

To:	Montana-Dakota Utilities Co. and Otter Tail Power Company		
From:	HDR Engineering, Inc.	Project:	Big Stone South to Ellendale Transmission Line Project
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BSSE Native Habitat Classification Model

Introduction

The Big Stone South to Ellendale Transmission Line would connect the proposed Ellendale 345kV substation, located near Ellendale, North Dakota with the Big Stone South substation, located near Big Stone City, South Dakota. The dominant land-use in the project area is cropland with other agricultural uses occurring to a lesser extent. However, the southeast portion of the project area includes a regionally significant glacial landform called the Coteau des Prairies (Coteau). This glacial geologic feature is characterized by steep hillsides, rocky terrain, and abundant pothole wetlands that have made cultivation difficult. Therefore, much of the land cover of the Coteau remains as pasture or unplowed grassland, allowing native prairie plant communities to persist. The Coteau forms a plateau which rises several hundred feet above the surrounding landscape (Figure 1 displays the extent of the escarpment in the project area).

HDR Engineering, Inc. (HDR) developed a GIS model using infrared imagery and an on-the-ground assessment method to map areas of native prairie and other land-uses within the potential transmission line routes. This procedure allowed HDR to perform an assessment of habitats across a large geographic area without actually visiting each site and that can be used to facilitate routing by assessing potential impacts to habitats that may harbor federally listed (threatened, endangered, or candidate) species .

Federally protected species including western prairie fringed-orchid (*Platanthera praeclara*) and candidate species such as the Dakota skipper (*Hesperia dacotae*), Poweshiek skipperling (*Oarisma poweshiek*), and Sprague's pipit (*Anthus spragueii*) occur exclusively on sites that exhibit moderate to high quality native prairie. These habitat types also harbor species managed and regulated by state agencies such as sharp-tailed grouse (*Tympanuchus phasianellus*) and greater prairie chickens (*Tympanuchus cupido*).

Western prairie fringed-orchids are designated as a Threatened species under the Endangered Species Act (ESA) while Dakota skippers, Poweshiek skipperlings, and Sprague's pipits are currently listed as Candidate species. Unlike threatened or endangered species, candidate species do not have the full protection of the ESA. However, Dakota skipper and Poweshiek skipperling surveys conducted in the past seven years indicate a substantial decline in populations of these

prairie obligate butterflies and have caused the USFWS to initiate actions that would elevate their protected status to threatened or endangered by 2013 or 2014. The USFWS encourages and actively pursues conservation actions for candidate species with private landowners, state agencies, project proponents, and other partners. If effective, these actions may eliminate the need to list the species as threatened or endangered. Confirming the presence or absence of listed and candidate species is important to understand project risks and assist with routing, particularly where project facilities may cross federal easements (USFWS, NRCS) and habitats are consistent with the occurrence of listed or candidate species. If listing were to occur during the permitting or route development phase, it could put the project schedule at risk, if not otherwise properly considered.

In addition, identifying areas used by wintering or breeding bald eagles is important because this species is protected by the Bald and Golden Eagle Protection Act (1940). By locating and considering nest sites early in the route development process, concentration of these features can be avoided or the construction schedule can take buffer zones and timing restrictions into consideration. Furthermore, this species is easily recognizable by the public and agencies, which may object to projects located in eagle use areas. Properly understanding eagle use in the project area can address public and agency concerns and demonstrate a project proponents efforts to avoid and minimize impacts to this species.

Finally, sharp-tailed grouse leks are communal display sites, where large numbers of individuals gather during the breeding season. Although lek locations and size can vary depending on population size, habitat features, and land-use, regulatory agencies frequently express concern over impacts to these resources.

Methods

To generate a model displaying appropriate habitat in the project area a custom classification was conducted using, multi-band, multi-temporal satellite images. Specifically, bands 3, 4, 5 and 7, of Landsat 5 images taken on June 5th and August 24rd, 2011, were combined into a single, eight band raster set to represent the eastern portion of the project area. The same bands from a Landsat 5 image taken on May 11th and July 30th, 2011 were used to represent the western half of the project area (June and August images without pervasive data gaps or significant cloud cover were not available for this portion of the project area). These bands were chosen because they exhibit spectrally unique signatures throughout the growing season. Reflectance patterns over time can then be used to delineate landcover types such as native prairies and other land cover features (Guo, Price, & Stiles, 2003).

Due to the large project area, comprehensive land cover surveys were not feasible. Instead, HDR developed a custom land-use classification model for the BSSE project by collecting data where known native prairie and rare resource records occurred together. These data were used to “train” the model what spectral signatures to look for in the infrared imagery.

