Bat Habitat Assessment, Proposed Crowned Ridge I Wind Facility, Grant and Codington Counties, South Dakota

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PREPARED FOR

Crowned Ridge Wind, LLC

PREPARED BY

SWCA Environmental Consultants

BAT HABITAT ASSESSMENT, PROPOSED CROWNED RIDGE I WIND FACILITY, GRANT AND CODINGTON COUNTIES, SOUTH DAKOTA

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1 INTRODUCTION

1.1 Project Overview

Crowned Ridge Wind, LLC, an indirect, wholly-owned subsidiary of NextEra Energy Resources, LLC, plans to develop an approximately 300-megawatt (MW) wind facility known as the Crowned Ridge I Wind Energy Facility (the project) in Grant and Codington Counties, South Dakota (see project boundary, Figure 1). The project will produce energy sold to Xcel Energy through a Power Purchase Agreement. A new transmission line will be constructed to connect the wind facility to Otter Tail Power's Big Stone South 230-kilovolt (kV) substation near Big Stone City, South Dakota (Figure 1). For the purposes of this assessment, the wind array study area consists of 58,548 acres, and the transmission line study area consists of the center line of the proposed route with a 150-foot buffer, plus a 200-foot buffer at all turns (Figure 1). Construction of the Crowned Ridge 1 project is anticipated to commence in early 2019, and the project is scheduled to achieve commercial operation at or before the end of 2019.

The purpose of this report is to assess the availability and suitability of bat habitat within the study areas, to determine the potential for presence of state-listed and federally listed bat species, and to provide context for regulations relative to those species.

1.2 Environmental Setting

Ecoregions are delineated based upon the continuity of natural resource availability, vegetation communities, and other factors (Bryce et al. 1998). The U.S. Environmental Protection Agency and the Commission for Environmental Cooperation (CEC) defined a hierarchy of ecoregions at various scales, with Level I ecoregions being the coarsest level defined at the global scale, through Level III at the national scale (CEC 1997). Bryce et al. (1998) defined smaller Level IV ecoregions at a regional scale within the Level III ecoregions for the states of North Dakota and South Dakota.

The project is located within the Level IV Prairie Coteau, Prairie Coteau Escarpment, and Big Sioux Basin ecoregions, which are subdivisions of the Level III Northern Glaciated Plains ecoregion (Bryce et al. 1998). The Prairie Coteau ecoregion resulted from stagnant glacial ice melting beneath a layer of sediment, and is dominated by tightly undulating, hummocky landscape with no drainage pattern. There are large chains of lakes and scattered semi-permanent or seasonal wetlands (Bryce et al. 1998). The Prairie Coteau Escarpment is a small but unique ecosystem rising from the Missouri River valley to the Prairie Coteau. The elevation, broken topography, and precipitation patterns provide for deciduous forests along riparian corridors, and streams provide habitats and oxygenated water unique to this area of eastern South Dakota (Bryce et al. 1998). The Big Sioux Basin ecoregion is within the surrounding Prairie Coteau ecoregion and differs from that region in that it has a well-defined drainage network and gentler topography (Bryce et al. 1998).

