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South Dakota Species of Habitat Fragmentation Concern: Grassland Birds



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SOUTH DAKOTA SPECIES OF HABITAT FRAGMENTATION CONCERN: GRASSLAND BIRDS

INTRODUCTION

Background and Definition

In March of 2012, the U.S. Fish and Wildlife Service released its voluntary *Land-Based Wind Energy Guidelines* (WEG) (U.S. Fish and Wildlife Service 2012). The WEG were developed in coordination with wind industry representatives in order to provide a structured, scientific process for addressing wildlife conservation concerns at all stages of land-based wind energy development. The WEG present a tiered data collection system of increasing complexity to evaluate potential impacts of wind energy projects and inform decisions regarding siting, construction and operation of wind facilities. Each Tier emphasizes the potential occurrence of, and impacts to, species of habitat fragmentation concern which are defined in the WEG as follows:

Species of Habitat Fragmentation Concern: Species of concern for which a relevant federal, state, tribal, and/or local agency has found that separation of their habitats into smaller blocks reduces connectivity such that the individuals in the remaining habitat segments may suffer from effects such as decreased survival, reproduction, distribution, or use of the area. Habitat fragmentation from a wind energy project may create significant barriers for such species.

Fragmentation results from loss of habitat and the creation of barriers (e.g. roads, wind turbines, trees in grasslands), leaving smaller, more isolated patches further divided by anthropogenic features. Historically, native grasslands dominated the South Dakota landscape, but much of the native prairie habitat has been lost to/degraded by development. Since 1970, birds that evolved within, and are dependent upon, intact grassland ecosystems have experienced steeper population declines in recent decades than birds of any other biome in North America with a loss of over 700 million breeding individuals (53% decline in abundance) across 31 species (Rosenburg et al. 2019). Research has indicated the grassland nesting bird species included in this report are negatively affected when their habitat becomes fragmented.

Fragmentation effects can also be found in species inhabiting other habitat types. For example, some grassland birds will use planted grasslands (Bakker and Higgins 2009), but research has indicated individuals using these habitats are displaced by wind energy facilities (Leddy et al. 1999). Grassland-nesting waterfowl [e.g. blue-winged teal (*Anas discors*), mallard (*Anas platyrhynchos*)] are negatively affected by habitat fragmentation (Stephens et al. 2005) and/or are known to suffer displacement effects from wetlands by turbines (Loesch et al. 2013). Additionally, some woodland birds [e.g. ovenbird (*Seiurus aurocapilla*), red-eyed vireo (*Vireo olivaceus*)] are

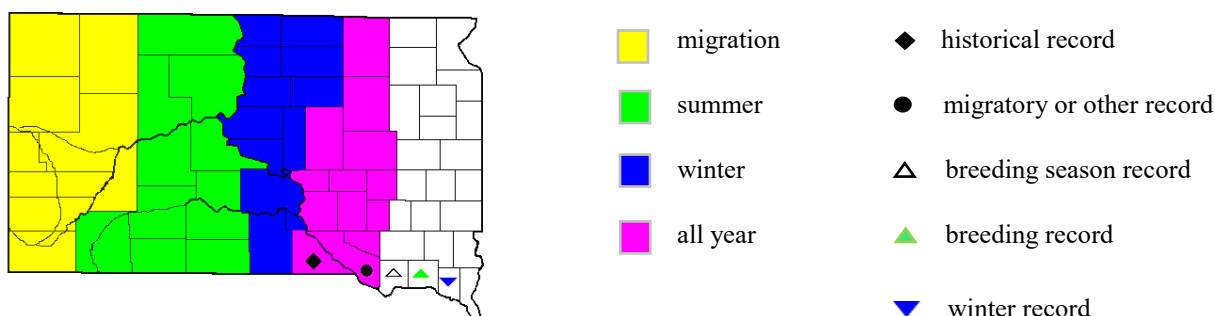
sensitive to habitat fragmentation and/or noise pollution associated with energy development (Bayne et al. 2008, Habib et al. 2007, Bayne et al. 2005). Wind-development impacts to such species should not be discounted; however, the focus of this South Dakota report is on the species declining most precipitously as a group: grassland birds.

The primary recommendation of the U.S. Fish and Wildlife Service regarding these species of habitat fragmentation concern in South Dakota is to avoid further loss and degradation of their habitat by avoiding development in grasslands, both native (first priority) and non-native, to the maximum extent possible.

