	1	0	1	1	0
GP-16	24-Jun	0	0	0	0	0	0	0	3	5	0	0	0	0	3	0
GP-16	25-Jun	0	0	0	0	0	0	0	0	8	0	1	0	0	1	0
		0	0	0	0	0	0.2	0	2.4	5.6	0.2	1.4	0	0.2	1.4	0
GP-17	21-Jun	0	0	0	2	0	0	0	4	0	1	0	0	0	0	0
GP-17	22-Jun	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0
GP-17	23-Jun	0	0	0	1	0	0	0	2	0	0	0	0	0	0	0
GP-17	24-Jun	0	0	0	1	0	0	0	4	1	1	0	0	0	1	1
GP-17	25-Jun	0	0	0	1	0	0	0	3	0	0	1	0	1	1	0
		0	0	0	1	0	0	0	2.8	0.2	0.6	0.2	0	0.2	0.4	0.2
GP-18	21-Jun	0	0	0	1	0	0	0	2	7	0	2	0	0	2	0
GP-18	22-Jun	0	0	0	2	0	0	0	3	1	0	0	0	0	1	0
GP-18	23-Jun	0	0	0	1	0	0	0	2	2	0	0	0	2	1	0
GP-18	24-Jun	0	0	0	0	0	1	0	4	19	0	1	0	1	1	0
GP-18	25-Jun	0	0	0	0	0	0	0	2	11	0	0	0	1	0	0
		0	0	0	0.8	0	0.2	0	2.6	8	0	0.6	0	0.8	1	0
GP-19	21-Jun	1	0	0	0	0	2	0	4	1	0	0	0	0	0	0
GP-19	22-Jun	0	0	0	0	0	2	0	4	1	0	0	0	0	0	0
GP-19	23-Jun	0	0	0	0	0	1	0	3	0	0	0	0	0	2	0
GP-19	24-Jun	0	0	0	0	0	0	0	1	0	0	1	0	2	1	0
GP-19	25-Jun	0	0	0	0	0	1	0	2	0	1	0	0	3	0	0
		0.2	0	0	0	0	1.2	0	2.8	0.4	0.2	0.2	0	1	0.6	0
GP-20	21-Jun	0	0	0	1	0	1	0	2	0	0	0	0	0	0	1
GP-20	22-Jun	0	0	0	2	0	0	0	5	0	0	0	0	1	1	1
GP-20	23-Jun	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
GP-20	24-Jun	0	0	0	5	0	0	0	3	0	1	0	0	0	0	0
GP-20	25-Jun	0	0	0	6	0	0	0	4	0	0	0	0	0	0	0
		0	0	0	2.8	0	0.2	0	3	0	0.2	0	0	0.2	0.2	0.4
GP-21	24-Jun	0	0	0	0	0	0	0	3	2	0	0	0	2	1	0
GP-21	25-Jun	0	0	0	0	0	0	0	6	0	1	0	0	1	2	0
		0	0	0	0	0	0	0	4.5	1	0.5	0	0	1.5	1.5	0
GP-22	24-Jun	0	0	0	31	0	0	0	6	4	0	1	0	2	4	0
GP-22	25-Jun	0	0	0	29	0	0	0	16	0	0	0	0	0	3	0
		0	0	0	30	0	0	0	11	2	0	0.5	0	1	3.5	0

\* Species abbreviations: ABB = *Nicrophorus americanus*, Carol = *Nicrophorus carolinus*, Gutt = *Nicrophorus guttula*, Marg = *Nicrophorus marginatus*, Obscur = *Nicrophorus obscures*, Orbic = *Nicrophorus orbicollis*, Pus = *Nicrophorus pustulatus*, Tomen = *Nicrophorus tomentosus*, Ramo = *Heterosilpha ramosa*, Surin = *Necrodes surinimensis*, Necro = *Necrophila Americana*, Inaequ = *Oiceoptoma inaequale*, Nova = *Oiceoptoma novaboracense*, Lappo = *Thanatophilus lapponicus*, Trunc = *Thanatophilus truncates*.

Table 4. Carrion beetles captured during the Grande Prairie Wind Project survey.

## Control Data

Four control traps were placed near Chambers, Nebraska and were opened on June 21. Control traps caught ABB on all survey nights. Additional sampling that was conducted in northern Nebraska also captured large numbers of ABB during the June 20-June 25 survey. For first-time captures of ABB, control traps averaged about 2.5 ABB per trapnight and with recaptures, the control traps averaged about 2.8 ABB per trapnight.

