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NEBRASKA PUBLIC POWER DISTRICT

R-Project

Final August 2019 ABB Survey Results

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128143

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Final August 2019 ABB Survey Results

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ACRONYMS AND ABBREVIATIONS

ABB	American burying beetle
ABB/acre	ABB per acre
ESA	Endangered Species Act
°F	degrees Fahrenheit
FR	Federal Register
HCP	Habitat Conservation Plan
ITP	Incidental Take Permit
NESCA	Nebraska Endangered Species Conservation Act
NGPC	Nebraska Game and Parks Commission
NPPD	Nebraska Public Power District
POWER	POWER Engineers, Inc.
ROW	right-of-way
R-Project	Gerald Gentleman Station to Holt County 345 kV Transmission Project
U.S.	United States
USFWS	United States Fish and Wildlife Service

1.0 INTRODUCTION

Nebraska Public Power District (NPPD) plans to construct a 345,000 volt transmission line from NPPD's Gerald Gentleman Station near Sutherland to a new substation to be sited adjacent to NPPD's existing substation east of Thedford. The new line will then proceed east and connect to the proposed Holt County Substation to be sited in Holt County at the intersection of Holt, Antelope, and Wheeler counties (Figure 1). Referred to as the R-Project, the approximately 225-mile-long line will help enhance operation of NPPD's electric transmission system, relieve congestion from existing lines within the transmission system, and provide additional opportunities for development of renewable energy projects.

The R-Project crosses occupied habitat for the American burying beetle (ABB; *Nicrophorus americanus*), a federally endangered insect. This report documents the results of the August 2019 ABB surveys conducted in support of the R-Project.

1.1 R-Project Habitat Conservation Plan

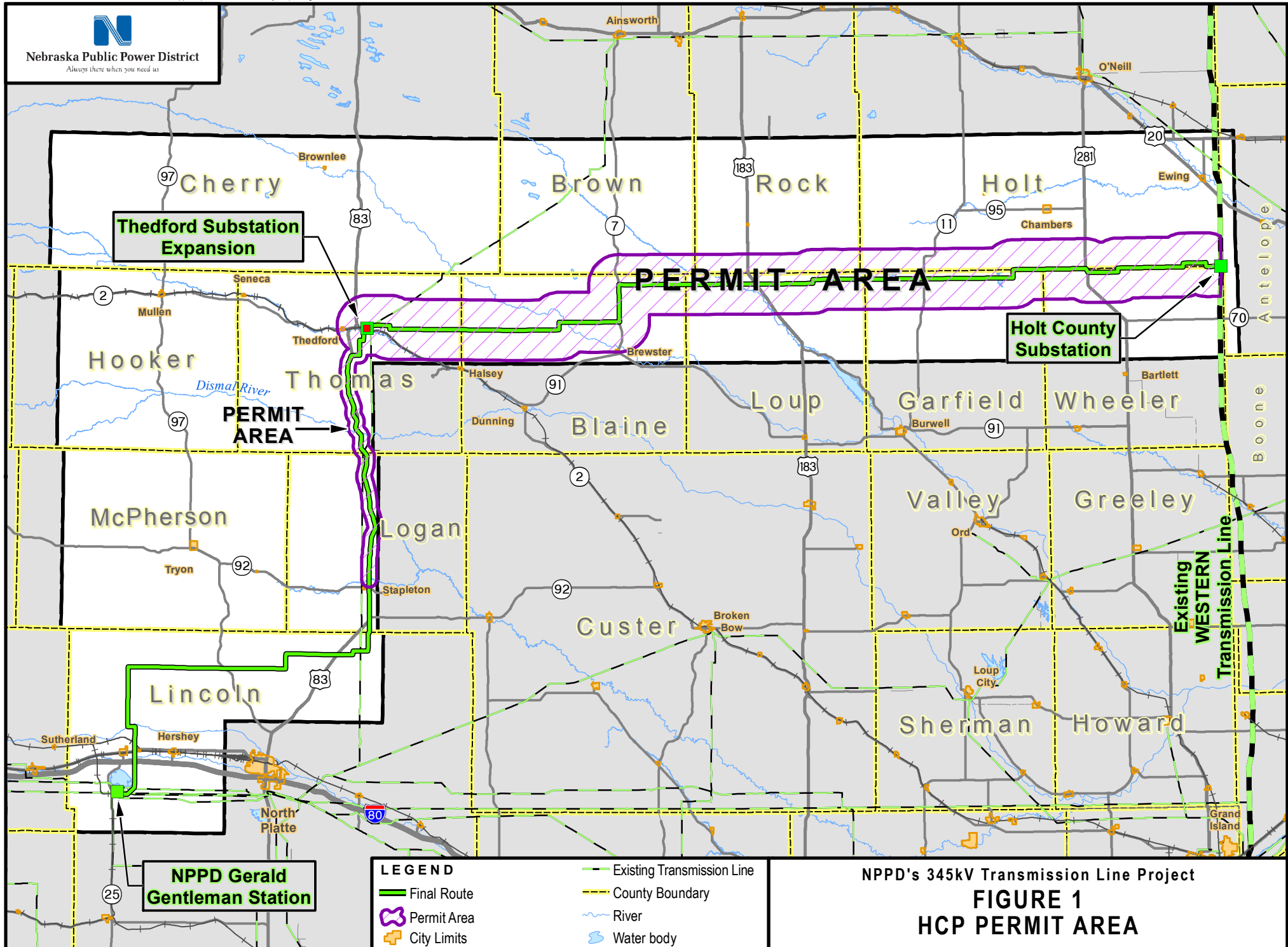
Because the R-Project may result in impacts to ABB, NPPD has completed a Habitat Conservation Plan (HCP) to accompany an Incidental Take Permit (ITP) under Section 10(a)(1)(B) of the federal Endangered Species Act (ESA). The ITP was issued on June 12, 2019. An ITP authorizes "take" of threatened or endangered wildlife that cannot be avoided and is incidental to otherwise lawful activities. An HCP must accompany an application for an ITP. The purpose of the habitat conservation planning process associated with the ITP is to ensure there is adequate minimizing and mitigating of the effects of the authorized incidental take. The purpose of the ITP is to authorize the incidental take of a federally-listed species, not to authorize the activities that result in take. "Take" is defined in the ESA as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct" of any federally-listed threatened or endangered species. Harm may include significant habitat modification where it kills or injures a listed species through impairment of essential behavior (e.g., nesting or reproduction).

An HCP requires the permit applicant to define a Permit Area. The Permit Area for this HCP is defined as the geographical area within which incidental take resulting from covered activities is expected to occur. The Permit Area incorporates 671,429 acres of the ABB range and begins where the R-Project crosses Nebraska Highway 92 at the town of Stapleton, Nebraska and continues north to the Thedford Substation and then east to the new Holt County Substation (Figure 1). The Permit Area includes all portions of the R-Project that fall within areas with a greater than one percent probability of ABB occurrence based on the species distribution model for ABB in Nebraska's Sandhills described in Jorgensen et al. (2014). The Permit Area from Stapleton to the Thedford Substation includes one mile on either side of the R-Project centerline (two miles wide total), while the Permit Area from the Thedford Substation to the Holt County Substation includes four miles on either side of the R-Project centerline (eight miles wide total). The varying Permit Area width incorporates all potential impacts occurring outside the transmission line right-of-way (ROW) including construction access and construction yards. The Permit Area is narrow between Stapleton and the Thedford Substation because the R-Project largely follows United States (U.S.) Highway 83 along this segment and all temporary disturbances will be within one mile of the transmission line. This includes those portions of the route between Stapleton and the Thedford Substation where the R-Project is not adjacent to U.S. Highway 83. Conversely, from the Thedford Substation to the new Holt County Substation, existing access is limited, and the Permit Area must be wider to encompass all construction access. While the Permit Area incorporates all areas where potential disturbance may occur, it is estimated that only 0.2 percent (1,283 acres) of the Permit Area will actually be disturbed.