Species profiles herein include range maps, state/federal status within South Dakota, preferred habitat(s), fragmentation concerns, and supporting literature.

Range Maps Key

South Dakota range maps in the species profiles are reproduced with permission from the South Dakota Ornithologists' Union (Tallman et al. 2002) with the following updated key to the colors and symbols:



Species Status Key

Species' status in terms of state and federal designations are provided in the species profiles. The descriptions and sources of those designations are as follows:

- BCC – Birds of Conservation Concern: species in need of coordinated and proactive conservation efforts among state, federal and private entities, with the goals of precluding future evaluation of these species for Endangered Species Act protections and promoting/conserving long-term avian diversity (U.S. Fish and Wildlife Service 2008).
- SGCN - Species of Greatest Conservation Need: species of fish or wildlife, as the State fish and wildlife agency deems appropriate, that are indicative of the diversity and health of the State's wildlife and are identified in a state wildlife action plan. South Dakota's

Species of Greatest Conservation Need must meet at least one of the following criteria: species listed as state or federally threatened or endangered, with the exception of gray wolf; species for which South Dakota represents an important part of the species' range; and species with characteristics that may make them vulnerable to extirpation (South Dakota Department of Game, Fish and Parks 2014).

- PL - Priority Level: a species ranking system for South Dakota birds that utilizes metrics such as (but not limited to) species' abundance in South Dakota, whether the core of the species' breeding range includes South Dakota, and the species' population trends. PLs I-III are defined as follows (Bakker 2005):
 - PLI: species with the highest conservation priority due to high maximum abundance of the species within its range, or South Dakota constitutes the core of the species breeding range and the species is showing population declines either in South Dakota or range wide.
 - PLII: species with a moderate conservation priority due to medium abundance scores, or management plans are already in place (e.g., federally listed species, game species).
 - PLIII: species with a moderate conservation priority but low abundance scores in South Dakota; South Dakota is on the periphery of the species' range; the species is unique to some habitats (Black Hills) in South Dakota, which may not be declining nationally, but are important to the biodiversity in the state; and/or South Dakota wintering species.

Acknowledgements

Drs. Kent Jensen, Amy Lewis, Jeffrey Palmer, and David Swanson provided expertise in development and review of the species list.

The South Dakota Ornithologists' Union gave permission to use species' range maps.

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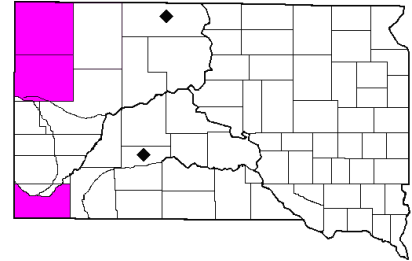
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SPECIES PROFILES

Greater Sage-grouse

Centrocercus urophasianus



Species Status: BCC*, SGCN,
PLI

*BCC in parts of the range outside of SD

Habitat Preference

Require areas with sagebrush habitat and herbaceous cover for year-round use (Drilling et al. 2018).

Habitat Fragmentation Concerns

Landscapes that were most likely to support large sage-grouse leks were located in highly connected, sagebrush dominated areas with limited energy development and unpaved roads in Wyoming. Areas predicted to have stable or increasing sage-grouse abundance occurred in landscapes that maintained these characteristics long-term (Burkhalter et al. 2018).

Within 2 years of the development of a wind energy facility, sage-grouse nest and brood survival were lower as distance to wind turbines decreased in Wyoming (LeBeau et al. 2014).

Female sage-grouse avoided habitats with higher percentages of surface disturbance due to wind energy infrastructure during brood rearing and the summer period during a 6-year study (LeBeau et al. 2017).

Lek persistence was positively related to the amount of sagebrush habitat within 6.4 km of the lek in Montana and Wyoming (Walker et al. 2007).

Wintering females avoided coniferous habitat at the 0.65 km² scale, riparian areas at the 4 km² scale, and areas with coal-bed natural gas development located in otherwise suitable winter habitat (Doherty et al. 2008).

