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Effects of Management Practices on Grassland Birds: Sprague's Pipit

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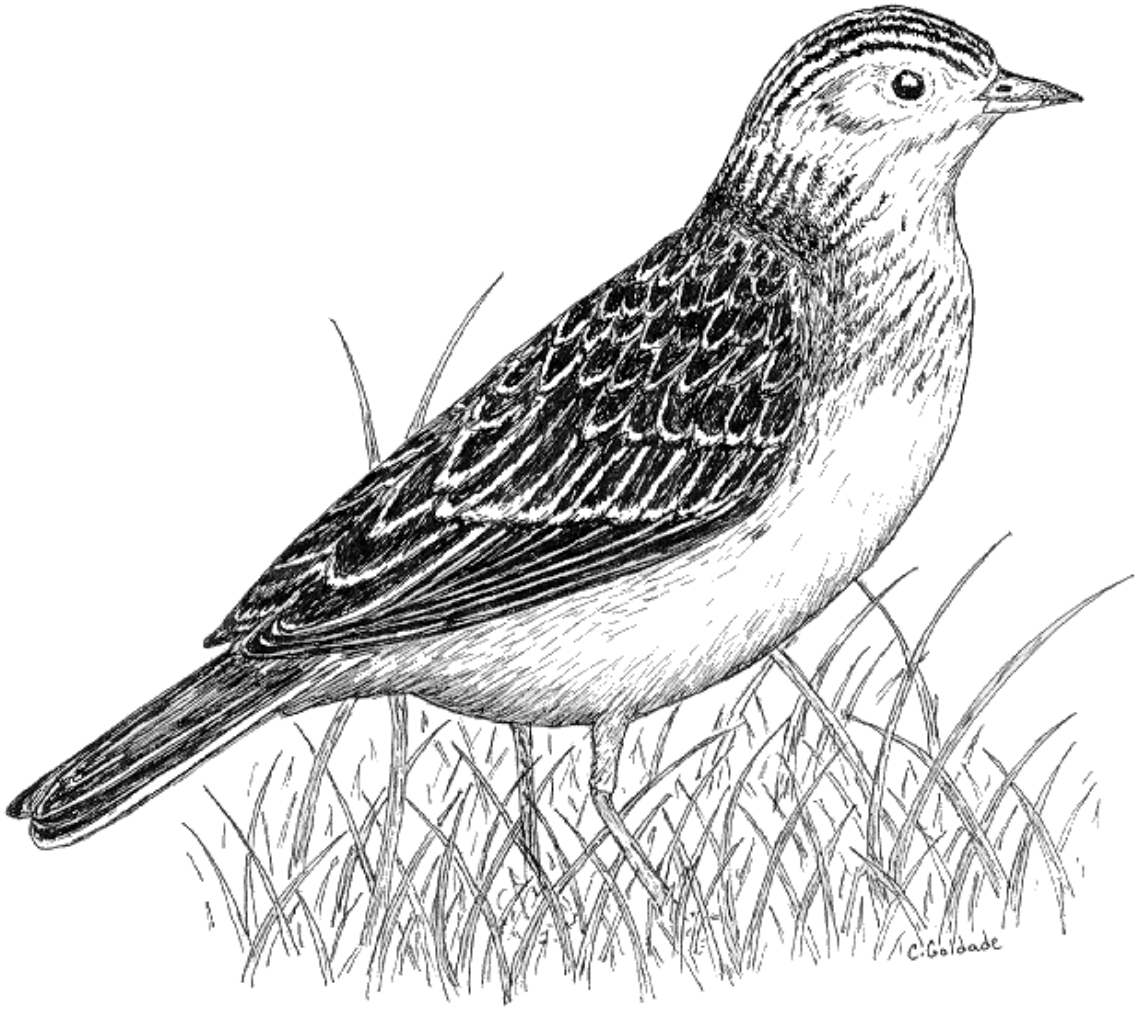
EFFECTS OF MANAGEMENT PRACTICES ON GRASSLAND BIRDS:

SPRAGUE'S PIPIT



Grasslands Ecosystem Initiative
Northern Prairie Wildlife Research Center
U.S. Geological Survey
Jamestown, North Dakota 58401

This report is one in a series of literature syntheses on North American grassland birds. The need for these reports was identified by the Prairie Pothole Joint Venture (PPJV), a part of the North American Waterfowl Management Plan. The PPJV recently adopted a new goal, to stabilize or increase populations of declining grassland- and wetland-associated wildlife species in the Prairie Pothole Region. To further that objective, it is essential to understand the habitat needs of birds other than waterfowl, and how management practices affect their habitats. The focus of these reports is on management of breeding habitat, particularly in the northern Great Plains.