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2.0 SURVEY NEED

Take, as calculated in the R-Project HCP, is based upon a density estimate established during meetings with United States Fish and Wildlife Service (USFWS) using previously completed trapping efforts in Nebraska. Previously collected data was refined to include only those in high quality habitat with at least a five-night survey period. Individual densities for each trap were calculated by dividing the number of ABB captured in each trap by the effective trap area (500 acres) and then adjusting for a capture efficiency of 90 percent (rounded up from 89.4; Butler 2011). Because of the annual population fluctuation, the take estimate applies a precautionary approach to protect against underestimation of the R-Project's potential incidental take by applying a density based on the 99th percentile of the dataset described above. This resulted in a density estimate of 0.13 ABB per acre (ABB/acre) used in the HCP take calculation.

The USFWS indicated that NPPD would need to conduct a survey to provide sufficient recent data to confirm that the take calculation in the HCP based on a density of 0.13 ABB/acre will not be surpassed during construction of the R-Project. The survey effort documented here was requested by the USFWS and was completed under existing ESA Section 10(a)(1)(A) permits.

The survey effort documented in this report is described in the *R-Project Annual ABB Survey Plan* (POWER 2016). The final *R-Project Annual ABB Survey Plan* is provided in the R-Project HCP as Appendix F.

3.0 ABB SPECIES INFORMATION

3.1 Status and Distribution

The ABB was listed as federally endangered under the ESA in July of 1989 (54 Federal Register [FR] 29652 – 29655). The Nebraska Endangered Species Conservation Act (NESCA) states that a species occurring in the state of Nebraska protected under the ESA will also be listed under NESCA. Therefore, the ABB is also protected as a state of Nebraska endangered species under NESCA. No critical habitat has been designated for the ABB.

The historical range of the ABB included portions of 35 states covering the temperate regions of eastern and central North America. However, over the early twentieth century, the ABB disappeared from the majority of its range, with the last known specimens being collected along the eastern seaboard in the 1940s. At the time of listing, only two disjunct natural populations were known, one population on Block Island in Rhode Island and one population in Latimer County, Oklahoma (USFWS 1991). After the species was listed as federally endangered, additional populations were discovered in the Midwest, particularly in Oklahoma, South Dakota, and Nebraska. Natural, extant populations of ABB have now been identified in Rhode Island, South Dakota, Nebraska, Kansas, Oklahoma, Texas, and Arkansas (USFWS and Nebraska Game and Parks Commission [NGPC] 2008). Populations of ABB have been reintroduced into portions of southwestern Missouri (77 FR 16712 – 16718), Ohio, and Penikese and Nantucket Islands in Massachusetts. While the Penikese Island reintroduction efforts have not been successful, there has been limited success noted from reintroduction efforts in Missouri.

In Nebraska, the ABB currently occurs in two distinct populations. One is located in the Loess Hills of south central Nebraska primarily south of the Platte River. The Loess Hills population occurs in Lincoln, Dawson, Frontier, and Gosper counties. The larger ABB population in Nebraska occurs in the Sandhills and Loess Prairies Ecoregions of north central Nebraska (NGPC 2014). This population occurs

throughout all or a portion of Logan, McPherson, Hooker, Thomas, Cherry, Custer, Blaine, Loup, Rock, Brown, Keya Paha, Boyd, Holt, Knox, Antelope, Boone, Valley, Greeley, Wheeler, and Garfield counties. Trapping efforts of the two populations within the last ten years have confirmed ABB occurrence within 17 Nebraska counties (USFWS 2013a). Recent efforts to model areas of high probability of ABB occurrence indicate that ABB are most likely to be encountered in Holt, Rock, Brown, and northern Loup counties (Jorgensen et al. 2014).

3.2 Habitat Characteristics/Use

Throughout its range, the ABB is largely restricted to areas mostly undisturbed by human activity. The ABB was previously believed to require mature forests with deep, humic soils (Lomolino et al. 1995), but its distribution is now known to be more restricted by prey availability and human disturbance than by soil composition (Holloway and Schnell 1997). In the Nebraska Sandhills, habitat modeling identified loamy sand, wetland cover, and higher 30-year average precipitation as variables associated with ABB presence. Variables associated with ABB absence were loam soil, agriculture, woodland, and urban development (Jorgensen et al. 2014; Jurzenski et al. 2014). In Nebraska, ABB can be found throughout the Nebraska Sandhills Ecoregion in mesic areas such as wet meadows and wetlands, semi-arid sandhills, loam grasslands, and tree-lined shelterbelts. Soil composition and moisture play a major role in habitat occupied by ABB; soil moisture has been shown to positively influence beetle presence. Moist soils are a major component of habitat used by ABB during daily periods of inactivity. Research completed on behalf of the Nebraska Department of Roads indicates that ABB largely prefer moist soils during periods of inactivity. This research found that 70 percent of tested ABB preferred moist loam soils and 20 percent preferred moist sandy soils (W. Hoback unpublished). Probability of occurrence models created by Jorgensen et al. (2014) and Jurzenski et al. (2014) indicate that one area with a high probability of ABB occurrence is located in Holt County south of the Elkhorn River. This region coincides with the Elkhorn Headwaters Biologically Unique Landscape, which is known for a high water table and a high density of subirrigated meadows and wetlands. One common theme to suitable habitat is the presence of substantial vegetative structure, either trees or grasses. Short grasses, less than eight inches in height, are not favored by the ABB, likely due to desiccation of the soils (USFWS and NGPC 2008).

Like all scavengers, the ABB searches its environment for food sources in the form of deceased animals or carrion. Because carrion is typically a limited resource, ABB must find carcasses quickly. The discovery of a carcass often occurs within two days but may occur as quickly as 35 minutes after death (Ratcliffe 1996). Deceased animals of all sizes provide a source of food for ABB but carcasses used for brood rearing must be of the proper size. Small mammals and birds between 50 and 300 grams are typically selected for brood rearing (Ratcliffe 1996; Panella 2013). ABB in Oklahoma were positively correlated with increased populations of small mammals and passerine birds, indicating that more ABB were located where potential prey items were more abundant (Holloway and Schnell 1997). Reliance of available carrion likely accounts for the ABB's avoidance of highly fragmented landscapes. Landscapes fragmented by anthropogenic disturbance may allow easier access for vertebrate scavengers (coyotes, opossum, and raccoon), which consume carcasses before ABB can bury them (Panella 2013).

The lifecycle of the ABB can be divided into three parts, the early-late summer active period (mid/late May to late June and August to early September), reproductive period when adults are underground actively tending to broods (late June through early August), and the winter inactive period for teneral beetles (October to mid/late May). Adult ABB that emerge in August of the previous year become active after winter dormancy when nighttime temperatures reach approximately 60 degrees Fahrenheit (°F). In Nebraska, this typically occurs in late May or early June (USFWS 2013b). The ABB is fully nocturnal with its peak activity occurring between 10 p.m. and 2 a.m. Adults immediately begin the search for suitable carrion on which to mate and raise broods. Until a suitable carcass is located, ABB will remain

active at night and bury themselves during the day. Studies conducted in a laboratory setting indicate that ABB may bury to a depth of 16 centimeters during daily periods of inactivity (W. Hoback unpublished) in the summer active time. Carrion suitable for brood rearing must be small enough for burial but large enough to sustain the brood until emergence later in the summer. Kozol et al. (1988) found no preference for mammalian or avian carcasses. Upon locating and securing a carcass suitable for brood rearing, a male and female ABB pair will bury the carcass. Burial depths may range from “several inches” (Ratcliffe 1996) to 60 centimeters underground (Scott 1998).

It is hypothesized that overwintering ABB in Nebraska employ a strategy that lowers their body to near freezing temperatures during the coldest parts of the winter (USFWS 2013a). Research indicates that burying beetles in the Sandhills may burrow below the frost line during the winter (Conley 2014).