Date	Site ID	GPS (UTM)	Sex	Pronotal width (mm)	Bee tag	Recapture		
6/22/2014	TRS4	14 T0513783 4677332	F	10.08	64 GRN			
			M	10.4	65 GRN			
			M	8.94	66 GRN			
6/23/2014	TRS4	14 T0513783 4677332				65 GRN		
						64 GRN		
			M	10.13	67 GRN			
			M	10.1	68 GRN			
			M	10.26	69 GRN			
			TRS1	14 T0515918 4672435	F	10.76	70 GRN	
	TRS2	14 T0515873 4670900	M	? Died due to Ants				
6/24/2014	TRS4	14 T0513783 4677332				68 GRN		
						64 GRN		
						65 GRN		
			F	10.36	72 GRN			
			M	9.31	74 GRN			
			M	10.47	75 GRN			
			F	8.49	76 GRN			
			F	8.47	77 GRN			
			TRS2	14 T0515873 4670900	M	9.4	78 GRN	
					M	10.33	79 GRN	
					F	11.57	80 GRN	
					F	11.3	81 GRN	
					F	11.15	82 GRN	
					F	10.31	83 GRN	
					M	8.47	84 GRN	
					F	7.99	85 GRN	
			TRS1	14 T0515918 4672435	M	8.87	86 GRN	
					F	11.17	88 GRN	
					F	10.32	89 GRN	
		M	9.57	90 GRN				
6/25/2014	TRS4	14 T0513783 4677332	M	10.28	92 GRN			
						11.17	93 GRN	
						10.53	94 GRN	
	TRS2	14 T0515873 4670900				82 GRN		
			M	10.14	95 GRN			
			M	10.79	96 GRN			
			M	9.64	97 GRN			
	TRS1	14 T0515918 4672435				79 GRN		
						86 GRN		
			F	11.36	98 GRN			
			F	9.05	99 GRN			
			M	9.37	1 GRN			
	TRC 2	14 T0522318 4680509	F	10.24	2 GRN			
			M	12.1	3 GRN			