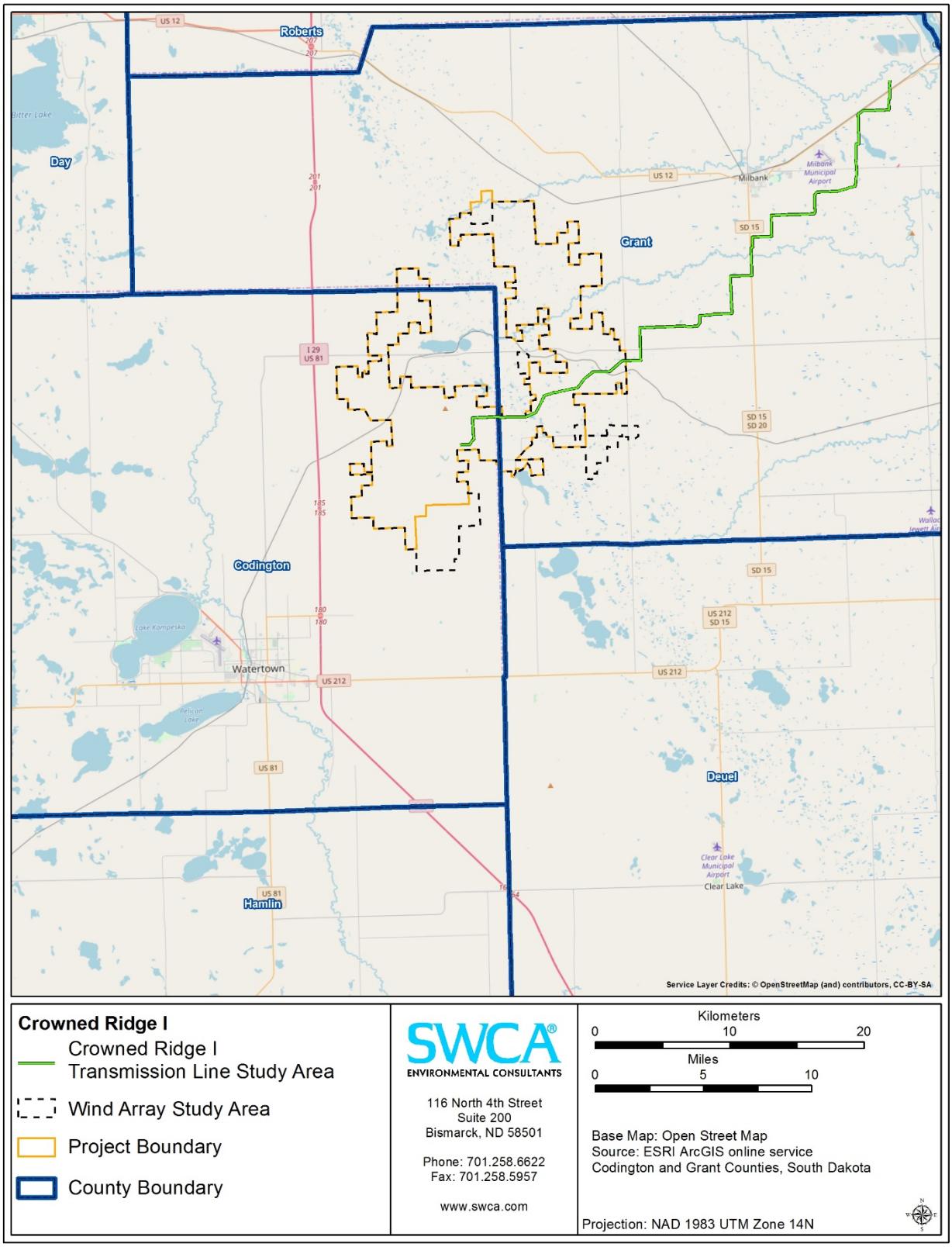

Figure 1. Location of the study areas.

2 BATS OF SOUTH DAKOTA

Several sources were reviewed to identify bat species with potential to occur within Grant and Codington Counties, South Dakota, including the South Dakota Bat Working Group; the South Dakota Department of Game, Fish, and Parks (SDGFP) *South Dakota Wildlife Action Plan* (SDWAP; SDGFP 2014); the Annotated Checklist of Bats from South Dakota (Jones and Genoways 1967); NatureServe (Hammerson 2015a–d); and the *Guide to Mammals of the Plains States* (Jones et al. 1985) (Table 1). The U.S. Fish and Wildlife Service (USFWS) Threatened and Endangered Species List; the Threatened, Endangered, and Candidate Species list of South Dakota; and the SDWAP were cross-referenced with the list of bat species with potential to occur within Grant and Codington Counties to identify 1) state-listed or federally listed species, and 2) species described in the SDWAP as having established, state-specific, non-regulatory conservation recommendations.

2.1 Species of Conservation Concern

For the purposes of this assessment, “species of conservation concern” is defined as those that are currently listed as threatened or endangered at the State or Federal level and those that are listed in the South Dakota Wildlife Action Plan (SDWAP).

The northern long-eared bat was listed as a threatened species with a 4(d) rule on April 2, 2016 (USFWS 2016) and is the only currently federally listed species with potential to occur within the study areas. However, USFWS confirmed that there are no known northern long-eared bat hibernacula or maternity roost trees in Grant and Codington Counties. Additionally, based on their records, USFWS stated that while the species could occur in these counties, it is likely to only be a migrant, rather than a resident species (USFWS personal communication, 2018).

The northern long-eared bat 4(d) rule includes take prohibitions for specific activities in specific geographic areas. Purposeful take of northern long-eared bats without a permit is prohibited throughout the range of the species; however, incidental take without a permit is prohibited only within the “White-Nose Syndrome Zone.” The White-Nose Syndrome Zone is defined as all counties within 150 miles of a confirmed white-nose syndrome-positive county; the study areas are within the White-Nose Syndrome Zone (USFWS 2016). Within the White-Nose Syndrome Zone, tree-clearing activities that occur in June or July and within 150 feet of a known maternity roost tree, and that result in incidental take without a permit, are prohibited. Incidental take without a permit that results from tree-clearing activities within 0.25 mile of a known northern long-eared bat hibernaculum at any time of year also is prohibited. There currently is no prohibition of incidental take of northern long-eared bats that results from operation of a wind energy generation facility.

The SDWAP includes the northern long-eared bat and silver-haired bats (*Lasionycteris noctivagans*) as “species of greatest conservation need” indicating that they are “species with characteristics that make them vulnerable” (SDGFP 2014). The SDWAP is an assessment of South Dakota's fish and wildlife and associated habitat that provides conservation measures for long-term preservation of species of conservation concern (SDGFP 2014). The intent of the plan is to foster voluntary partnerships between governmental agencies, tribes, organizations, and private entities to help prevent fish and wildlife from becoming endangered. Listing on the SDWAP does not convey any regulatory status or authority.