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Species for which syntheses are available or are in preparation:

American Bittern
Mountain Plover
Marbled Godwit
Long-billed Curlew
Willet
Wilson's Phalarope
Upland Sandpiper
Greater Prairie-Chicken
Lesser Prairie-Chicken
Northern Harrier
Swainson's Hawk
Ferruginous Hawk
Short-eared Owl
Burrowing Owl
Horned Lark
Sedge Wren
Loggerhead Shrike
Sprague's Pipit
Grasshopper Sparrow
Baird's Sparrow
Henslow's Sparrow
Le Conte's Sparrow
Nelson's Sharp-tailed Sparrow
Vesper Sparrow
Savannah Sparrow
Lark Sparrow
Field Sparrow
Clay-colored Sparrow
Chestnut-collared Longspur
McCown's Longspur
Dickcissel
Lark Bunting
Bobolink
Eastern Meadowlark
Western Meadowlark
Brown-headed Cowbird

EFFECTS OF MANAGEMENT PRACTICES ON GRASSLAND BIRDS:

SPRAGUE'S PIPIT

Jill A. Dechant, Marriah L. Sondreal, Douglas H. Johnson, Lawrence D. Igl,
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February 1998
(revised January 2001)

ORGANIZATION AND FEATURES OF THIS SPECIES ACCOUNT

Information on the habitat requirements and effects of habitat management on grassland birds were summarized from information in more than 4,000 published and unpublished papers. A ***range map*** is provided to indicate the relative densities of the species in North America, based on Breeding Bird Survey (BBS) data. Although birds frequently are observed outside the breeding range indicated, the maps are intended to show areas where managers might concentrate their attention. It may be ineffectual to manage habitat at a site for a species that rarely occurs in an area. The species account begins with a brief ***capsule statement***, which provides the fundamental components or keys to management for the species. A section on ***breeding range*** outlines the current breeding distribution of the species in North America, including areas that could not be mapped using BBS data. The ***suitable habitat*** section describes the breeding habitat and occasionally microhabitat characteristics of the species, especially those habitats that occur in the Great Plains. Details on habitat and microhabitat requirements often provide clues to how a species will respond to a particular management practice. A ***table*** near the end of the account complements the section on suitable habitat, and lists the specific habitat characteristics for the species by individual studies. A special section on ***prey habitat*** is included for those predatory species that have more specific prey requirements. The ***area requirements*** section provides details on territory and home range sizes, minimum area requirements, and the effects of patch size, edges, and other landscape and habitat features on abundance and productivity. It may be futile to manage a small block of suitable habitat for a species that has minimum area requirements that are larger than the area being managed. The Brown-headed Cowbird (*Molothrus ater*) is an obligate brood parasite of many grassland birds. The section on ***cowbird brood parasitism*** summarizes rates of cowbird parasitism, host responses to parasitism, and factors that influence parasitism, such as nest concealment and host density. The impact of management depends, in part, upon a species' nesting phenology and biology. The section on ***breeding-season phenology and site fidelity*** includes details on spring arrival and fall departure for migratory populations in the Great Plains, peak breeding periods, the tendency to renest after nest failure or success, and the propensity to return to a previous breeding site. The duration and timing of breeding varies among regions and years. ***Species' response to management*** summarizes the current knowledge and major findings in the literature on the effects of different management practices on the species. The section on ***management recommendations*** complements the previous section and summarizes specific recommendations for habitat management provided in the literature. If management recommendations differ in different portions of the species' breeding range, recommendations are given separately by region. The ***literature cited*** contains references to published and unpublished literature on the management effects and habitat requirements of the species. This section is not meant to be a complete bibliography; a searchable, annotated bibliography of published and unpublished papers dealing with habitat needs of grassland birds and their responses to habitat management is posted at the Web site mentioned below.