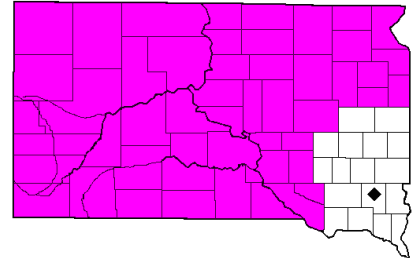
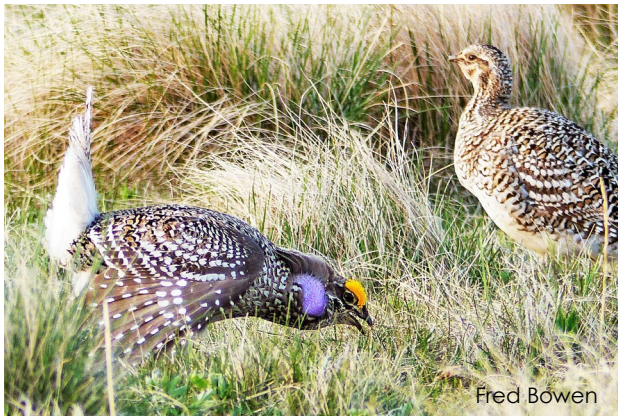
Twenty-nine percent of a marked population of hens shifted nesting activity into cleared habitats during the 3 years following conifer removal in the northern Great Basin (Severson et al. 2017a). Hen survival and nest survival increased in areas where conifers were removed relative to the control area with no conifer removal (Severson et al. 2017b).

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Sharp-tailed Grouse

Tympanuchus phasianellus



Species Status: PLI

Habitat Preference

Landscapes with large amounts of grassland habitat containing a variety of plant types (Drilling et al. 2018).

Habitat Fragmentation Concerns

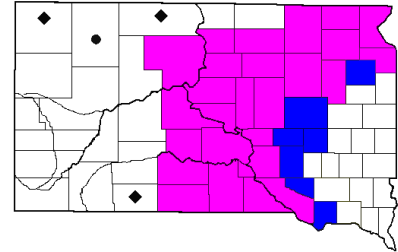
Active prairie sharp-tailed grouse leks had significantly lower proportions of upland forest and brush cover types and higher percentages of native grasses within 500 and 1000 meters of the site than inactive leks (Hanowski et al. 2000).

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Greater Prairie-chicken

Tympanuchus cupido



Species Status: SGCN, PLI

Habitat Preference

Large heterogeneous grassland landscapes (Drilling et al. 2018) including areas with tall herbaceous growth (Norton et al. 2010).

Habitat Fragmentation Concerns

Female greater prairie-chicken mean home range size increased approximately two-fold in response to wind energy development, and female space use increased with distance from wind turbines (Winder et al. 2014).

Persistence of leks <8 km from turbines decreased with decreasing distance to turbines but was positively related to number of attending males and grassland cover surrounding leks (Winder et al. 2015) in Kansas.

Greater prairie-chickens avoided areas within 100 m of power lines and moved across power lines less often than would be expected by chance in Oklahoma (Pruett et al. 2009).

Greater prairie-chickens were absent from patches smaller than 140ha in southeastern North Dakota and northwestern Minnesota (Winter et al. 2006).

Females avoid nesting near roads in the Nebraska sandhills; 74% of nests were located >700 m from roads (Harrison et al. 2017).

Nest success declined with increasing woody cover and litter. Only 3 of 17 nests hatched when woody cover was >5%. Conversely, when woody cover was ≤5% 15 of 26 nests hatched (McKee et al. 1998).

Lek points had significantly less forest (1.6 vs 11.0%) and residential land and more Conservation Reserve Program grasslands (20 vs. 15.9%) within 810 ha (2,002 ac) than did non-lek points (Merrill et al. 1999).

Forest cover was lower at active lek sites at the 400 (approx. 6 vs 20%) and 800 (approx. 15 vs 28%) m scales (Niemuth 2000).

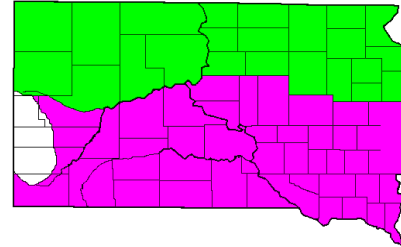
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Northern Harrier



Circus cyaneus



Species Status: PLI

Habitat Preference

Open, treeless grasslands (Drilling et al. 2018).

Habitat Fragmentation Concerns

Significantly lower abundance and occurrence 4 years after construction of a wind facility than preconstruction in Wisconsin (Garvin et al. 2011). Northern harriers were still absent from the area 8 years later indicating they may not acclimate to wind facilities (Dohm et al. 2019).