The HDR biologists conducted a targeted survey between October 22nd and 25th, 2012. The biologists mapped locations of remnant prairie habitats and ranked the communities as high or low quality by identifying species assemblages, estimating anthropogenic disturbance, and noting other dominant land-use types in the project route and on nearby sites. Native prairie habitat was visually reviewed from public roads after being located on aerial photographs and by using known occurrences of listed species (SD GFP, 2012 and MN DNR, 2012) and the Minnesota County Biological Survey (where appropriate). Blocks of remaining prairie communities were then ranked according to Minnesota Department of Natural Resources (MNDNR) prairie ranking criteria (MN DNR, 2007). This system is used to standardize prairie habitat ranking by considering the diversity of native grasses and forbs, the degree of human disturbance, the presence of non-native vegetation, the presence of woody vegetation, and evidence of fire suppression among other factors. Those grasslands featuring native communities and those lacking non-native or woody species with little to moderate levels of human disturbance were considered appropriate habitat and ranked as high quality. Highly disturbed grasslands, those with low native species diversity or those dominated by non-natives were considered low quality habitat. The extent of several additional land-use types were also recorded to enhance the classification process of high quality native prairies. Table 1 summarizes the land-use types mapped and included in the training dataset.

Table 1. Land-use types included in the training dataset and their characteristics

Land Cover Type	Characteristics
Dry Hill Prairie – High Quality	<ul style="list-style-type: none"> • High diversity of native grasses and forbs dominate • Minimal or absent of non-native species • Moderate to steep slopes • Abundant glacial material, such as cobble or boulders
Dry Hill Prairie – Low Quality	<ul style="list-style-type: none"> • Native grasses and forbs present • Non-native species persist throughout area • Moderate to steep slopes • Abundant glacial material, such as cobble or boulders
Mesic Prairie – High Quality	<ul style="list-style-type: none"> • High diversity of native grasses and forbs dominate • Minimal or absent of non-native species • Flat to gently rolling terrain • Somewhat poorly drained
Mesic Prairie – Low Quality	<ul style="list-style-type: none"> • Native grasses and forbs present • Non-native species persist throughout area • Flat to gently rolling terrain • Somewhat poorly drained
Non-native Grassland	<ul style="list-style-type: none"> • Dominated by non-native grasses (<i>Bromus inermis</i>, <i>poa pratensis</i>, etc) • Native species absent
Cropland	<ul style="list-style-type: none"> • Row crops, corn, soy etc.
Small Grains	<ul style="list-style-type: none"> • Wheat or alfalfa

Land Cover Type	Characteristics
Emergent Wetland	<ul style="list-style-type: none"> • Wetland area dominated by <i>Typha spp</i>, <i>Spartina pectinata</i> or other hydrophytes • Open, standing water minimal
Open Water	<ul style="list-style-type: none"> • Lakes, ponds, rivers
Woodland	<ul style="list-style-type: none"> • Mature deciduous or evergreen canopy
Gravel	<ul style="list-style-type: none"> • Gravel pits or other aggregate extraction facilities
Pavement	<ul style="list-style-type: none"> • Roads, parking lots, airport runways
Urban	<ul style="list-style-type: none"> • Commercial, downtown core
Exposed Rock	<ul style="list-style-type: none"> • Exposed granite

Good examples of each land-use type were mapped in the field using GIS software to create a training dataset for the supervised classification. Upon completion of the targeted surveys this field verified training dataset was used to generate an output of land-use types within the project area.

Finally, forested floodplains along the James River, James River tributaries, Minnesota River and within the project area were examined for occurrences of bald eagles and to locate nests, eagles, or potential nesting habitat. Public roads in the vicinity of these rivers were driven to visually survey for eagles and large stick nests.

Results

The results of the habitat model identified blocks of high quality native prairie in the project area, which are generally associated with the Coteau. These areas are associated with an escarpment marking the transition between the higher elevations of the Coteau and the surrounding level outwash plains. Steep or rocky slopes are common along this landform which have prevented tilling and heavy grazing. However, many low quality grasslands were also identified in this area but considered low quality habitat due to the lack of abundant native vegetation. Steep slopes and rocky ground is most pronounced along the eastern edge of the Coteau, which traverses the project area in a northwest/southeast orientation. The municipality of Summit, South Dakota is located near northwest extent of the escarpment while La Bolt, South Dakota is near the southeastern extent. Figure 1 displays the extent of high quality native prairies in the project area.