Table 1. Ecology and Distribution of Bat Species with Potential to Occur in Grant and Codington Counties, South Dakota

Common Name	Scientific Name	Status	Species Ecology
Red bat	*Lasiurus borealis*	-	Red bats are a common species throughout their range and are found throughout South Dakota in both coniferous and deciduous forested areas (Jones and Genoways 1967). It is hypothesized that red bats migrate to South Dakota in April and leave the state in late August or early September (Swier 2003).
Silver-haired bat	*Lasionycteris noctivagans*	State: *Rare, SDWAP**	Silver-haired bats are relatively uncommon throughout their range and erratically distributed (Kunz 1982). Jones and Genoways (1967) suggested the silver-haired bat was a migrant only; however, Swier (2003) captured individuals in July, showing that some are likely summer residents. The species roosts in trees under bark, in cavities, and snags (Mattson et al. 1996), typically in cottonwood forests in eastern South Dakota (Swier 2003). Silver-haired bats migrate great distances in spring and early fall (Kunz 1982).
Hoary bat	*Lasiurus cinereus*	-	Hoary bats are South Dakota's largest bats and are widespread, though usually not found in great densities (Jones and Genoways 1967; Shump and Shump 1982). Hoary bats roost in trees generally near a water source (Swier 2003) and forage at higher altitude, relative to other bat species. The species migrates south for the winter, leaving in late August and returning in early June (Turner 1974).
Northern long-eared bat	*Myotis septentrionalis*	Federal: *Threatened* State: *Rare, SDWAP**	Within South Dakota, the northern long-eared bat is likely restricted to large, riparian forests along the Missouri River (Swier 2003). USFWS considers the species potentially present state-wide, however there are no records of the species from Grant, Codington, or the adjacent counties (USFWS personal communication 2018). Typically found near water and dense forest conditions, both coniferous and riparian; roost sites consist of exfoliating bark and tree cavities, open buildings, and caves or mines; winter hibernacula are frequently caves or mines (SDGFP 2014). During the summer, northern long-eared bats roost in trees with cracks, crevices, or exfoliating bark, and human-made structures (USFWS 2016). The species hibernates in caves or cave-like structures during the winter (USFWS 2016).
Little brown bat	*Myotis lucifugus*	-	Little brown bats are considered a common species and a generalist capable of exploiting many habitats. The species is historically commonly found throughout South Dakota (Higgins et al. 2000; Jones et al. 1985). Foraging and roosting areas are selected opportunistically (Fenton and Barclay 1980), though deciduous forests and urban areas appear to support the species more often (Swier 2003). Little brown bat roosts include human-made structures, trees, caves, and mines (Fenton and Barclay 1980) and the species forages over water (Swier 2003). The species migrates between summer maternity grounds and hibernacula in spring and fall (Fenton and Barclay 1980).
Big brown bat	*Eptesicus fuscus*	-	Big brown bats are common throughout nearly all of the United States, including South Dakota (Nowak and Paradiso 1983). Though forested areas are frequently used as foraging and roosting habitat, the big brown bat has become closely associated with urban areas and roosts in human-made structures (Nowak and Paradiso 1983). It is hypothesized that big brown bats summer in eastern South Dakota and migrate west to hibernate, though Swier (2003) recorded big brown bats in eastern South Dakota year-round.

* SDWAP: Species is addressed in the South Dakota Wildlife Action Plan.

3 HABITAT AVAILABILITY

The wind array study area and transmission line study area consist of 58,548 and 689 acres of primarily herbaceous and cultivated crop landcover, respectively. Topography is gently rolling, with more hills towards the eastern edge. Aerial photography and the National Land Cover Dataset (NLCD) (Homer et al. 2015) were used to determine the quantities and distribution of land cover types within the study areas (Tables 2 and 3; Figures 2 and 3).

Table 2. Land Cover Classifications within the Wind Array Study Area, Grant and Codington Counties, South Dakota

Land Cover Type	Area (acres)	Percent Composition
Herbaceous	26,763.93	45.71%
Cultivated Crops	22,054.20	37.67%
Hay/Pasture	5,967.38	10.19%
Developed, Open Space	1,860.80	3.18%
Emergent Herbaceous Wetlands	918.17	1.57%
Deciduous Forest	374.35	0.64%
Open Water	282.95	0.48%
Developed, Medium Intensity	198.25	0.34%
Developed, Low Intensity	47.35	0.08%
Shrub/Scrub	37.36	0.06%
Developed, High Intensity	24.50	0.04%
Woody Wetlands	15.65	0.03%
Barren Land	1.88	<0.01%
Evergreen Forest	1.33	<0.01%
Total	**58,548.10**	**100.00%**

Table 3. Land Cover Classifications within the Transmission Line Study Area, Grant and Codington Counties, South Dakota

Land Cover Type	Area (acres)	Percent Composition
Cultivated Crops	302.18	43.83%
Developed, Open Space	141.81	20.57%
Herbaceous	131.56	19.08%
Hay/Pasture	74.45	10.80%
Emergent Herbaceous Wetlands	21.35	3.10%
Deciduous Forest	8.04	1.17%
Open Water	5.43	0.79%
Developed, Low Intensity	3.82	0.55%
Shrub/Scrub	0.81	0.12%
Woody Wetlands	0.01	<0.01%
Total	**689.47**	**100.00%**