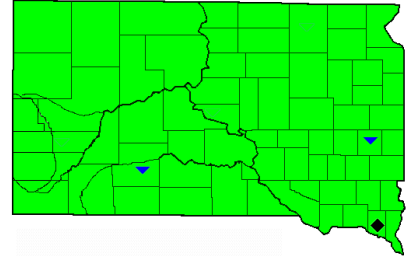
Occupied habitat patches were >100 ha in size and density was positively correlated with patch size in North Dakota (Johnson and Igl, 2001).

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Burrowing Owl

Athene cunicularia



Species Status: BCC, SGCN,
PLI

Habitat Preference

Prairie dog colonies and pastures where they nest in mammal burrows (Drilling et al. 2018); prairie dog colonies with low visual obstruction readings and relatively high percent coverage of forbs and bare ground (Thiele et al. 2013).

Habitat Fragmentation Concerns

Burrowing owls perched, flew near operating turbine blades, and collided disproportionately more at turbines with the most cattle dung within 20 m, with the highest densities of mammal burrow systems within 15 m, and with burrowing owl burrows located within 90 m of turbines (Smallwood et al. 2007).

Burrowing owl occurrence decreased with increased wooded habitat within 800 and 1200 m of prairie dog colonies (Thiele et al. 2019), and probability of nesting in colonies dropped from 80% with 0% tree cover within 800 m to below 50% when tree cover increased to 3.5% (Thiele et al. 2013).

Burrowing owls rarely occupied prairie dog colonies <10 ha in size (Griebel and Savage 2007).

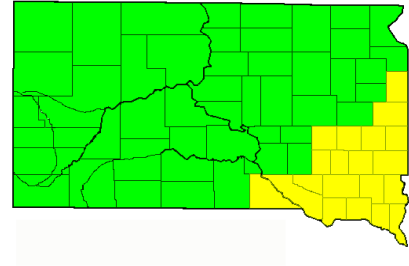
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Willet

Tringa semipalmata



Species Status: SGCN, PLI

Habitat Preference

Grasslands near shallow wetlands (Drilling et al. 2018) preferring pastures with short, native grasses (Ryan and Renken 1987, Kantrud and Higgins 1992).

Habitat Fragmentation Concerns

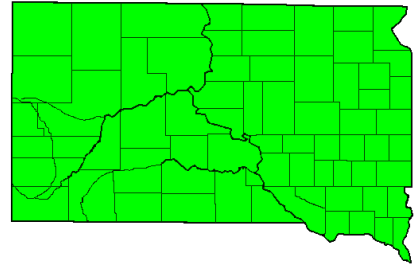
Estimate of abundance and occurrence has been shown to be greater in off-road versus on-road surveys in Alberta (Wellicome et al. 2014).

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Upland Sandpiper

Bartramia longicauda



Species Status: BCC*, SGCN,
PLI

*BCC in parts of the range outside of SD

Habitat Preference

Large grasslands (>250 acres) with a mix of vegetation heights for nesting and brood rearing (Drilling et al. 2018).

Habitat Fragmentation Concerns

Displaced from grasslands within 100 m of wind turbines 1 year after construction and remained displaced beyond 300 m from turbines 2-5 years after construction in South Dakota (Shaffer and Buhl 2016).

Occurrence was negatively associated with tree cover within 400 m (Cunningham and Johnson 2006).

Found only on large grassland patches (>45 ha) and were absent from smaller patches (<10.5 ha) in Wisconsin (Vos and Ribic 2011).

Occurrence was positively correlated with patch area and inversely correlated with perimeter-area ratio in Nebraska (Helzer and Jelinski 1999).

Occupied grasslands had a lower percentage of aspen woodland within 100 m and 500 m than unoccupied grasslands in North Dakota (Grant et al. 2004).

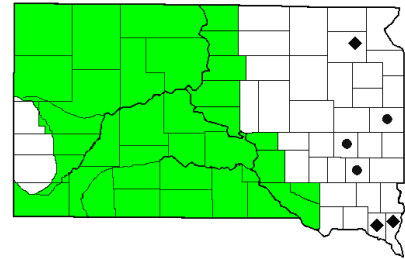
Abundance was highest in an 800-ha landscape with high grassland coverage and low forest coverage in Wisconsin (Murray et al. 2008).