This report has been downloaded from the Northern Prairie Wildlife Research Center World-Wide Web site, www.npwrc.usgs.gov/resource/literatr/grasbird/grasbird.htm. Please direct comments and suggestions to Douglas H. Johnson, Northern Prairie Wildlife Research Center, U.S. Geological Survey, 8711 37th Street SE, Jamestown, North Dakota 58401; telephone: 701-253-5539; fax: 701-253-5553; e-mail: Douglas_H_Johnson@usgs.gov.

SPRAGUE'S PIPIT
(*Anthus spragueii*)

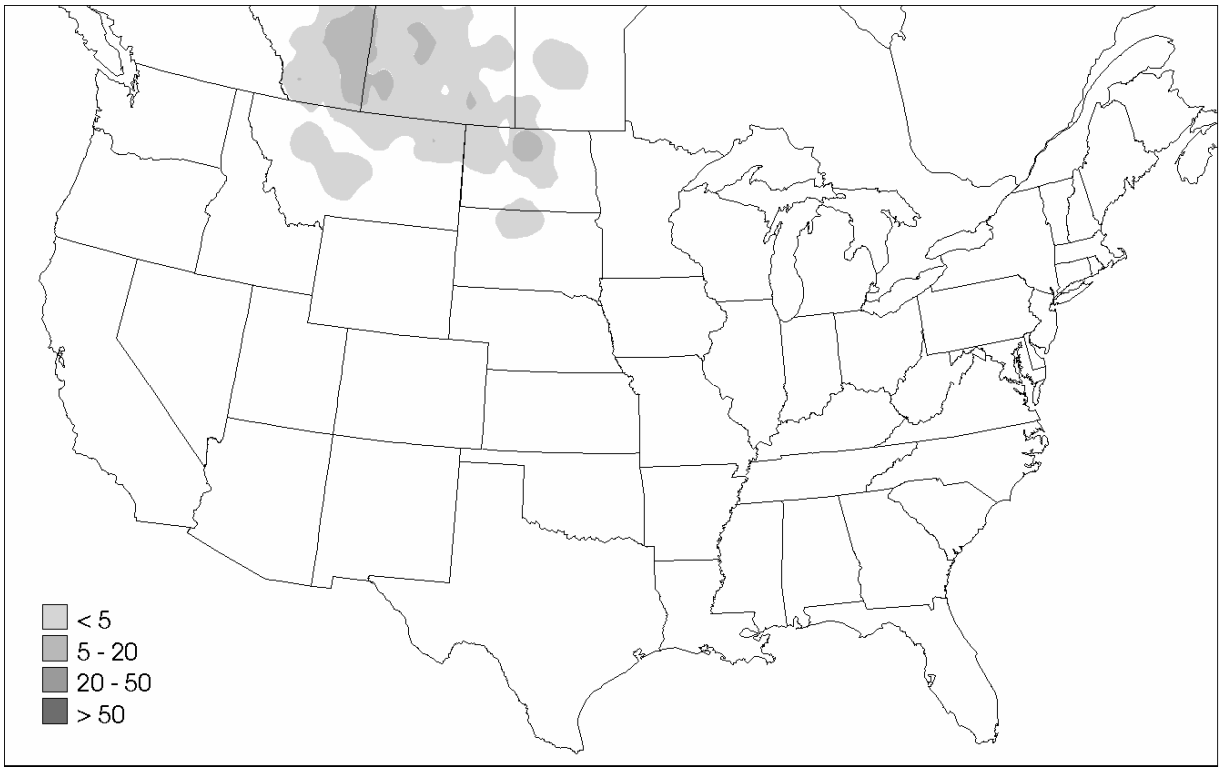

Figure. Breeding distribution of the Sprague's Pipit in the United States and southern Canada, based on Breeding Bird Survey data, 1985-1991. Scale represents average number of individuals detected per route per year. Map from Price, J., S. Droege, and A. Price. 1995. The summer atlas of North American birds. Academic Press, London, England. 364 pages.