ABB have been shown to be quite mobile. Bedick et al. (2004) reported average nightly movements of 0.62 mile with 85 percent of recaptures moving 0.31 mile in a night. The USFWS considers the effective trap radius of a baited pitfall trap to be 0.5 mile (800 meters), indicating that a single trap baited with carrion will attract ABB from at least 0.5 mile away (USFWS 2013b). While ABB movement may average approximately 0.5 mile, individual ABB are capable of moving much larger distances. Jurzenski (2012) documented one ABB moving 4.5 miles in a single night and another moving 18 miles in one night. Those individuals were likely aided by strong winds during the night of their dispersal.

4.0 METHODOLOGY

4.1 Survey Method

Trapping protocol followed those outlined by the *American Burying Beetle (Nicrophorus americanus) Range-wide Presence/Absence Survey Guidance* (USFWS 2018). Presence/Absence trapping must include at least five suitable trap nights of trapping. Any night in which the temperature drops below 55°F at midnight, or in which precipitation throughout the night is greater than 0.5 inch, will not be counted as one of the five trap nights.

To capture ABB and other burying beetles present in the survey area, a five-gallon plastic bucket was buried in the ground so the lip of the bucket was slightly higher than the surface of the ground. Approximately four centimeters of soil were placed in the bottom of the trap to allow captured beetles to bury. A wood cover was placed over the bucket to protect captured beetles from rain and sunlight. The cover was raised above the lip of the bucket approximately four centimeters to allow access by the beetles. Dirt and/or a plug of sod were placed on the cover to help hold it down and insulate the trap. Traps are removed after five protocol-level survey nights. Upon removal of each trap, the resulting hole was refilled with the original dirt and the plug of sod was replaced. Each trap has an attraction radius of approximately 0.5 mile.

Bait consisted of euthanized white laboratory rats with a mass ranging from 200 to 250 grams. The bait was removed from the freezer and allowed to thaw and age in a sealed container. Traps were placed in the ground, and one whole decaying rat was placed in each trap. A second bait was added to each trap following the third trap night.

All carrion beetles captured in the traps were removed, identified to species, counted, and released at the trap location. All captured ABB were identified for sex, measured for pronotum width, aged as teneral or senescent, marked using a micro-cauterizer on the elytron in a pattern starting with the upper right maculation, then lower right, then upper left, then lower left. ABB were not marked on the last day. All

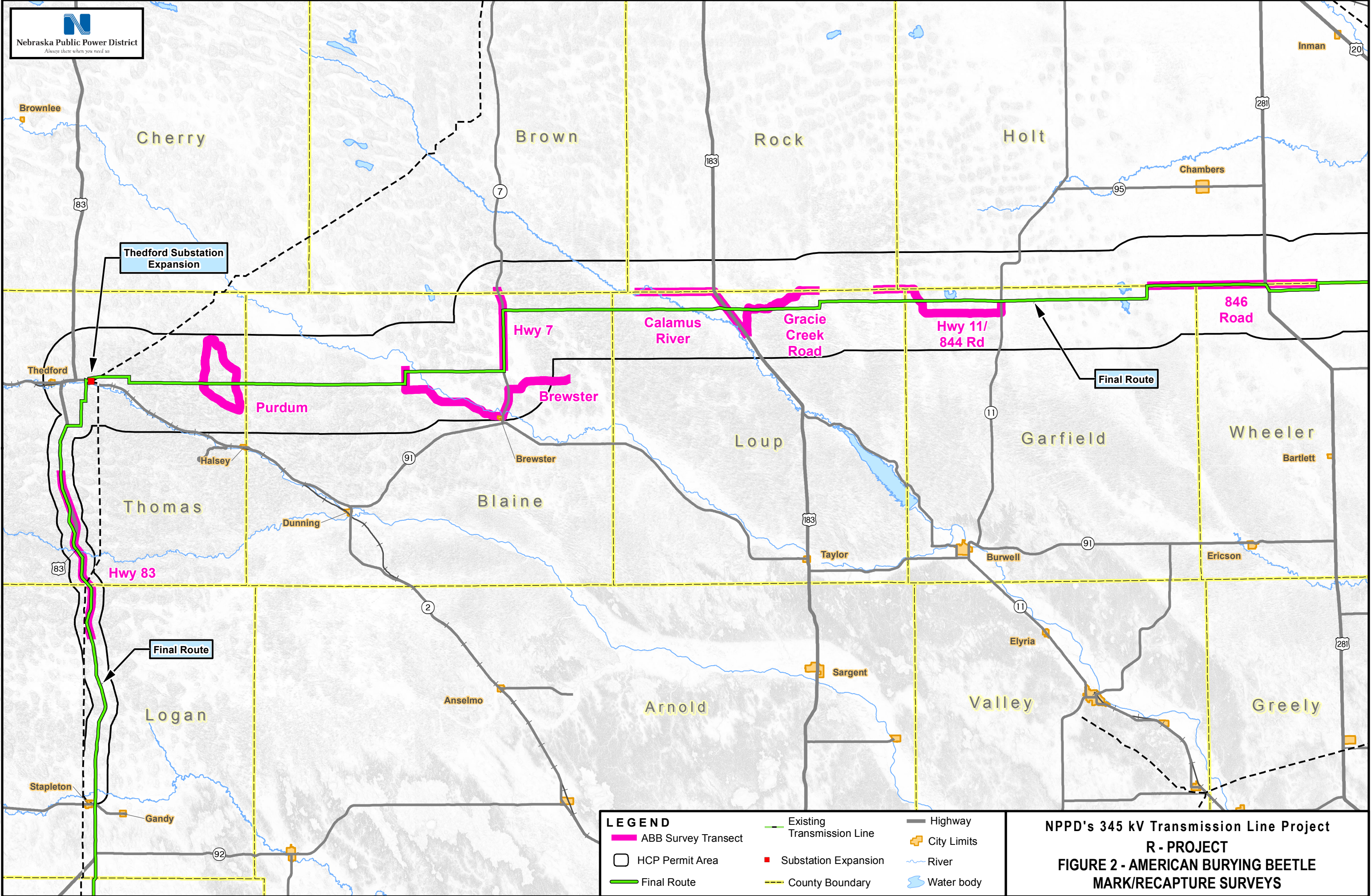
other species were counted and released, and captured ABB were released after marking up wind and in close proximity to the trap where they were captured.

4.2 Survey Location

Based upon analysis of sample size and recommendations from Dr. Wyatt Hoback, NPPD planned to randomly identify 80 trap locations throughout the Permit Area. Trap locations were grouped into eight strings of traps placed along existing access in the Permit Area that could each be surveyed by a single team of biologists in the allotted time frame. The initial trap location was randomly selected within each grouping, and the remaining traps in each group were spaced one mile apart, as per protocol (USFWS 2016). Using this method, NPPD identified 79 trap locations spread throughout the HCP Permit Area (Figure 2) along publicly accessible roads. These 79 traps were surveyed in August 2016, August 2017 and August 2018 to provide an accurate comparison of ABB captures from year to year. Seven traps along the Gracie Creek Road survey transect could not be accessed in 2019 due to flooded roads. These seven traps were placed along Highway 183 and Fawn Road north of the original trap locations.

During the survey planning stages, the proposed trap locations within potential ABB habitat were classified by three general categories based on vegetation and soil moisture: high/sandy, low/wet, and mixed. POWER Engineers, Inc. (POWER) biologists completed a high-level classification of disturbance areas associated with the R-Project and proposed trap locations. The classification was conducted using a combination of field- and aerial-imagery-based visual interpretation of the landscape. The three classification categories in potential disturbance areas were compared to the classification categories at proposed trap locations to ensure they were proportionally represented along the transmission line ROW. The traps surveyed in this effort present a representative sample of the entire Permit Area and potential habitat classification of the disturbed areas. Traps that had to be relocated along the Gracie Creek Road survey transect were placed in habitat of similar quality as the trap locations that could not be reached.