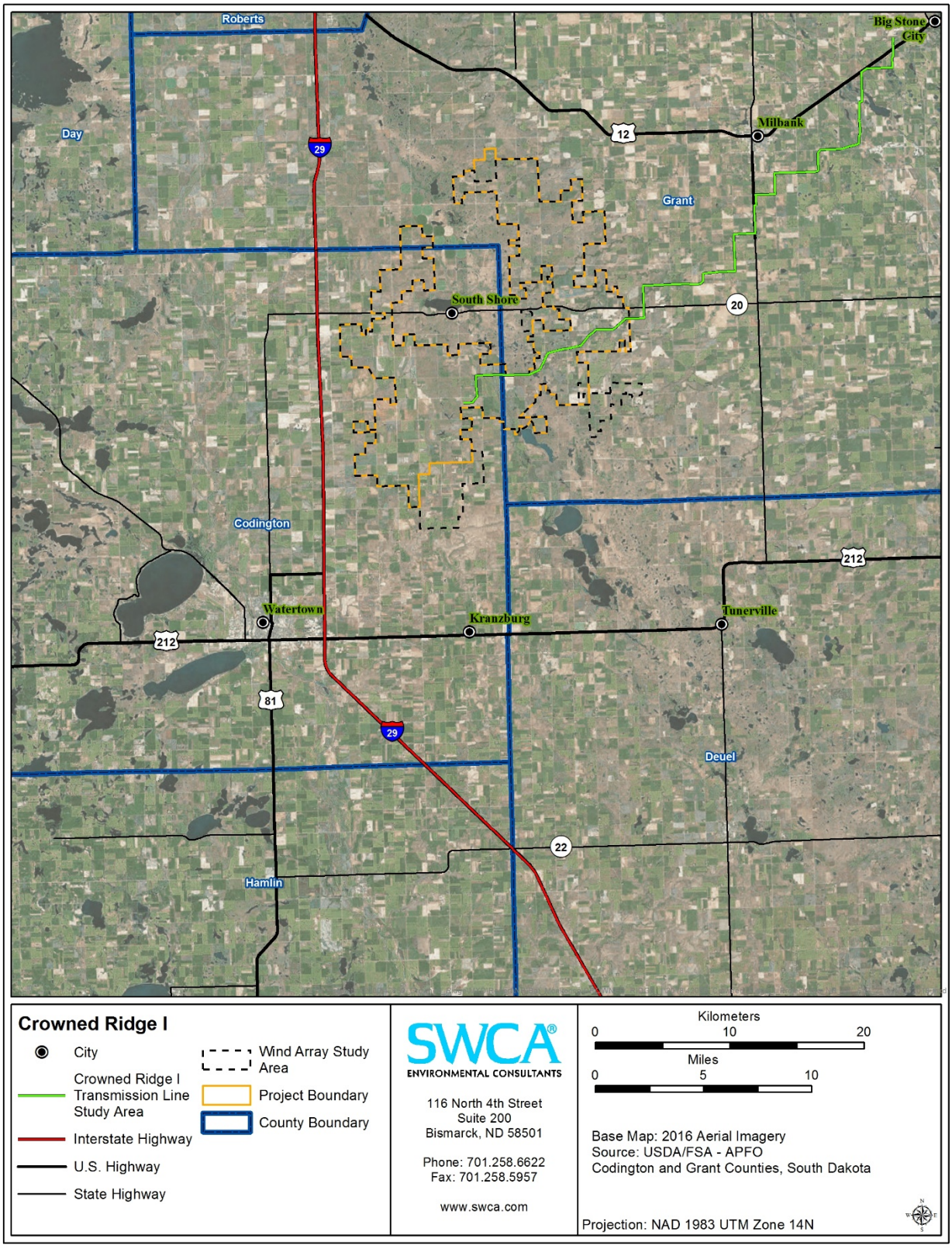

Figure 2. Aerial photography within the study areas.