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Long-billed Curlew

Numenius americanus



Species Status: BCC, SGCN,
PLI

Habitat Preference

Native mixed-grass prairies (Drilling et al. 2018).

Habitat Fragmentation Concerns

The number of curlew detections was negatively associated with the percent evergreen forest and percent shrub coverage within 800 m of roadside surveys conducted throughout the United States (Sallfeld et al. 2010).

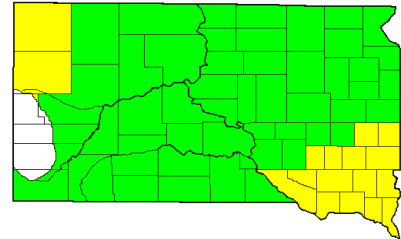
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Marbled Godwit



Limosa fedoa



Species Status: BCC, SGCN,
PLI

Habitat Preference

Large, contiguous grassland-wetland complexes (Drilling et al. 2018).

Habitat Fragmentation Concerns

Abundance estimates and occurrence were greater in off-road versus on-road surveys in Alberta (Wellicome et al. 2014).

Marbled godwit abundance decreased by 25 percent within 0.1 km of roads in Alberta (Sliwinski and Koper 2012).

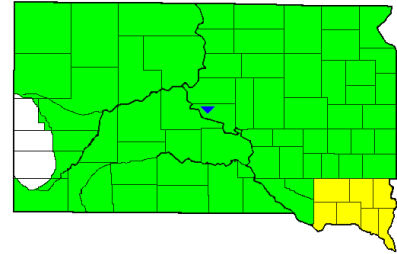
Occurrence decreased with increased woodland cover at the 100-m scale and with increased tree cover at the 400 m and 800 m scales in North Dakota (Cunningham and Johnson 2006).

Literature

- Cunningham, M.A. and D.H. Johnson. 2006. Proximate and landscape factors influence grassland bird distributions. *Ecological Applications* 16:1062-1075.
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Wilson's Phalarope

Phalaropus tricolor



Species Status: SGCN, PLI

Habitat Preference

Shallow ponds, marshes, and wet meadows; nest on the ground near wetlands (Drilling et al. 2018).

Habitat Fragmentation Concerns

Occurrence was negatively associated with woodland cover at the 100 m scale and tree cover at the 1600 m scale (Cunningham and Johnson 2006).

Abundance in stock ponds was 3.5 times greater in 25.9 square kilometer (km²) landscapes dominated by grasslands ($\geq 95\%$ grassland) than in landscapes dominated by cropland ($>75\%$ cropland) in western South Dakota (May et al. 2002).

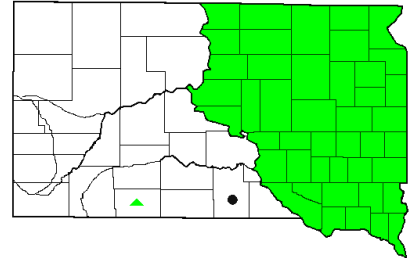
Wilson's phalarope occurrence increased with increased area of wetland and grassland within 25.9 km² landscapes surrounding surveyed wetlands in eastern South Dakota (Naugle et al. 2001).

Literature

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Sedge Wren

Cistothorus platensis



Species Status: NA

Habitat Preference

Wet meadows, hayfields, and idle grasslands (Drilling et al. 2018).

Habitat Fragmentation Concerns

Avoided planted shelterbelts out to at least 70 m and counts increased at sites after tree removal in North and South Dakota (Tack et al. 2017).

Abundance increased in grasslands where trees were removed but declined on control sites over the 6-year study in Minnesota (Thompson et al. 2015).

Occurrence was negatively associated with tree cover at the 1600 m scale in North Dakota (Cunningham and Johnson 2006).

Increased occupancy of suitable patches when >60% of landscape is composed of grassland habitat and greater densities in large versus small grassland patches (Bakker et al. 2002).

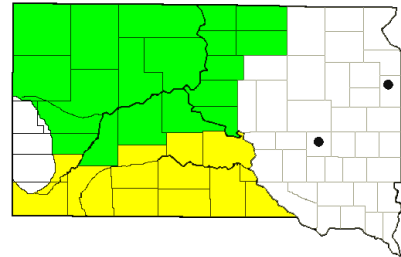
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- Thompson, S.J., T.W. Arnold, J. Fieberg, D.A. Granfors, S. Vacek, and N. Palaia. 2016. Grassland birds demonstrate delayed response to large-scale tree removal in central North America. *Journal of Applied Ecology* 53: 284-294.