General trap locations are summarized in the *R-Project Annual ABB Survey Plan* (POWER 2016) and include the following areas: Highway 83, Purdum, Brewster, Highway 7, Calamus River, Gracie Creek Road, Highway 11/844 Road, and 846 Road. See Appendix A for mapping of unique trap locations, including the modified traps on the Gracie Creek Road survey transect.



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5.0 RESULTS

All traps were set on August 1, 2019 and were monitored for five consecutive trap nights. Bait was replaced on the morning of August 4. Weather during the survey remained within the parameters for ABB activity and individual ABB were captured throughout the survey are each trap night.

Surveyors captured 126 ABB over the course of five trap nights. Of these 126 ABB captures, there were 112 unique individuals and 14 recaptures of individuals that had been previously captured and marked during the survey. ABB were captured in 34 of the 79 traps; 45 of the 79 traps failed to capture any ABB. A full summary of each ABB trap is included in Appendix B.

Traps were placed at the same locations as the 2016, 2017, and 2018 survey efforts to provide an accurate comparison of ABB captures from year to year. However, seven traps had to be relocated along the Gracie Creek Road survey transect in 2019 due to flooded roads. Total ABB captured were down in 2019 when compared to the 2016, 2017, and 2018 survey efforts. 2019 ABB numbers were lower in the six survey transects that typically capture ABB (Brewster, Highway 7, Calamus, Gracie Creek Road, Highway 11, and 846 Road), and approximately the same in two survey transects that rarely capture ABB (Highway 83 and Purdum). Comparison by transect between the 2016, 2017, 2018, and 2019 survey efforts is provided in Table 1. This reduction in ABB captures was expected given the lower numbers captured in 2018 and the extremely wet spring and summer conditions throughout the survey area in 2019.

TABLE 1 ANNUAL RESULTS COMPARISON

SURVEY TRANSECT	2016 INDIVIDUAL ABB	2017 INDIVIDUAL ABB ¹	2018 INDIVIDUAL ABB	2019 INDIVIDUAL ABB
Highway 83	0	0	0	0
Purdum	2	3	0	1
Brewster	99	46	77	38
Highway 7	118	49	27	12
Calamus	63	8	43	16
Gracie Creek Road	23	23	33	20
Highway 11	122	74	30	13
846 Road	64	91	17	12
TOTAL	491	294	227	112

1. Brewster Trap #12 was not surveyed in 2017 at landowner request.

The 2019 survey set 79 traps over five protocol-level trap nights for a total of 395 trap nights. Each trap has an estimated trap radius of approximately 500 acres that resulted in a total survey area of approximately 39,500 acres within the Permit Area. The calculated density of ABB per trap, assuming a 500 acre trap radius, was 0.0032 ABB/acre. This includes traps which did not capture any ABB. The average density for traps which did capture ABB was 0.0073 ABB/acre. The trap with the highest density was Brewster #11, which captured 19 individual ABB for a density of 0.0422 ABB/acre.

A mark-recapture ABB population and density estimate was developed using the Schnabel Method (Schnabel 1938; Guy and Brown 2007) for comparison. The Schnabel method is similar to the more commonly used Lincoln-Petersen estimator but also accounts for multiple census periods.

Assumptions of the Schnabel Method are the same as the Lincoln-Petersen estimator. Under the Schnabel Method, biologists collect a species multiple times. Each survey effort notes the number of individuals captured, the number of individuals recaptured (cumulatively), and marks all the new captures. The Schnabel Method also allows for the calculation of confidence intervals around a population estimate. ABB population estimates within the total survey area derived from the Schnabel Method are provided in Table 2. Table 3 presents the annual variation in population estimates of the survey area for each year of survey completed to date. Schnabel Method population estimates are only available for four survey transects in 2019 because three survey transects failed to recapture any ABB marked during the 2019 survey. Purdum, Calamus River, and Gracie Creek Road survey transects did not recapture any ABB during the survey. As such, the numbers presented in Table 2 and Table 3 likely under-represent the actual ABB population estimates.

TABLE 2 SURVEY AREA POPULATION AND DENSITY ESTIMATES DERIVED FROM SCHNABEL METHOD

	Estimated ABB Population – Upper 95% Confidence	Estimated ABB Population – Survey Area	Estimated ABB Population – Lower 95% Confidence
ABB population estimate ¹	235	233	231
Density (ABB per acre)	0.012	0.012	0.012

¹ Note that Schnabel Method population estimates are not available for three survey transects that failed to recapture any marked ABB.

TABLE 3 SURVEY AREA ANNUAL ABB MARK/RECAPTURE POPULATION ESTIMATES

Survey Year	Estimated ABB Population – Upper 95% Confidence	Estimated ABB Population – Survey Area	Estimated ABB Population – Lower 95% Confidence
2016	1,589	1,281	1,073
2017	736	714	695
2018	1,049	1,017	987
2019 ¹	235	233	231

¹ Note that Schnabel Method population estimates are not available for three survey transects that failed to recapture any marked ABB.

6.0 HCP COMPLIANCE MONITORING

The purpose of the August 2019 survey effort was to determine whether the ABB density within the Permit Area was equal to or lower than that estimated in the HCP take calculation based on a larger area and multi-year data set. The ABB density estimate applied to the HCP take calculation was 0.13 ABB /acre and was derived from the upper 99th percentile previously collected data. Based on the results of the August 2019 survey, the ABB density within the permit area is below the 0.13 ABB/acre used in the HCP take calculation. Therefore, NPPD does not believe that any modification to the take calculation is warranted based upon the 2019 data.

Surveys completed using the ABB Annual Survey Plan fall under Compliance Monitoring described in the HCP. Take estimates derived from the Compliance Monitoring will be compared to the take of 167 ABB described in the HCP and authorized under the ITP issued in June 2019. At this time, no disturbance is planned for 2019 and no ABB would be taken.

Take estimates derived from Compliance Monitoring will be determined using the following steps. Table 4 provides a framework for determining ABB take each year.

1. Determine a habitat category of each trap surveyed.

2. Determine a unique mean density for each habitat category using all traps in that habitat category. Density will be determined using the following equation:
 - a. $(\text{Total ABB captures} / 0.9) / \text{total acres trapped} = \text{ABB/acre}$
3. Determine a habitat category for each section (one square mile) that contains a project-related disturbance that occurred that year and total the disturbance acres for each habitat category. Disturbance areas that were disturbed during the previous year will not be re-counted.
4. Multiply the total disturbance acres for each habitat category by the density determined for that habitat category (Step 2). This will result in a total ABB estimated to occur in disturbance areas within each habitat category.
5. Total the ABB estimated to occur in disturbance areas within each habitat category to determine the total number of ABB likely to be taken that year.

TABLE 4 2019 ANNUAL ABB TAKE ESTIMATION

HABITAT CATEGORY	UNIQUE MEAN DENSITY	ACRES OF DISTURBANCE FOR 2019	ESTIMATED ABB
Prime	0.0052	0	0
Good	0.0057	0	0
Fair	0.0008	0	0
Marginal	0	0	0
Poor	0	0	0
TOTAL	--	0	0