Keys to management include providing suitable grassland habitat, especially native prairie, with intermediate vegetation height and low visual obstruction, and controlling succession therein.

Breeding range:

Sprague's Pipits breed from northcentral Alberta to central Manitoba, south to Montana and northcentral South Dakota, and east to northwestern Minnesota (National Geographic Society 1987). (See figure for the relative densities of Sprague's Pipits in the United States and southern Canada, based on Breeding Bird Survey data.)

Suitable habitat:

Sprague's Pipits use grasslands of intermediate height and sparse to intermediate vegetation density (Dale 1983, Madden 1996, Sutter 1996, Sutter and Brigham 1996). Although they will use exotic vegetation, they are significantly more abundant in, and prefer, native prairie (Wilson and Belcher 1989, Dale 1992, Hartley 1994, Anstey et al. 1995, Madden 1996, Prescott and Murphy 1996, Prescott and Wagner 1996, Sutter 1996, Davis and Duncan 1999). Other habitat features required include low visual obstruction, moderate litter cover, and little or no woody vegetation (Faanes 1983, Dale 1992, Anstey et al. 1995, Madden 1996, Sutter 1996, Davis and Duncan 1999). Vegetation in dry lake bottoms and alkali lake borders can also be

suitable for Sprague's Pipits (Saunders 1914, Stewart 1975, Wershler et al. 1991). In Alberta native grassland, Sprague's Pipits preferred areas with moderate cover diversity, moderate grass height and height variation, and moderate to high grass to forb ratio (Prescott and Murphy 1996). Within grazed mixed-grass areas in North Dakota, abundance of Sprague's Pipits was positively associated with percent clubmoss (*Selaginella densa*) cover and plant communities dominated by native grass (*Stipa*, *Bouteloua*, *Koeleria*, and *Schizachyrium*) (Schneider 1998). Abundance was negatively associated with percent grass cover, litter depth, density of low-growing shrubs, vegetation density, and with plant communities dominated by Kentucky bluegrass (*Poa pratensis*) and native grass. In areas not occupied by Sprague's Pipits, percent grass cover, litter depth, and vegetation density were greater than in areas where Sprague's Pipits were present. Strongest vegetational predictors of the presence of Sprague's Pipit were decreasing bare ground and decreasing litter depth.

Sprague's Pipits are generally most abundant in idle grasslands, but also tolerate light to heavy grazing, prescribed burning, and, in some cases, mowing done the previous year (Maher 1973, Owens and Myres 1973, Karasiuk et al. 1976, Kantrud 1981, Faanes 1983, Dale 1984, Pylypec 1991, Wershler et al. 1991, Bock et al. 1993, Anstey et al. 1995, Skeel et al. 1995, Madden 1996, Prescott and Wagner 1996, Sutter 1996, Dale et al. 1997). Despite short-term negative impacts, these techniques ultimately benefit Sprague's Pipits by preventing encroachment of woody vegetation and excessive litter accumulation; Sprague's Pipits avoided idle areas with deep litter in North Dakota (Madden 1996).

Sutter (1997) studied nest-site selection and nest-entrance orientation in grazed mixed-grass prairie in Saskatchewan. Sprague's Pipits preferred dense, grassy, and relatively tall vegetation with low forb density and little bare ground. Nest sites were located in areas with significantly higher grass and sedge cover and maximum plant height, and lower forb and shrub cover, bare ground cover, and forb density than non-nest sites. Dominant vegetation on the study area and at nest sites was thick-spike wheatgrass (*Agropyron dasystachyum*) and fringed sagewort (*Artemisia frigida*). Nests were domed and were usually at the end of a partially or completely covered runway which could be up to 15 cm long and sharply curved. No significant directionality was found in nest-entrance orientation; mean nest orientation was 82°. In northwestern North Dakota, male breeding territories were located on ridgetops with short grass and low sedge and forb density (Robbins 1998). A table near the end of the account lists the specific habitat characteristics for Sprague's Pipits by study.