The project area traverses the western extent of the Coteau (Figure 1). However, native prairie habitats in this area are less extensive than found in the east. This is due to the more gradual change in elevation between Bristol and Groton, South Dakota which has allowed for more intensive agricultural use. South of these towns, the slope of the western escarpment becomes more pronounced and native prairie remnants become more common.

Due to the linear nature of the eastern and western escarpments of the Coteau and abundance of native prairie remnants along this feature, it may not be feasible to avoid all of these habitats within the project area.

Route development across the western escarpment between Groton and Bristol could place a route in a landscape where agricultural production is more intense and native prairie habitat is generally absent. Routing across the eastern escarpment may be more challenging, because native prairie habitats are more abundant. In general, native prairies along the eastern escarpment form a contiguous line across the project area but are most highly concentrated in the northern portion of the project area and outside the corridor, northwest of Summit, South Dakota (Figure 1). Native prairie remnants are present along the southern portion of the escarpment but are more fragmented by agriculture than in the north. Routing adjacent to existing right-of-ways in the southern portion of the project area would likely minimize impacts to native prairie areas. For example, a route following an existing roadway in the vicinity of South Shore, South Dakota may impact less native prairie habitats than a route closer to Summit.

A smaller block of native prairie remnants were identified in the Hecla Sandhills, in the northwest portion of the project area. This landform is located along the South Dakota/North Dakota border approximately six miles southeast of Oakes, North Dakota and seven miles east of the James River, near Hecla, South Dakota. In this area sandy soils limit agricultural productivity, therefore native plant community characteristics are prevalent. While a large portion of the Hecla Sandhills is avoided by the study corridor, its northern extent reaches into the project area between Oakes and Cogswell, North Dakota.

The high quality prairie remnants identified along the eastern and western escarpment of the Coteau and in the Hecla Sandhills, likely contain appropriate habitat for Dakota skipper, Poweshiek skipperling, or Sprague's pipit or for sharp-tailed grouse leks.

Numerous bald eagles were observed along the James River, east of Aberdeen. Several nesting territories were also located within the James River floodplain east of Aberdeen. Portions of the Elm and Maple Rivers in Brown County, South Dakota were included in the survey. Potential nesting territories were located along these rivers as well, but were not as abundant as potential nesting territories along the James River. Bald eagle nests were also located near Big Stone Lake and Hoop Lake in Marshall County, South Dakota. Although several nests and eagles were observed during the October surveys conducted by HDR, these surveys occurred outside of the breeding season so the nests cannot be considered active or inactive. Nevertheless, the presence of bald eagle nests suggests breeding is taking place in the vicinity of the project area.

Recommendations

Since complete avoidance of appropriate native prairie or eagle habitats is unlikely, a series of best management practices could be implemented to reduce project risks and potential affects upon federally protected or candidate species.

Field surveys in areas of high quality native prairies, identified by the habitat classification map and in areas of previous occurrences, to confirm the presence or absence of listed species could further determine which BMPS which would be appropriate for the project. Table 2 displays the recommended survey areas and survey schedule to locate protected species in the project area.

Table 2. Suggested field survey details.

Survey Species	General Survey Area(s)	Survey Methods	Survey Season	Estimated Effort
Prairie Butterfly Occurrence Survey: Dakota skipper & Poweshiek skipperling	Native prairies of the Eastern & Western Escarpment of Coteau des Prairies, Hecla Sandhills	Pedestrian	Late June through mid July	5 to 14 Days
Bald Eagle Stick Nest Surveys	James River, Elm River, Maple River, Big Sioux River, Whetstone River, Big Stone Lake and other large lakes	Fixed Wing	Mid-February through March 31 st	3-5 days
Sprague's Pipit Occurrence Survey	Large contiguous native prairies of Coteau des Prairies and Hecla Sandhills	Pedestrian visual and aural survey	Mid-May through Mid-June	3-5 Days
Sharp-tailed Grouse Lek Survey	Large contiguous native prairies of Coteau des Prairies and Hecla Sandhills	Fixed Wing	Mid-March through Early May	3, single day surveys.

If sensitive species or leks are located within the project area following surveys, the following BMPs may be appropriate:

- Select a minimally invasive route by avoiding known occurrences or appropriate habitat to the extent practicable.
- Winter construction to minimize impacts to native prairies by heavy equipment. Also minimizes the level of human activity when the target species is likely to be present.
- Modify construction schedule to avoid appropriate habitat during the breeding season.
- Use construction mats to minimize impacts to native prairies by heavy equipment.
- Micro-site structure locations to maximize span distance and strategically place structures to minimize footprint in appropriate habitat.