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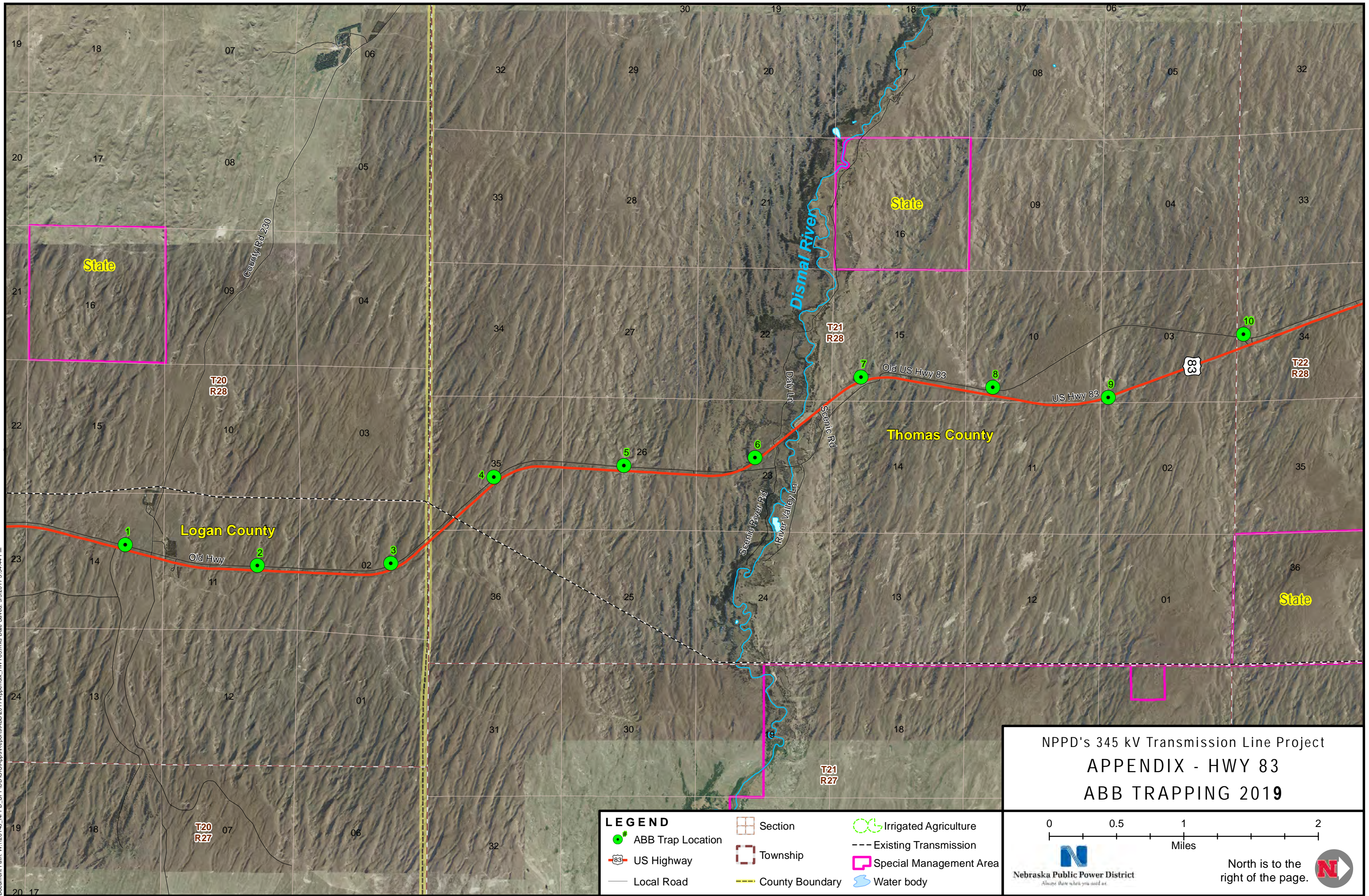
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APPENDIX A INDIVIDUAL TRAP LOCATION

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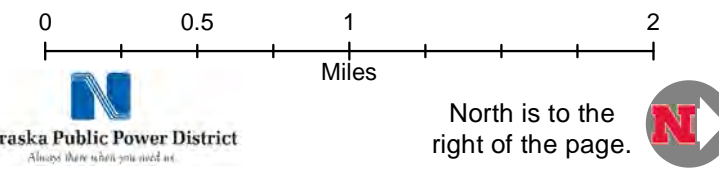
LEGEND

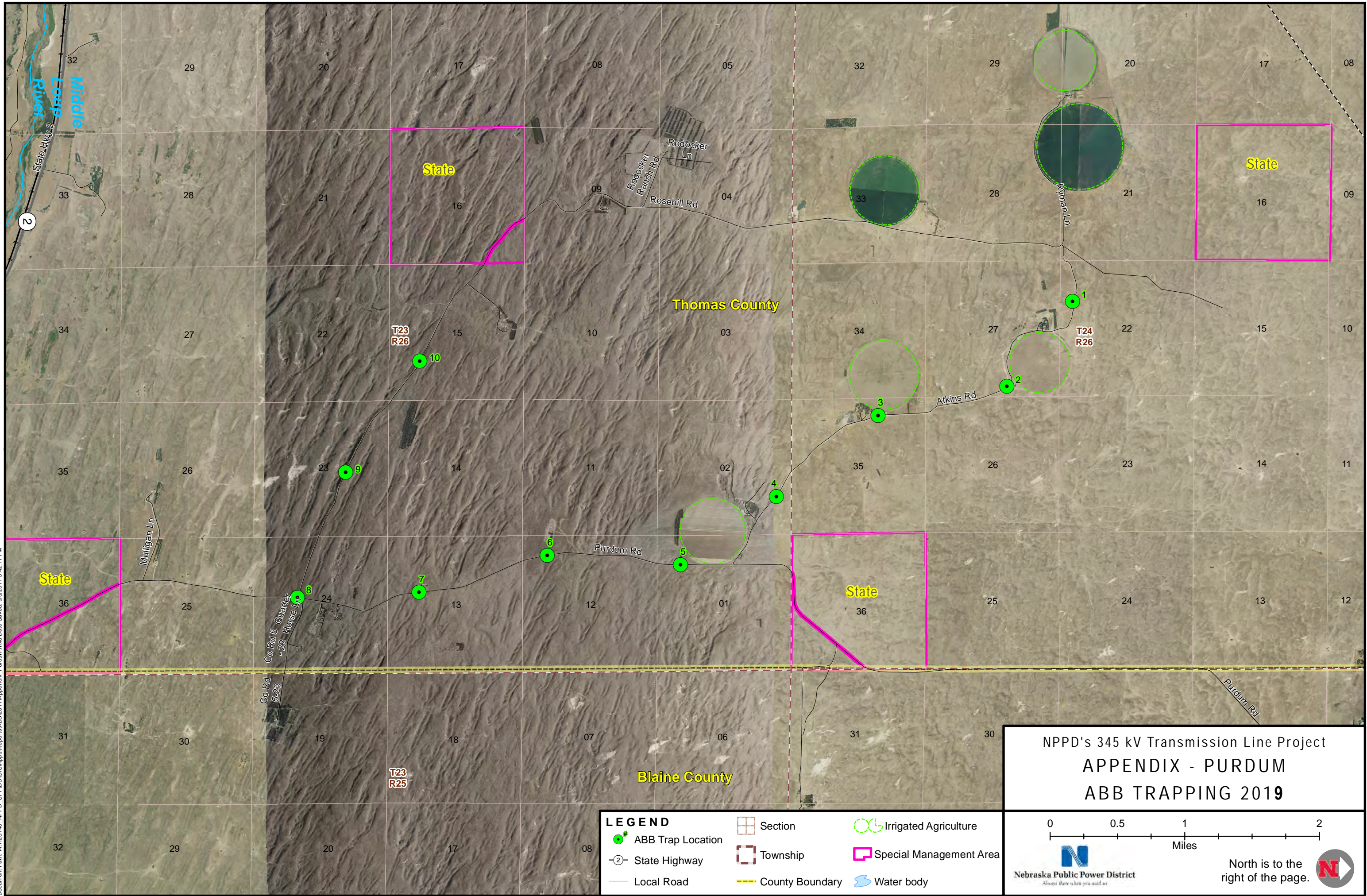
- ABB Trap Location
- US Highway
- Local Road