Area requirements:

Most studies of Sprague's Pipits were conducted in extensive grasslands, suggesting that the species is most common in large grassland areas, and thus may be area sensitive (Maher 1973, Owens and Myres 1973, Dale 1983, Faanes 1983, Wilson and Belcher 1989, Pylypec 1991, Madden 1996). In Saskatchewan, Sprague's Pipits were found to be area sensitive, and the minimum area requirement was 190 ha (SWCC 1997). In Manitoba, Brown-headed Cowbird (*Molothrus ater*) brood parasitism was higher on birds (including Sprague's Pipits) nesting on a smaller (22 ha) site than on two larger (64 ha) sites (Davis and Sealy 2000).

Brown-headed Cowbird brood parasitism:

The only known records of brood parasitism by Brown-headed Cowbirds have been reported from the Canadian provinces of Saskatchewan and Manitoba (De Smet 1992; Davis 1994; Davis and Sealy 2000; S. K. Davis, Saskatchewan Wetland Conservation Corporation,

Regina, Saskatchewan, *unpublished data*). Rates of parasitism vary from 0% of 24 nests (Robbins and Dale 1999) to 18% of 17 nests (Davis 1994, Davis and Sealy 2000). Refer to Table 1 in Shaffer et al. (2003) for rates of cowbird brood parasitism. Sprague's Pipits may be multiply-parasitized (Friedmann 1963, SWCC 1997, Davis and Sealy 2000). In Saskatchewan, Davis (*unpublished data*) found that parasitized nests were significantly farther from cowbird perch sites than unparasitized nests. There was no difference in concealment cover between parasitized and unparasitized nests.

Breeding-season phenology and site fidelity:

Sprague's Pipits arrive on the breeding grounds in April and depart for the wintering grounds in September and October (Bent 1965, Maher 1973, Stewart 1975, Robbins 1998). In North Dakota, they have two periods of breeding activity, the first from late April to early June, and the second from mid-July to early September (Stewart 1975). In Saskatchewan, clutch initiation dates ranged from about 11 May through about 29 July (Maher 1973). Another Saskatchewan study found two peaks of breeding activity (21-31 May and 1-10 July) in 1994, and a single peak (1-10 June) in 1995 (Sutter 1996). Using radio-tagged birds, Sutter et al. (1996) determined that females lay replacement clutches and that some females are double-brooded.

Species' response to management:

When implementing management, such as burning or haying, avoid disturbing nesting habitat during the breeding season, approximately late April to early September (Maher 1973, Stewart 1975). Grazing during the breeding season should be light to moderate (Owens and Myres 1973, Kantrud and Kologiski 1982, Bock et al. 1993, Anstey et al. 1995, Davis et al. 1999). Research activities, such as radio-telemetry studies, also may reduce nesting success (Sutter 1996).

Little information is available regarding ultimate effects of prescribed burning on Sprague's Pipit populations. In North Dakota, Sprague's Pipits were absent from unburned, idle grasslands; highest abundance was reached in areas burned 2 yr previous (Madden 1996). Abundance of Sprague's Pipits was positively related to a fire index that calculated the amount of fire an area received based on number of burns in the last 15 yr and number of years since last fire (Madden et al. 1999). Abundance was highest in grasslands that had been burned four times in the previous 15 yr, compared to unburned areas and areas burned one to two times in the previous 15 yr. In one Saskatchewan site, Sprague's Pipit populations declined for the first 2 yr following fall burns, then recovered to densities similar to those in unburned areas (Pylypec 1991).

In Saskatchewan, Sprague's Pipits were more abundant and had higher productivity indices in idle native grasslands than either native haylands or tame haylands (Dale et al. 1997). Periodically hayed lands were avoided, but Sprague's Pipits often returned to haylands in Canada the first year after mowing, when vegetation recovered sufficiently (Owens and Myres 1973, Dale et al. 1997). In North Dakota, Sprague's Pipits were absent from haylands mowed the previous year, possibly due to excessively thick revegetation and absence of litter (Kantrud 1981). De Smet and Conrad (1991) reported little direct damage to nests from mowing; however, Dale et al. (1997) found consistently higher productivity indices in unmowed hayland than in hayland mowed during the nesting season.