These BMPs may reduce impacts to listed prairie species and demonstrate efforts to avoid and minimize impacts to species protected by the ESA. However, additional BMPs may be identified during field surveys, the permitting process or agency consultations which could be applied to further minimize impacts to sensitive species.

Works Cited

Bald and Golden Eagle Protection Act. 1940. *16 U.S.C. §§668-668d* .

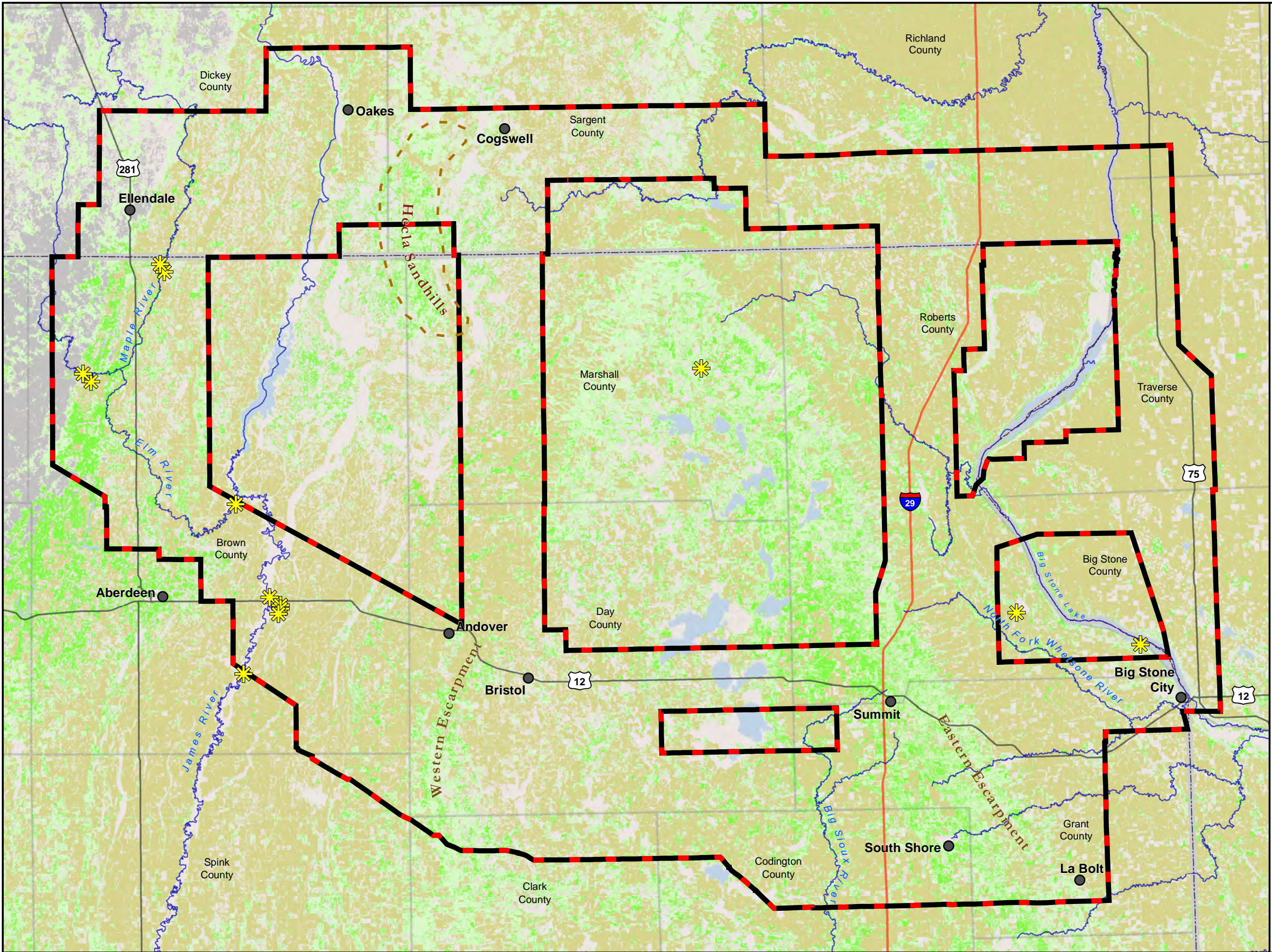
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Figure 1
Native Habitat Report
Big Stone South to Ellendale
345 kV Transmission Line Project
North Dakota and South Dakota



- Bald Eagle Nest 
- Cities 
- Rivers 
- Interstate 
- Highway 
- Project Area 
- Low Quality Grassland 
- High Quality Grassland 
- Cropland 
- No Data/Cloud Cover 
- State Border 
- County Border 