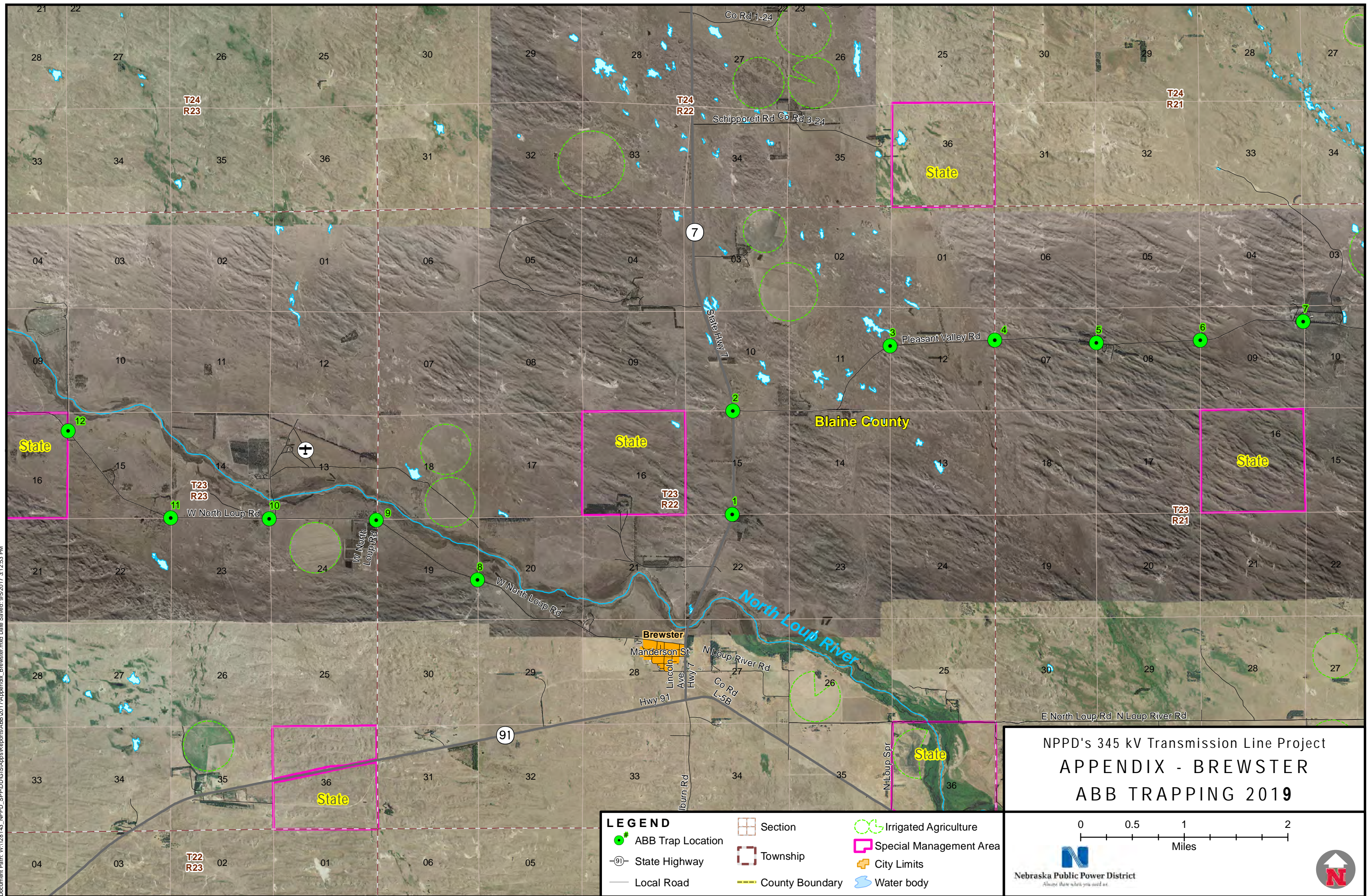
- Section
- Township
- County Boundary

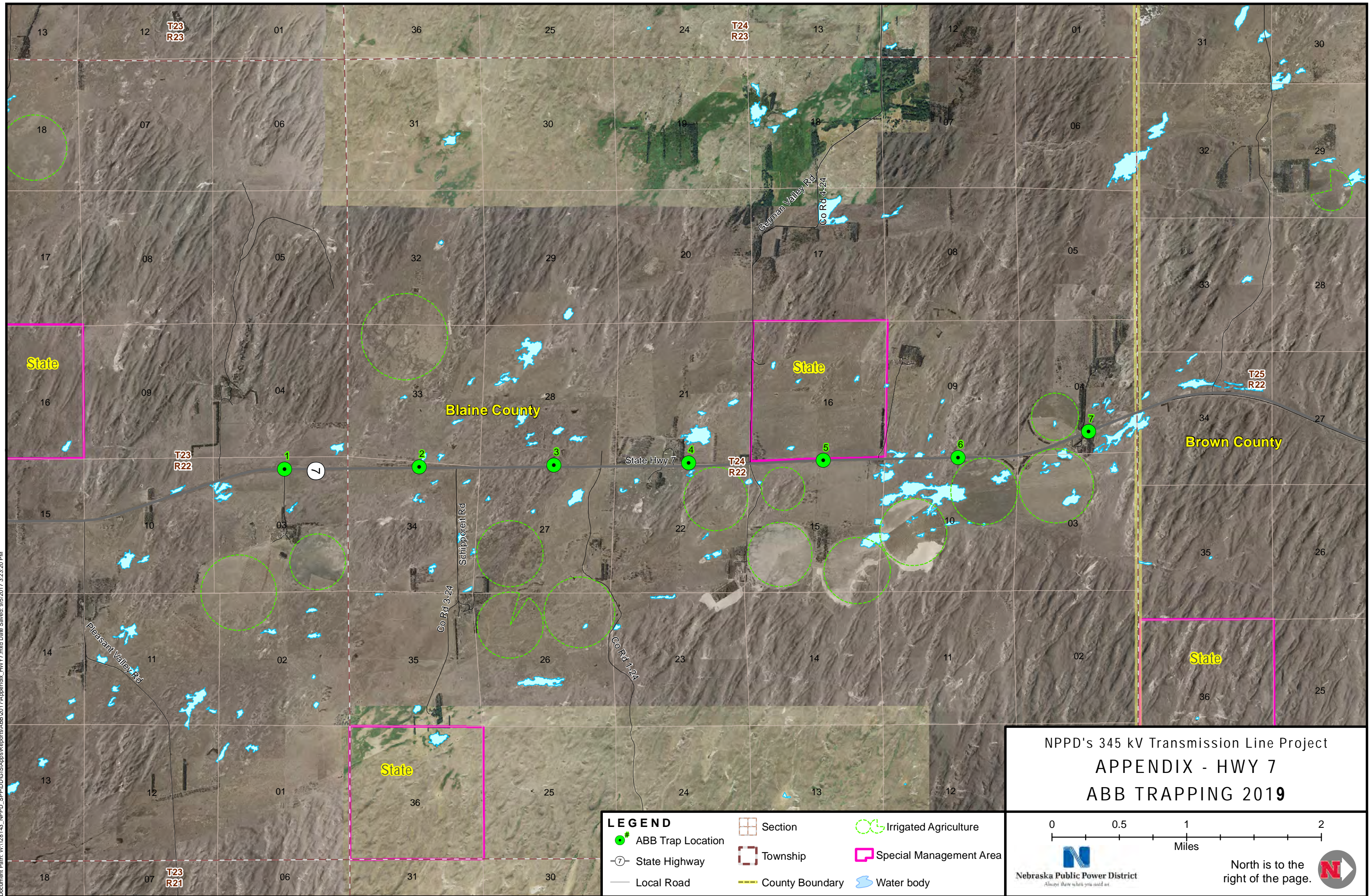
- Irrigated Agriculture
- Existing Transmission
- Special Management Area
- Water body