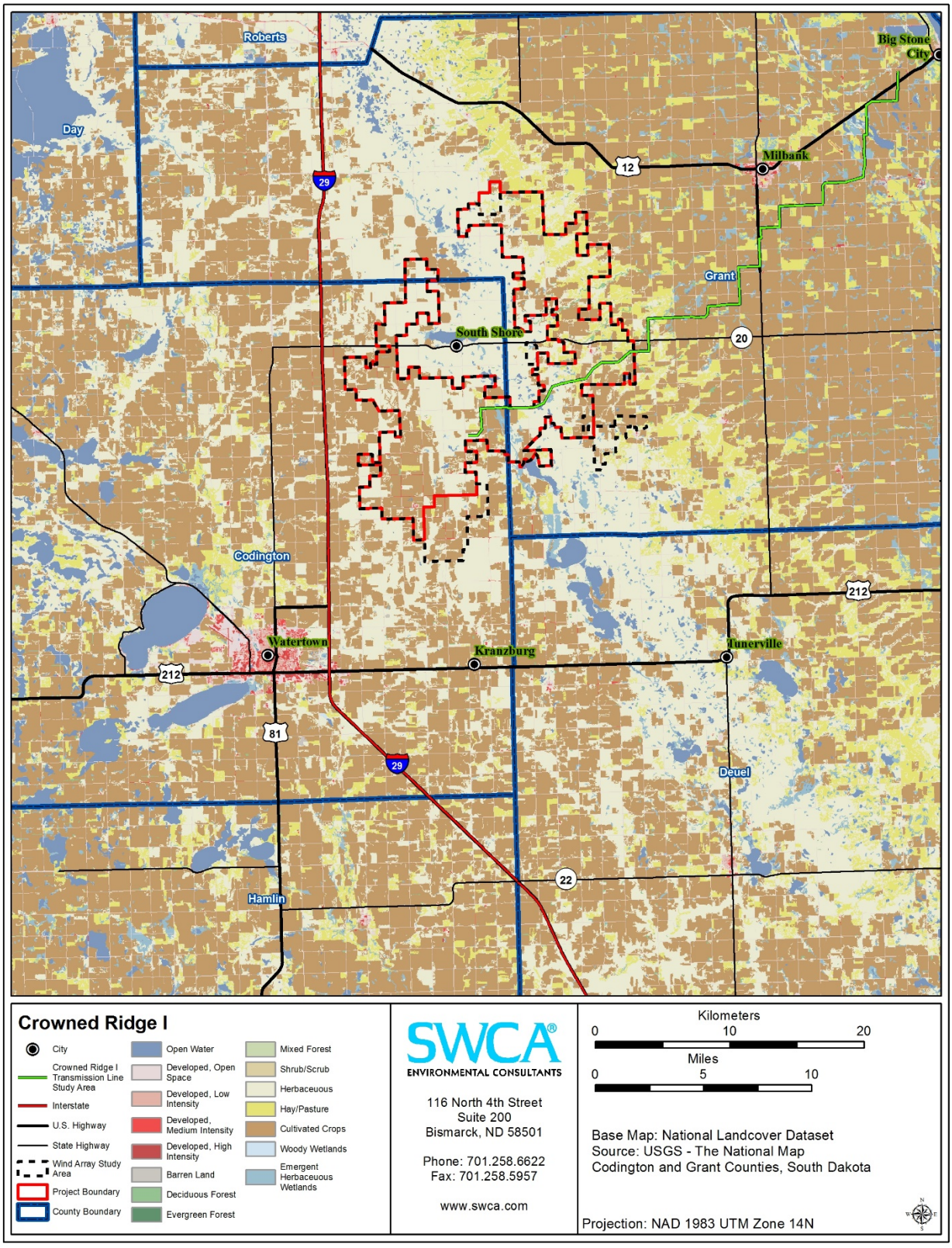

Figure 3. USGS land cover within the study areas.

The National Wetlands Inventory (USFWS 2012) and National Hydrography Dataset (U.S. Geological Survey [USGS] 2009) were reviewed to determine the quantity and distribution of water sources and suitable foraging areas throughout the study areas (Figure 4). There are several wetlands and other waterbodies throughout the study areas, though the numerous large lakes present in this region are primarily outside of the study areas. Streams within the study areas are generally small, headwater streams. These waterbodies can provide foraging grounds and water resources for all bat species. However, when compared to the water resources available outside of the study areas, there are overall fewer and smaller features available within the study areas.

Overall, forested area is extremely limited within the study areas. According to NLCD, forested area (deciduous forest, woody wetlands, and evergreen forest) comprises only 391.33 acres, or 0.67 percent of the wind array study area, and 8 acres, or 1.2 percent, within the transmission line study area. These areas consist primarily of tree lines, small woodlots, and minimal riparian corridors. Forested areas are small and fragmented throughout the study areas. This lack of forested area reduces the availability of summer habitat for forest-dwelling bat species. Each of the species with potential to occur within the study areas are considered forest-dwelling species, though they exist on a spectrum of facultative to obligate forest species. The big brown bat and little brown bat are well-adapted to urban settings and are likely to roost in human-made structures, though they naturally roost and forage in forested habitat; the red bat, silver-haired bat, and hoary bat are able forage in urban settings, but they roost in forested habitat; and the northern long-eared bat is a forest obligate species that roosts and forages almost exclusively in forested habitat.

Beyond being forest-obligate species, northern long-eared bats are considered a forest interior species. White et al. (2017) noted that the species rarely forages more than a few meters away from forest edges, indicating that they are unlikely to use open areas. A study of northern long-eared bats within a managed forest in West Virginia found that this species forages in areas with forest patch sizes between 114 and 161 acres (Owen et al. 2003). Research conducted in Michigan and Prince Edward Island, Canada, within a landscape dominated by agricultural activity showed that northern long-eared bats may use woodlots as small as 15 acres (Foster and Kurta 1999; Henderson and Broders 2008).

For the purposes of this assessment, NLCD land cover data was combined with a manual review of aerial photography to identify forested areas mis-identified by NLCD. Forest patches smaller than 15 acres were considered unsuitable for northern long-eared bats. Forest patches between 15 and 114 acres were considered suitable and of moderate quality, and forest patches greater than 114 acres were considered suitable and of high quality. Using these criteria, 815 acres of forested habitat is unsuitable for use by northern long-eared bats, 246 acres of forested habitat is of moderate quality for northern long-eared bats, and 341 acres of forested habitat is of high quality for northern long-eared bats within the wind array study area (Figure 5). Thirteen acres of forested habitat is unsuitable for use by northern long-eared bats, 21 acres of forested habitat is of moderate quality for northern long-eared bats, and 9 acres of forested habitat is of high quality for northern long-eared bats within the transmission line study area (see Figure 5).

Three of the six bat species that may be present within the study areas hibernate in caves or cave-like structures during the winter. SWCA Environmental Consultants (SWCA) reviewed cave and karst mapping to determine the likelihood of such features occurring within the study areas. There is a slim band of carbonate that runs through the eastern portion of the wind array study area, and an additional two thin bands crossed by the transmission line study area (Figure 6). These areas are underlain by minerals that are prone to cave formation; however, no caves were identified during the desktop analysis.