Grazed grasslands generally support fewer Sprague's Pipits than ungrazed grasslands, and heavy grazing is often detrimental as it reduces vegetation height below levels acceptable to Sprague's Pipits (Maher 1973, Owens and Myres 1973, Dale 1984, Bock et al. 1993, Sutter 1996; but see Kantrud 1981 for Sprague's Pipit use of heavily grazed pastures). However, lightly to moderately grazed grasslands are used throughout the breeding range (Owens and Myres 1973, Kantrud and Kologiski 1982, Bock et al. 1993, Anstey et al. 1995, Davis et al. 1999). In Saskatchewan, Sprague's Pipits preferred native pastures to tame pastures (Anstey et al. 1995, Sutter 1996, Sutter and Brigham 1996, Davis and Duncan 1999). Within tame pastures, Sprague's Pipits occurred more frequently in pure crested wheatgrass (*Agropyron cristatum*) than in crested wheatgrass/alfalfa (*Medicago sativa*) (Davis and Duncan 1999). Sutter and Brigham (1996) found that numbers of Sprague's Pipits in lightly grazed native vegetation were positively correlated with bare ground and forb density. Number of pipits was higher in areas with high percent grass and sedge cover and high maximum vegetation height than in areas with high litter depth and number of plant contacts >10 cm tall. Numbers of Sprague's Pipits were negatively correlated with grass, sedge, and litter cover; litter depth; and number of vegetation contacts >10 cm tall. In lightly grazed crested wheatgrass, numbers of Sprague's Pipits were positively related to grass and sedge cover, litter depth, and number of vegetation contacts <10 cm tall. In contrast to the above studies in Saskatchewan, Davis et al. (1999) found that Sprague's Pipits occurred as frequently in native pastures as in tame pastures. In Alberta, Sprague's Pipits preferred early-season native pastures (grazed in early summer), infrequently occupied early-season tame (grazed from late April to mid-June) and continuously grazed native pastures, and were fairly common in deferred-grazed native pastures (grazed after 15 July) (Prescott and Wagner 1996).

In a Saskatchewan study that examined whether the abundance of grassland birds differed between roadsides and trailsides, Sprague's Pipits were significantly more abundant along trailsides than along roadsides (Sutter et al. 2000). Roads were defined as traveling surfaces with adjacent drainage ditches planted to smooth brome (*Bromus inermis*) and ending with a fence 11-18 m from the traveling surface. Trails were defined as a single pair of wheel ruts visually indistinct from surrounding habitat in terms of plant structure and composition. Habitat along roads and trails were parcels of lightly to moderately grazed native prairie >256 ha.

Management Recommendations:

Protect grassland habitat (Stewart 1975, De Smet and Conrad 1991). Providing large tracts of grassland habitat may decrease rates of nest depredation and cowbird brood parasitism (Davis and Sealy 2000).

Maintain grasslands free of woody vegetation (Faanes 1983, Berkey et al. 1993, Anstey et al. 1995, Madden 1996).

Burn grassland once every 2-4 yr (Madden 1996, Madden et al. 1999). Populations can be expected to decline immediately after burning; vegetation must recover before Sprague's Pipit will recolonize areas.

Mow hayland using a rotational schedule of every other year. Divide large fields in half, with each half being mowed in alternate years, to ensure productivity of hay and of birds (Dale et al. 1997). Complete idling of hayfields is detrimental for Sprague's Pipits in Saskatchewan (Dale et al. 1997).

Delay mowing until after 15 July, which may allow $\geq$70% of nests to fledge in years with normal breeding phenology (Berkey et al. 1993, Dale et al. 1997). In years with delayed nesting, mowing may have to be delayed until late July or August to protect most nests and fledglings (Dale et al. 1997).

Avoid heavy grazing; throughout the breeding range, light to moderate grazing may be beneficial (Maher 1973, Dale 1983, Wershler et al. 1991, Bock et al. 1993, Sutter 1996). Grazing tame pastures in spring allows native pastures to be deferred, which improves habitat in the native pastures for Sprague's Pipits (Prescott and Wagner 1996).