NPPD's 345 kV Transmission Line Project
APPENDIX - HWY 83
ABB TRAPPING 2019

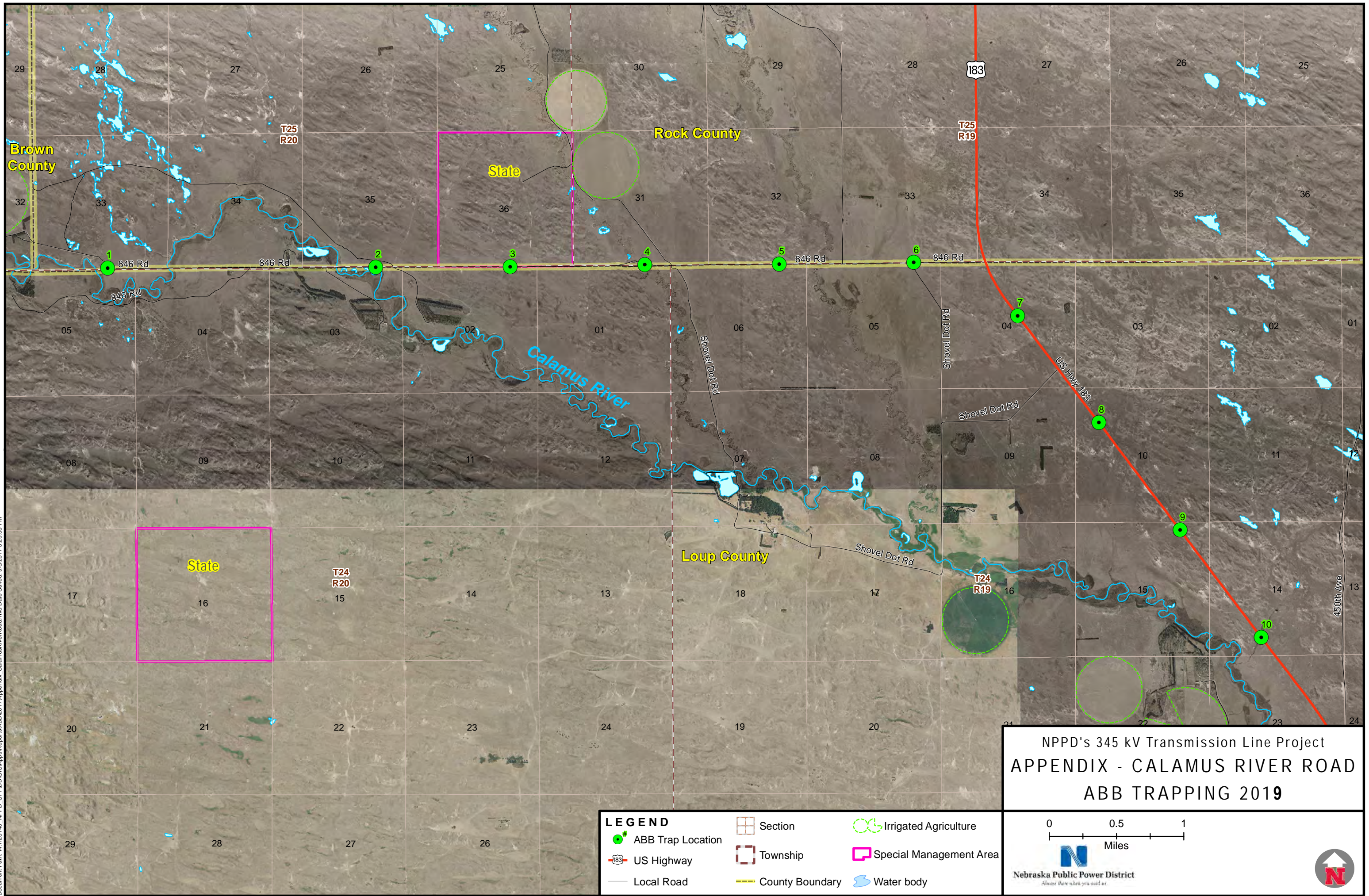




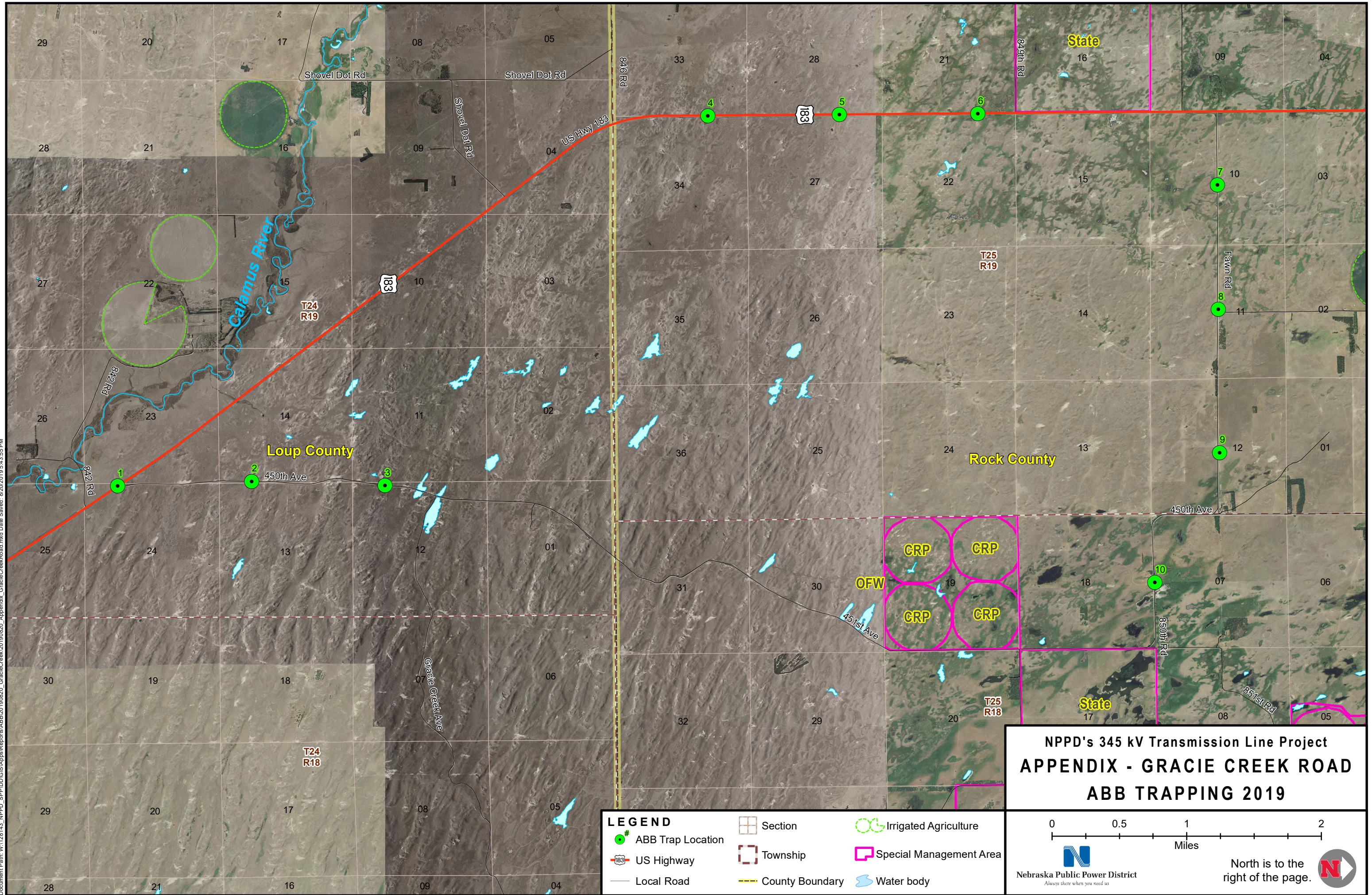




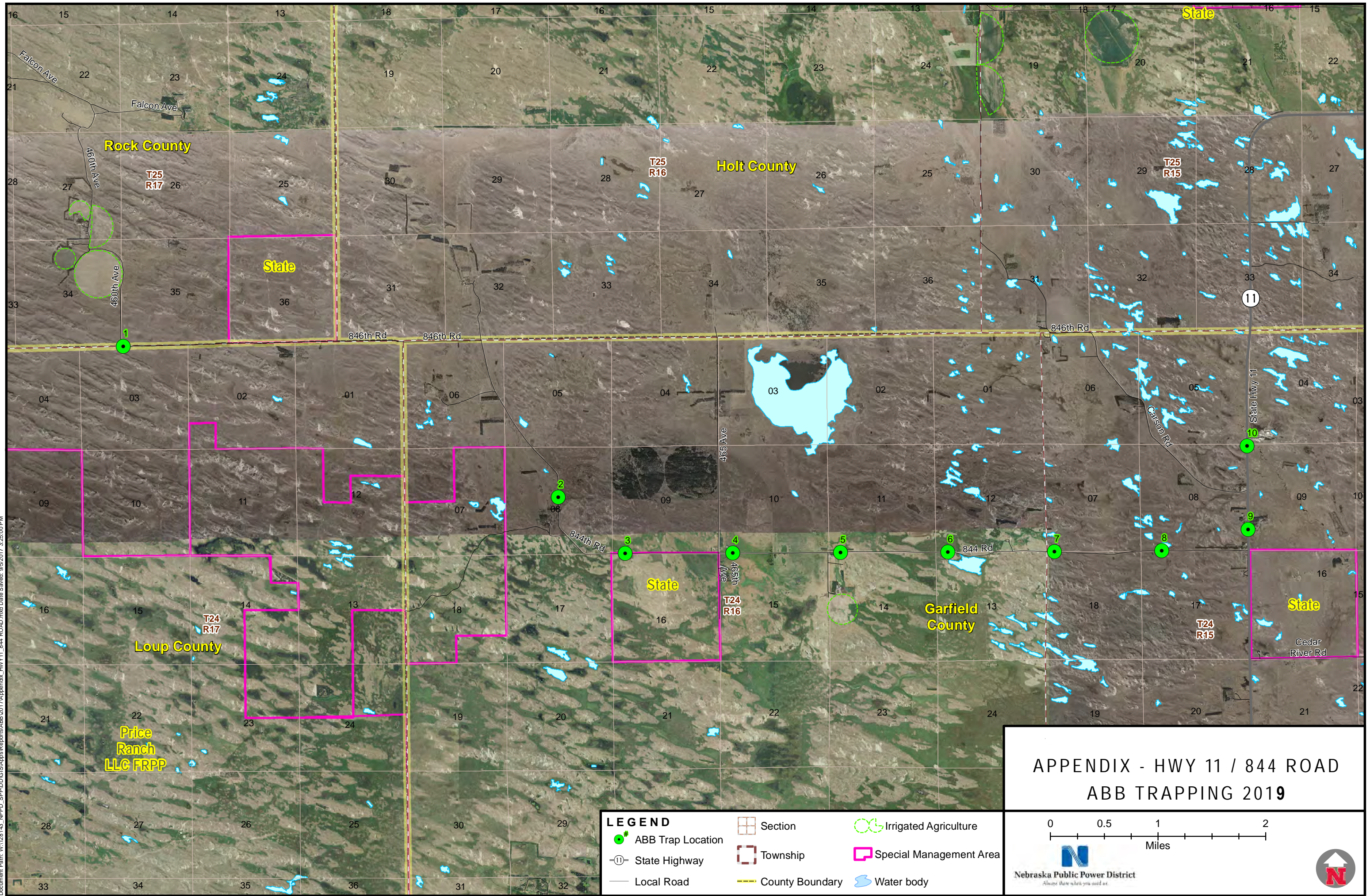
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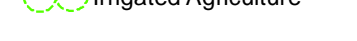
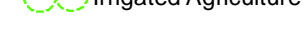
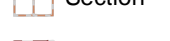
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A horizontal number line representing distance in miles. The line is marked with major tick marks at 0, 0.5, 1, and 2. The word "Miles" is written below the line. A small car icon is positioned on the line between 0 and 0.5, specifically at the 0.25 mark.



 ABB Trap Location



APPENDIX B INDIVIDUAL ABB TRAP SUMMARY

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TABLE B1 INDIVIDUAL ABB TRAP SUMMARY – 2019

TRANSECT	TRAP NUMBER	TOTAL ABB CAPTURED	RECAPTURES	INDIVIDUAL ABB CAPTURED	PERCENT RECAPTURE
Highway 83	1	0	0	0	NA
Highway 83	2	0	0	0	NA
Highway 83	3	0	0	0	NA
Highway 83	4	0	0	0	NA
Highway 83	5	0	0	0	NA
Highway 83	6	0	0	0	NA
Highway 83	7	0	0	0	NA
Highway 83	8	0	0	0	NA
Highway 83	9	0	0	0	NA
Highway 83	10	0	0	0	NA
Purdum	1	0	0	0	NA
Purdum	2	0	0	0	NA
Purdum	3	0	0	0	NA
Purdum	4	0	0	0	NA
Purdum	5	0	0	0	NA
Purdum	6	0	0	0	NA
Purdum	7	0	0	0	NA
Purdum	8	1	0	1	0%
Purdum	9	0	0	0	NA
Purdum	10	0	0	0	NA
Brewster	1	7	2	5	29%
Brewster	2	7	1	6	14%
Brewster	3	0	0	0	NA
Brewster	4	0	0	0	NA