Sprague's Pipit

Anthus spragueii



Species Status: BCC, SGCN,
PLIII

Habitat Preference

Grazed and undisturbed native mixed grass prairie in fair to excellent range condition (Drilling et al. 2018).

Habitat Fragmentation Concerns

Abundance increased steadily up to 149m from shallow gas wells and their abundance was lowest next to roads in southern Alberta (Daniel and Koper 2019).

Avoided nesting within 100 m of, and fledged fewer young from, successful nests near trails used for oil and gas industry employee access to wells in Alberta (Ludlow et al 2015).

Daily nest survival rate and the number of young surviving to day 8 increased with increasing distance from pipeline right of way in Saskatchewan (Sutter et al. 2016).

Abundance was 2.5 times greater at control versus oil infrastructure sites and density was 31% higher 400 m from infrastructure in Alberta (Nenninger and Koper 2018).

Avoided areas within 350 m of single bore oil well edges in northwestern North Dakota (Thompson et al. 2015).

Estimate of abundance and occurrence greater in off-road versus on-road surveys in Alberta (Wellicome et al. 2014).

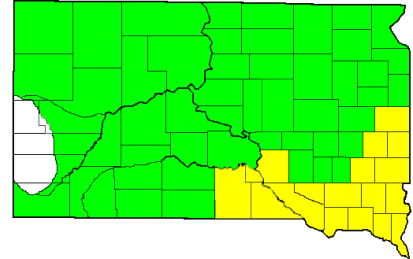
Density increased with increased patch size in Saskatchewan (Davis et al. 2006).

Literature

- Daniel, J. and N. Koper. 2019. Cumulative impacts of roads and energy infrastructure on grassland songbirds. *Condor* 121(2): 1-21.
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Chestnut-collared Longspur

Calcarius ornatus



Species Status: BCC, SGCN,
PLI

Habitat Preference

Shorter areas of mixed grass prairies (Drilling et al. 2018); avoid grasslands with introduced forbs (Greer et al. 2016).

Habitat Fragmentation Concerns

Displaced overall and within 300 m from wind turbines 2-5 years after wind facility construction in South Dakota (Shaffer and Buhl 2016).

Abundance increased >45m from roads and up to 247 m from gas wells and declined as gas well density increased; clutch size and nest success were lowest next to gas wells and nest success decreased as gas well density increased in southern Alberta (Daniel and Koper 2019).

Reduced density within at least 550 m of single-bore oil well edges in North Dakota (Thompson et al. 2015).

An increase of wooded edge from 0 to 3.5% decreased chestnut-longspur occurrence by 50%, in areas with any amount of woody edge the probability of occurrence was less than 30%, density decreased with wooded edge (Greer et al. 2016).

Estimate of abundance and occurrence greater in off-road versus on-road surveys in Alberta (Wellicome et al. 2014).

Density increased with increased distance from roads in Alberta (Koper and Schmiegelow 2016).

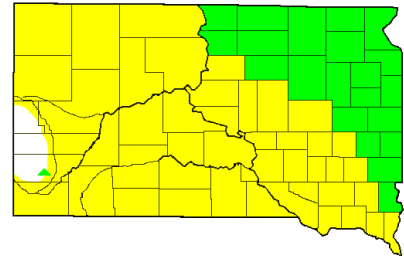
Significantly higher abundance 800 m from roads than in on-road counts in western South Dakota (Hendricks 2017).

Literature

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Clay-colored Sparrow

Spizella pallida



Species Status: NA

Habitat Preference

Grasslands with some shrubby cover (Drilling et al. 2018).

Habitat Fragmentation Concerns

Displaced 200 to 300 m from wind turbines 2-5 years after wind facility construction (Shaffer and Buhl 2016).

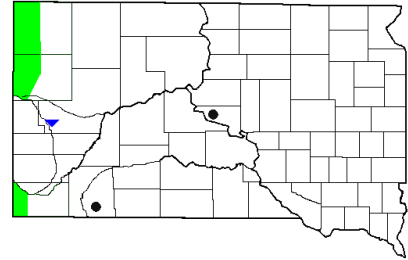
Occupancy of suitable patches increased when >60% of landscape composed of grassland habitat (Bakker et al. 2002).