Convert non-native uplands, including hayland and pasture, to native vegetation (Berkey et al. 1993, Sutter 1996, Dale et al. 1997).

Table. Sprague's Pipit habitat characteristics.

Author(s)	**Location(s)**	**Habitat(s) Studied***	**Species-specific Habitat Characteristics**
Anstey et al. 1995	Saskatchewan	Cropland, mixed-grass pasture, tame hayland, tame pasture	Were abundant in native prairie; abundance was positively associated with narrow-leaved grasses ≤10 cm tall and negatively associated with shrubs 20-100 cm tall; avoided heavily grazed pastures
Dale 1983	Saskatchewan	Idle mixed-grass, mixed-grass pasture	Preferred areas where vegetation is dense at base and top of canopy; used areas with higher litter cover than adjacent unused areas; vegetation density and height were important to habitat selection
Dale 1984	Saskatchewan	Idle mixed-grass, mixed-grass pasture	Abundance declined with grazing
Dale 1992	Saskatchewan	Idle native, idle native/tame, tame hayland	Were most abundant in native grassland compared to tame fields and hayfields; occupied areas where narrow-leaved grasses were present, and avoided areas with extremely tall vegetation or deep litter
Dale et al. 1997	Saskatchewan	Idle mixed-grass, idle tame, tame hayland	Were most abundant in native prairie; productivity was low in tame and native mowed grassland and lowest in tame mowed grassland
Davis et al. 1999	Saskatchewan	Aspen parkland, cropland, mixed-grass pasture, tame hayland, tame pasture	Occurred as frequently in native pasture as in tame pasture but more frequently in pasture than in hayland or cropland; occurred more frequently in cypress upland and mixed grassland than in aspen parkland or moist-mixed grassland; occurrence in native pastures was negatively associated with heavy grazing and moist-mixed grassland; occurred more frequently in lightly to moderately grazed native pastures than in heavily grazed native pastures; lightly grazed pastures had abundant litter and plant material, robust and vigorous plants, <10% bare soil, and <10%

			clubmoss (*Selaginella densa*); heavily grazed pastures had very sparse plant material and litter, >20% bare soil, >40% clubmoss, and small plants with poor vigor; and moderately grazed pastures had characteristics intermediate between lightly and heavily grazed pastures
Davis and Duncan 1999	Saskatchewan	Mixed-grass pasture, tame pasture	Were more abundant in native pasture than tame pasture; abundance was positively correlated with standing residual vegetation; occurrence was positively associated with standing dead vegetation, Junegrass (*Koeleria pyramidata*), bluegrass (*Poa*), and thick-spike wheatgrass *(Agropyron dasystachyum)*
Faanes 1983	North Dakota	Idle mixed-grass, mixed-grass pasture, woodland	Nested in lightly to moderately grazed native prairie, near wooded draws; were not present in woody vegetation
Hartley 1994	Saskatchewan	Cropland; dense nesting cover (DNC; idle seeded-native, idle seeded-native/tame, idle tame, idle tame hayland), idle mixed-grass	Were found only on idle native grassland; did not occur in planted dense nesting cover or wheat fields