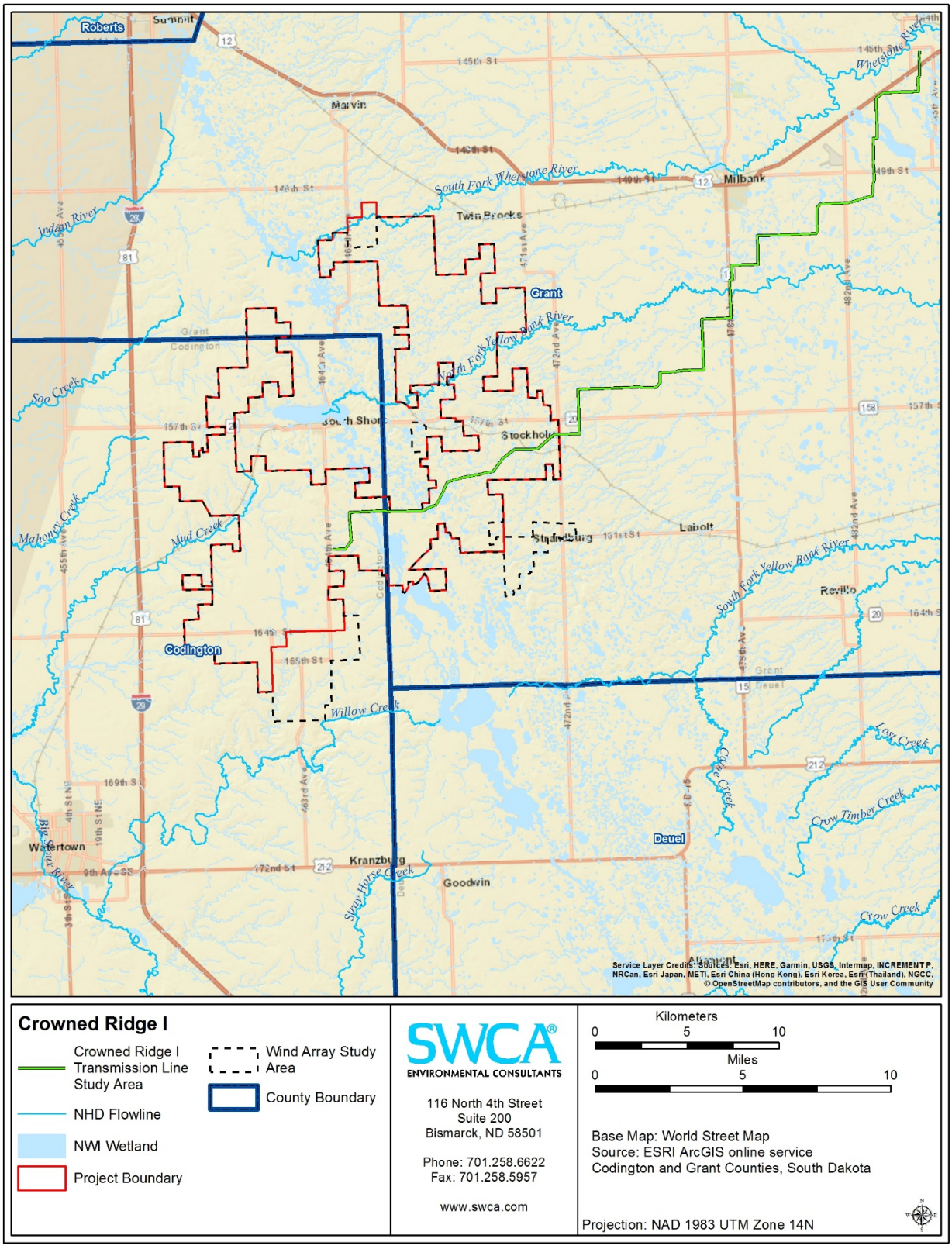

Figure 4. Water resources within the study areas.