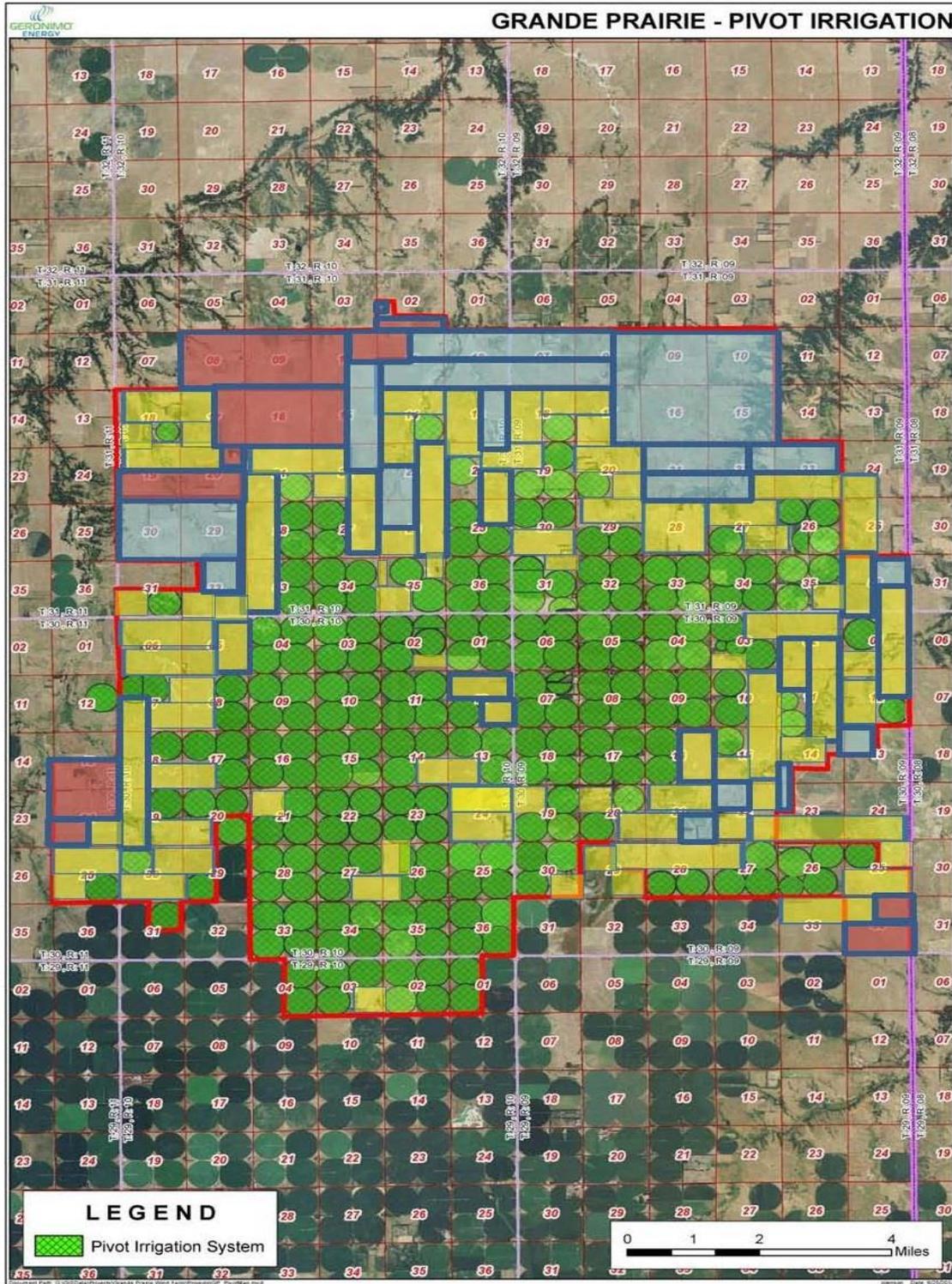
## Habitat Assessment Methodology

Habitat at each trap location was assessed by Dr. Hoback using the assessment method he developed for placing presence/absence traps in northern Nebraska. The area within 1 mile that was visible from the road around each trap location was classified into one of five habitat types.

1. **Poor.** Both sides of the survey route with row crop agriculture or habitat with the potential for large amounts of light pollution and disturbance associated with town or city edge.
2. **Marginal:** Potential habitat restricted to one side of the survey route, with row crop agriculture on one side or dry, sandy, upland areas with exposed soil and scattered dry adapted plant such as yucca (*Yucca* spp.).
3. **Fair:** Grassland with exotic species such as brome grass (*Bromus* spp.). Soil moisture content is lower than for prime or good habitat. Row crop agriculture is located within one mile.
4. **Good:** Native grassland species (tall or mixed grass prairie) with forbs. Low wetland meadows that are grazed by cattle or used for haying. Trees (usually cottonwoods) present. Sources of water are within a mile, but the area has either some cropland or sources of light pollution including yard lights, or houses within a mile.
5. **Prime:** Undeveloped wet meadows with some trees (especially cottonwoods [*Populus deltoides*]) or forest areas visible. Water sources are available including the presence of a river, stream or sub irrigated soils (water is close to the surface as a result of shallow aquifer). Cropland is not visible or is at a distance greater than 2.0 miles.