Literature

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Brewer's Sparrow

Spizella breweri



Species Status: BCC, PLIII

Habitat Preference

Require areas with sagebrush habitat and herbaceous cover (Drilling et al. 2018).

Habitat Fragmentation Concerns

Density was 39% lower within a 100 m buffer of low traffic, dirt roads compared to farther from roads in Wyoming (Ingelfinger and Anderson 2004).

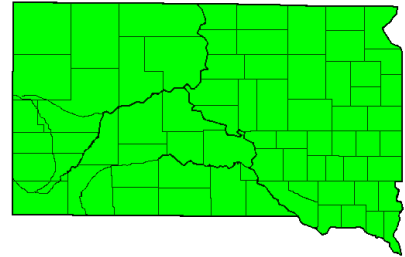
Nest survival decreased significantly with habitat loss, decreasing 1.6% with every additional hectare of loss in Wyoming (Hethcoat and Chalfoun 2015).

Literature

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Lark Bunting

Calamospiza melanocorys



Species Status: SGCN, PLI

Habitat Preference

Mixed grassland sage prairies (Drilling et al 2018).

Habitat Fragmentation Concerns

Probability of occurrence went from <10% to >50% when grassland habitat within 3200 m increased from <40 to >90% (Greer et al. 2016).

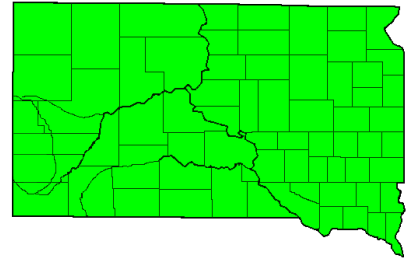
Occurrence was positively associated with percent coverage of grasslands and shrubland and was negatively associated with percent coverage of emergent wetlands, open water, forest, and developed land within 3,200 m of BBS points throughout the northern Great Plains (Niemuth et al. 2017). Occurrence was negatively related to a measure of habitat fragmentation which included the number of disjunct patches of grassland, wetlands, and forest in the landscape (Niemuth et al. 2017).

Literature

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Savannah Sparrow

Passerculus sandwichensis



Species Status: PLI

Habitat Preference

Native tall and mixed grass prairies and planted grasslands (Drilling et al. 2018).

Habitat Fragmentation Concerns

Lower densities existed 100-300 m from wind turbines 1 year after construction and displacement occurred 100 to 300 m from turbines in study areas 2-5 years after construction in North and South Dakota (Shaffer and Buhl 2016).

Abundance declined within 1,120m from roads and with increasing gas well density but steadily increased >1,190 m from oil wells; clutch sizes decreased when >15 gas wells were located per section in southern Alberta (Daniel and Koper 2019).

Nesting success was significantly lower at gas and oil infrastructure sites compared to controls and at electric grid-powered versus generator powered sites in Alberta (Bernath-Plaisted and Koper 2016).

Decreased density within 228 m of single-bore oil well edges in North Dakota (Thompson et al. 2015).

Savannah sparrows had lower nest success near roads in Alberta (Yoo and Koper 2017).

Avoided shelterbelts out to at least 220 m, the largest distance measured, and counts increased at sites after tree removal in North and South Dakota (Tack et al. 2017).

Decreased occurrence in small versus large grasslands and as the extent of wooded vegetation bordering grasslands increased in eastern South Dakota (Bakker et al. 2002).

Probability of occurrence in grasslands doubled when the percent grassland habitat within 3200 m increased from 5 to 80% (Greer et al. 2016).

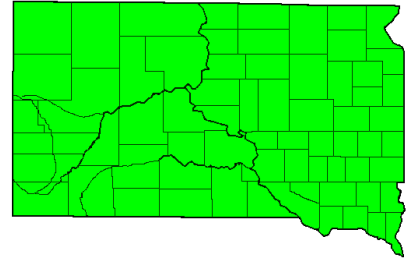
Nest survival increased with increased patch size in Saskatchewan (Davis et al. 2006).

Literature

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Grasshopper Sparrow

Ammodramus savannarum



Species Status: BCC, PLI

Habitat Preference

Grasslands with intermediate vegetation height and density; nests in relatively deep litter (Drilling et al. 2018).

Habitat Fragmentation Concerns

Displaced up to 300 m from turbines 2-5 years after wind facility construction in North and South Dakota (Shaffer and Buhl 2016).