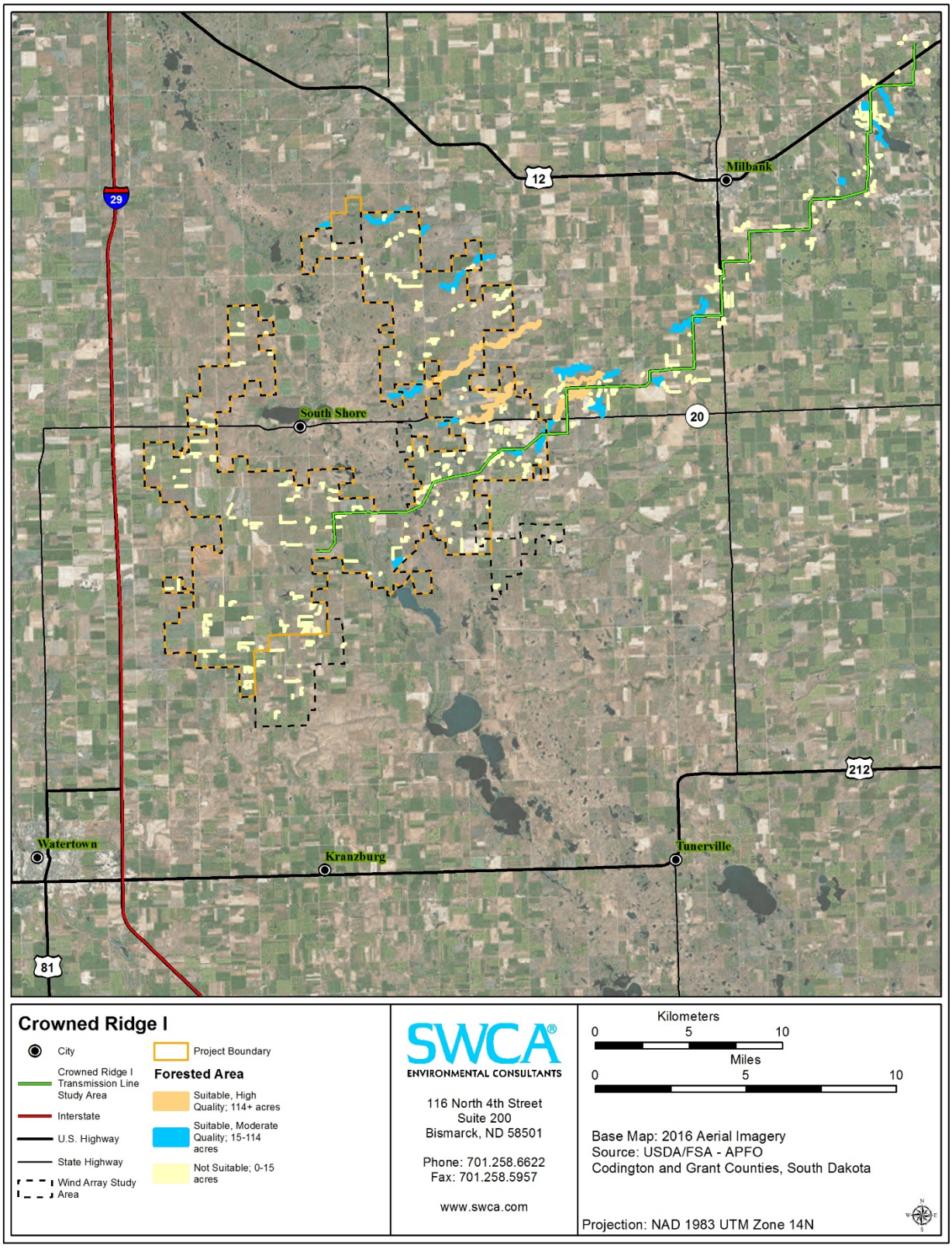

Figure 5. Forest patch size analysis within the study areas, indicating areas of suitable northern long-eared bat habitat.