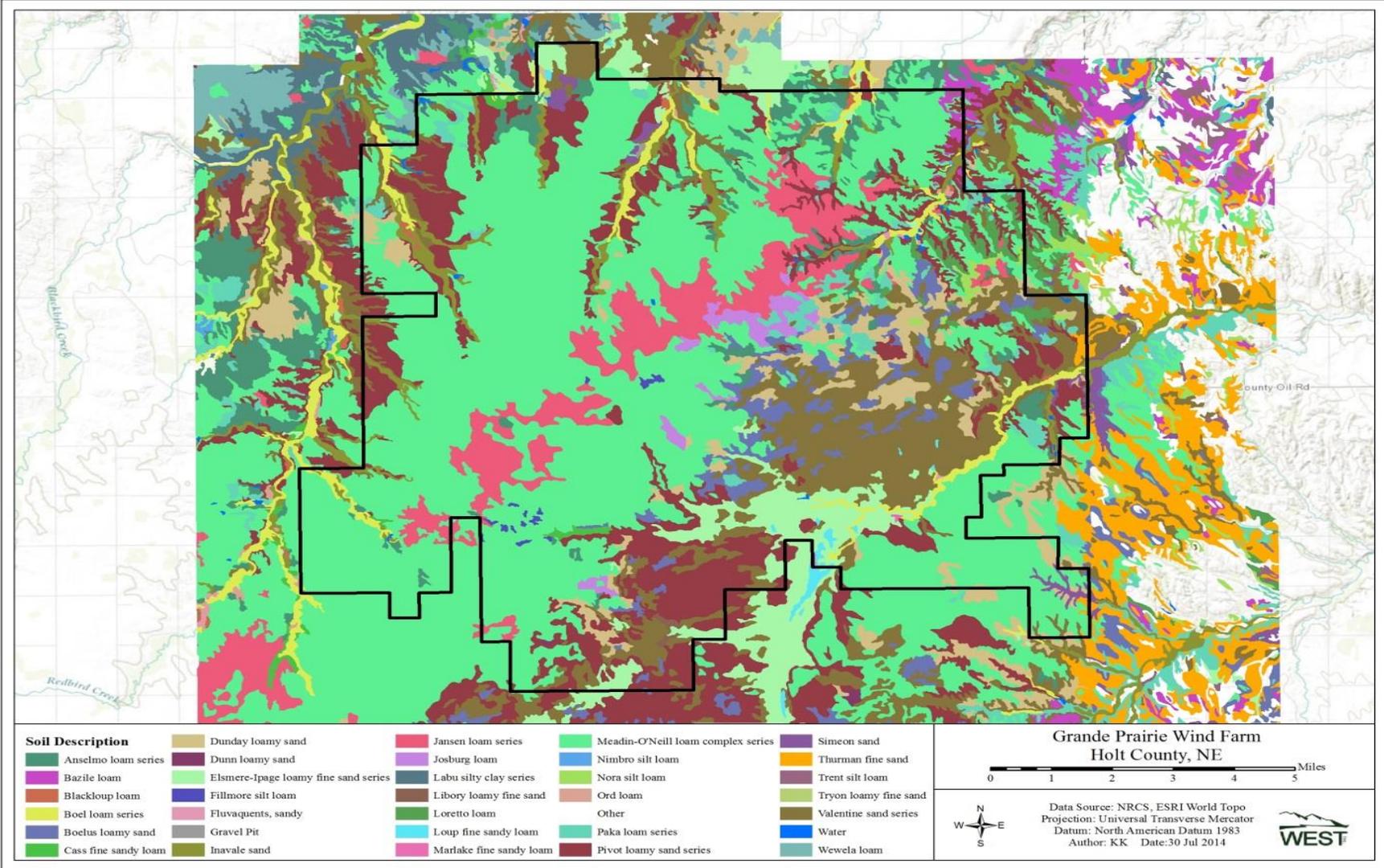
Extensive portions of the project area have been converted to row crop agriculture (Figure 2). Based on the habitat rating scheme, the majority of the project area occurs within 1 mile of row crop agriculture. Rangeland occurs in the north part of the project area; however, wet meadows are generally absent or when present have gravel near the surface. Therefore, none of the Grande Prairie Wind Farm is considered prime habitat based on soil properties (Figure 3).

Figure 2. Pivot irrigation and ABB habitat mapping within the Grande Prairie Wind Farm area.



\*ABB habitat mapping codes: Areas delineated as Pivot Irrigation System = Poor; Yellow = Marginal habitat; Blue = Fair habitat; Orange = Good habitat.

Figure 3. Soil types within the Grande Prairie Wind Farm.



Previous research has shown that ABBs are strongly affected by disturbance related to agriculture. As Figure 2 shows, the southern area in the project site and beyond is dominated by cropland. The one ABB captured at trap GP19 most likely was associated with the wet meadows south of that area. However, because of the pivot irrigation to the north and west of the trap location, the trap location was viewed as marginal for the species.

Additional traps were set on day 3 in the southeast corner of the project. The soil was very dry and sandy and large numbers of *N. marginatus* were captured. No ABBs were detected and this corner does not appear to support ABB. However, these two trap locations were only sampled for two nights as compared to five nights. Further, by comparing figures 1 and 2, the breadth of new pivot development can be appreciated.

Compared to control sites, two traps within the Grande Prairie Wind Farm caught 1 ABB each equaling ABB per trapnight of 0.2 for these traps. Overall, 104 trapnights of effort resulted in only 2 ABB captured compared to 45 ABB in 16 trapnights for control sites. The Grande Prairie Wind Farm appears to lie at the edge of ABB occurrence in Nebraska and does not appear to support a large population of this species.

## **Conclusions**

Based on the low capture rates of American burying beetle (0.2 ABB/ Trap night) and the large areas of disturbance from row crop agriculture, the Grande Prairie Wind Farm is unlikely to affect substantial numbers of American burying beetle.