Decreased density within 550 m of single-bore oil well edges and avoidance of multibore wells beyond 550 m in North Dakota (Thompson et al. 2015).

Greater abundance in point counts 800 m from gravel roads compared to 400 m or on-road counts (Hendricks 2017).

Decreased occurrence rate in small versus large grassland patches in the James River Lowland and Missouri Coteau regions of eastern South Dakota (Bakker et al. 2002).

Abundance nearly doubled as patch size increased from <40 ha to >259 ha in western South Dakota (DeJong et al. 2005).

Decreased occurrence and/or density with increased wooded edge surrounding grasslands (Bakker et al. 2002, Greer et al. 2016).

In landscapes with the same total grassland area, highest abundance was in those with more core area and fewer woody edges (Herse et al. 2018).

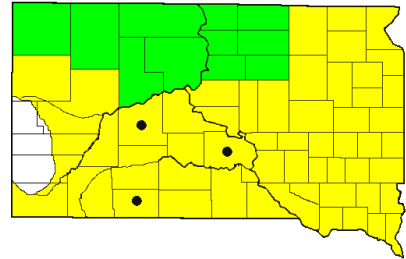
Occurrence was negatively associated with tree cover at the 1600 m scale (Cunningham and Johnson 2006).

Literature

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Baird's Sparrow

Centronyx bairdii



Species Status: BCC, SGCN,
PLI

Habitat Preference

Relatively wet/tall mixed grass prairie pastures and undisturbed grasslands (Drilling et al. 2018).

Habitat Fragmentation Concerns

Decreased density within at least 550 m of single-bore oil well edges in North Dakota (Thompson et al. 2015).

Abundance was 3 times greater at control versus oil infrastructure sites and density doubled 400 m from infrastructure in Alberta (Nenninger and Koper 2018)

Baird's sparrows avoided nesting within 100 m of and fledged fewer young from successful nests near trails used for oil and gas industry employee access to wells in Alberta (Ludlow et al. 2015).

Estimate of abundance and occurrence greater in off-road versus on-road surveys in Alberta (Wellicome et al. 2014).

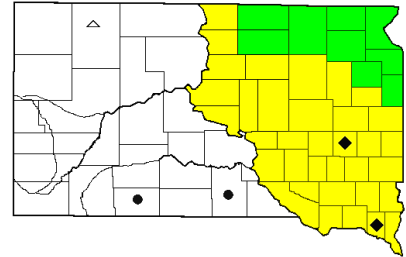
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Le Conte's Sparrow

Ammospiza leconteii



Species Status: SGCN, PLI

Habitat Preference

Tall, dense wet meadows and upland grasslands (Drilling et al. 2018).

Habitat Fragmentation Concerns

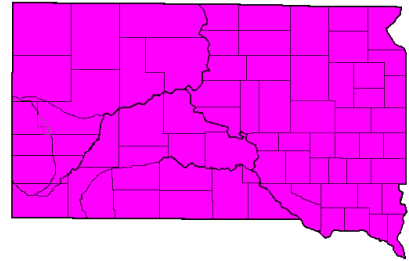
Mean occupancy of suitable plots by wintering Le Conte's sparrows was 4 times lower <200 m from the nearest wind turbine than it was >400 m from the nearest wind turbine in Texas (Stevens et al. 2013).

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Western Meadowlark

Sturnella neglecta



Species Status: PLI

Habitat Preference

Pastures, haylands and undisturbed grasslands (Drilling et al. 2018).

Habitat Fragmentation Concerns

Displaced areas within 100 m of wind turbines 1 year after construction and remained displaced 100 m and beyond 200 m from turbines 2-5 years after construction in North and South Dakota (Shaffer and Buhl 2016).

Abundance declined with increasing gas well density and increased as distance up to 805 m from roads increased in southern Alberta (Daniel and Koper 2019).

Decreased occurrence in grasslands with increased amounts of wooded perimeter in eastern and western South Dakota (Bakker et al. 2002, Greer et al. 2016).

Occurrence was negatively associated with tree cover at the 200 m scale (Cunningham and Johnson 2006).

Higher densities in large versus small grasslands in eastern South Dakota (Bakker et al. 2002).

Greater nest success in landscapes with more than 50% grassland in northeastern South Dakota (Berman 2007).

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- Shaffer, J.A. and D.A. Buhl. 2016. Effects of wind-energy facilities on breeding grassland bird distributions. *Conservation Biology* 30:59-71.

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