Brewster	5	1	0	1	0%
Brewster	6	1	0	1	0%
Brewster	7	0	0	0	NA
Brewster	8	2	1	1	50%
Brewster	9	1	0	1	0%
Brewster	10	2	0	2	0%
Brewster	11	23	4	19	17%
Brewster	12	2	0	2	0%
Highway 7	1	0	0	0	NA
Highway 7	2	5	0	5	0%
Highway 7	3	3	1	2	33%
Highway 7	4	5	0	5	0%
Highway 7	5	0	0	0	NA
Highway 7	6	0	0	0	NA
Highway 7	7	0	0	0	NA
Calamus River	1	2	0	2	0%
Calamus River	2	2	0	2	0%
Calamus River	3	2	0	2	0%
Calamus River	4	1	0	1	0%
Calamus River	5	0	0	0	NA

TRANSECT	TRAP NUMBER	TOTAL ABB CAPTURED	RECAPTURES	INDIVIDUAL ABB CAPTURED	PERCENT RECAPTURE
Calamus River	6	3	0	3	0%
Calamus River	7	0	0	0	NA
Calamus River	8	0	0	0	NA
Calamus River	9	1	0	1	0%
Calamus River	10	5	0	5	0%
Gracie Creek Road	1	1	0	1	0%
Gracie Creek Road	2	0	0	0	NA
Gracie Creek Road	3	0	0	0	NA
Gracie Creek Road	4	0	0	0	NA
Gracie Creek Road	5	0	0	0	NA
Gracie Creek Road	6	0	0	0	NA
Gracie Creek Road	7	1	0	1	0%
Gracie Creek Road	8	2	0	2	0%
Gracie Creek Road	9	0	0	0	NA
Gracie Creek Road	10	18	2	16	11%
Highway 11/844 Road	1	0	0	0	NA
Highway 11/844 Road	2	0	0	0	NA
Highway 11/844 Road	3	2	0	2	0%
Highway 11/844 Road	4	1	0	1	0%
Highway 11/844 Road	5	0	0	0	NA
Highway 11/844 Road	6	0	0	0	NA
Highway 11/844 Road	7	3	1	2	33%
Highway 11/844 Road	8	3	0	3	0%
Highway 11/844 Road	9	4	0	4	0%
Highway 11/844 Road	10	1	0	1	0%
846 Road	1	7	2	5	29%
846 Road	2	0	0	0	NA
846 Road	3	0	0	0	NA
846 Road	4	2	0	2	0%
846 Road	5	0	0	0	NA
846 Road	6	2	0	2	0%
846 Road	7	0	0	0	NA
846 Road	8	0	0	0	NA
846 Road	9	3	0	3	0%