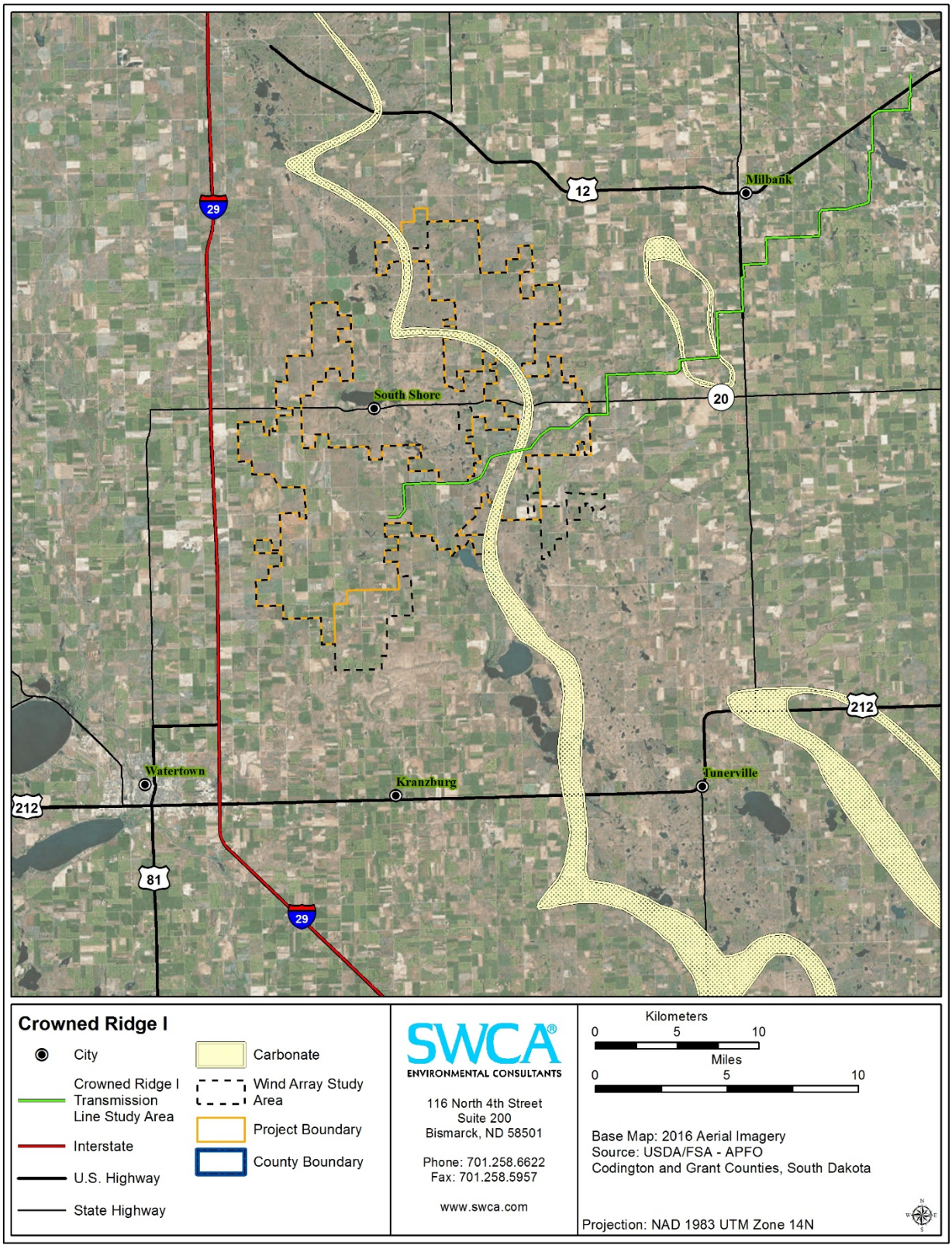

Figure 6. Karst geology within the study areas.

4 CONCLUSION

For bats with potential to occur within Grant and Codington Counties, SWCA cross-referenced species requirements with availability of suitable habitat for each species, reviewed occurrence records, and coordinated with USFWS to determine seasonal likelihood of occurrence for each species (Table 4).

The only federally listed species with potential to occur within the study areas is the northern long-eared bat. There is limited suitable habitat for the northern long-eared bat within the study areas, typically in the form of wooded riparian corridors, small woodlots, and isolated forest patches. The habitat available within the study areas is similar in availability and density to the surrounding landscape, indicating that there is no regionally unique habitat that could serve as an attractant for northern long-eared bats to the study areas.

The USFWS has stated that there is very low likelihood of northern long-eared bats occurring within the study areas as a summer resident. There is potential for the northern long-eared bat to occur within the study areas as a migrant during the spring and fall, though migration behavior of the species is poorly understood.

The northern long-eared bat currently is listed as a threatened species. However, due to the 4(d) rule, there is no prohibition on incidental take that results from operation of a wind energy generation facility. There are prohibitions on unpermitted incidental take that result from tree clearing in certain areas at certain times of year. However, because there are no known maternity roost trees or hibernacula within Grant and Codington Counties, those restrictions would not apply to construction of this project.

Table 4. Habitat Availability and Suitability, and Seasonal Likelihood of Occurrence for Bats with Potential to Occur within the Study Areas, Grant and Codington Counties, South Dakota

Common Name	Likelihood of Occurrence	Habitat Availability/Suitability in the Study Areas	Seasonal Likelihood of Occurrence			
			Spring	Summer	Fall	Winter
Red bat	High	There is limited forested habitat within the study areas. However, red bats are generalists and common throughout their range and may be present as summer residents and as seasonal migrants. Though there is a high likelihood of occurrence, the lack of habitat is likely to limit summer resident population size.	High	High	High	Very Low
Silver-haired bat	Medium	Silver-haired bats are distributed sporadically throughout their range. Available data indicate that summer residents in the region are uncommon, though population distribution throughout their range is poorly studied. Summer habitat is limited within the study areas. However, the species may migrate through the study areas in the spring and fall.	Moderate	Low	Moderate	Very Low
Hoary bat	High	There is limited suitable habitat within the study areas. However, hoary bats have a large home range and can forage over great distances each night. The species may occur in the study areas as summer residents and as seasonal migrants. Though there is a high likelihood of occurrence, the lack of habitat is likely to limit summer resident population size.	High	High	High	Very Low

Common Name	Likelihood of Occurrence	Habitat Availability/Suitability in the Study Areas	Seasonal Likelihood of Occurrence			
			Spring	Summer	Fall	Winter
Northern long-eared bat	Low	The study areas are within the range of the northern long-eared bat, but publicly available data indicate that the species has not been documented in Grant or Codington Counties. Coordination with USFWS determined that northern long-eared bats are considered a potential migrant in this region of South Dakota, with very low likelihood of summer residency. Records suggest that the species is limited to the southern reaches of the Missouri River and the Black Hills within South Dakota. Additionally, suitable habitat for northern long-eared bats is extremely limited within the study areas. The species may occur in the study areas during spring and fall as a migrant, is very unlikely to be present as a summer resident. There is little potential for suitable winter habitat to occur within the study areas. If such habitat is available, individuals typically remain underground for the duration of the season, and therefore do not have potential to occur on the landscape.	Low	Very Low	Low	None
Little brown bat	Medium	There is limited natural habitat within the study areas, though the species is well adapted to developed areas and human-made structures. However, eastern little brown bat populations have declined precipitously due to white-nose syndrome, limiting the likelihood of presence of this species within the study areas.	Low	Low	Low	None
Big brown bat	High	Big-brown bats are common throughout their range. Though there is limited natural habitat available within the study areas, their adaptation to live in developed areas and within human-made structures increases their likelihood of presence. This species is likely able to use the barns, houses, and other human-made structures available throughout the study areas.	High	High	High	Moderate

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