Kantrud 1981	North Dakota	Mixed-grass hayland, mixed-grass pasture	Were more common in moderately to heavily grazed areas than lightly grazed areas; avoided hayland mowed the previous year
Kantrud and Kologiski 1982	Northern Great Plains	Mixed-grass pasture, shortgrass pasture, shrubsteppe	Were most abundant in lightly to moderately grazed areas with aridic and typic boroll soil types; did not tolerate heavy grazing
Madden 1996	North Dakota	Burned mixed-grass, burned tame, idle mixed-grass, idle tame	Used native prairie; were associated with native grasses, low visual obstruction of vegetation (13 cm), and low amount of shrub cover (17.8%); were most abundant 2-3 yr postfire
Maher 1973	Saskatchewan	Burned mixed-grass, idle mixed-grass, mixed-grass hayland, mixed-grass pasture	Were more common in idle prairie than grazed prairie
Owens and Myres 1973	Alberta	Cropland, idle mixed-grass, mixed-grass hayland, mixed-grass pasture	Were most common in idle native prairie; also used lightly grazed, native prairie with dense grasses; reoccupied mown mixed-grass as height and density increased during the season following mowing
Prescott and Murphy 1996	Alberta	Mixed-grass pasture, tame pasture	Higher frequency of occurrence was on native rather than tame pasture; on native pasture, preferred areas with moderate cover diversity, moderate grass height and height variation, and moderate to high grass:forb ratio
Saunders 1914	Montana	Idle shortgrass, woodland	Used wetland borders and moist, alkali, low areas without dense vegetation; did not use xeric prairie benches or lush grass meadows
Schneider 1998	North Dakota	Mixed-grass pasture, tame pasture, wet-meadow pasture	Abundance was positively associated with percent clubmoss cover and plant communities dominated by native grass (*Stipa*, *Bouteloua*, *Koeleria*, and *Schizachyrium*); abundance was negatively associated with percent grass cover, litter depth, density of low-growing shrubs, vegetation density, and with

			plant communities dominated by Kentucky bluegrass (*Poa pratensis*) and native grass; in areas not occupied by Sprague's Pipits, percent grass cover, litter depth, and vegetation density were greater than in areas where Sprague's Pipits were present; strongest vegetational predictors of the presence of Sprague's Pipit were decreasing bare ground and decreasing litter depth
Stewart 1975	North Dakota	Idle mixed-grass, mixed-grass hayland, mixed-grass pasture	Preferred idle, lightly grazed, or occasionally mowed native prairie; also used alkali wetland borders
Sutter 1996, 1997	Saskatchewan	Idle mixed-grass, mixed-grass pasture, tame pasture	Preferred native mixed-grass to tame pasture; were most abundant in areas with intermediate cover values; nest sites had higher grass and sedge cover, higher maximum height, lower forb and shrub cover, lower bare ground cover, and lower forb density than random sites; average vegetation characteristics at nest sites were: 52.7% grass and sedge cover, 10.5% forb and shrub cover, 15.2% litter cover, 16.8% bare ground cover, 55.6 forb contacts per m^2, 27.7 cm maximum vegetation height, 2.4 cm litter depth, and vegetation density of 1.1 contacts above 10 cm and 3 contacts below 10 cm; nests were usually near (<100 m) roads and far (mean 20.7 m) from nearest perch (shrubs and rocks)
Sutter and Brigham 1998	Saskatchewan	Mixed-grass pasture, tame pasture	Were more abundant in native than crested wheatgrass; in both habitats, preferred moderate levels of grassy cover; numbers in native vegetation were positively correlated with bare ground and forb density; number of pipits was higher in areas with high percent grass and sedge cover and high maximum vegetation height than in areas with high litter depth and number of plant contacts >10 cm tall; numbers of Sprague's Pipits were negatively correlated with grass, sedge, and litter cover; litter depth; and number of vegetation contacts >10 cm; in crested wheatgrass, numbers were positively related to grass and sedge

			cover, litter depth, and number of vegetation contacts <10 cm tall
Sutter et al. 2000	Saskatchewan	Mixed-grass pasture	Abundance in mixed-grass prairie was 26% lower along roadsides than along trailsides
Wershler et al. 1991	Alberta	Cropland, idle mixed-grass, idle tame, mixed-grass pasture, parkland, wet meadow	Used lush grasslands, dry lake bottoms; used moderately grazed areas; heavy grazing was detrimental
Wilson and Belcher 1989	Manitoba	Idle mixed-grass, idle tame	Preferred native over tame vegetation; was positively associated with Junegrass and negatively correlated with smooth brome (*Bromus inermis*)

*In an effort to standardize terminology among studies, various descriptors were used to denote the management or type of habitat. "Idle" used as a modifier (e.g., idle tallgrass) denotes undisturbed or unmanaged (e.g., not burned, mowed, or grazed) areas. "Idle" by itself denotes unmanaged areas in which the plant species were not mentioned. Examples of "idle" habitats include weedy or fallow areas (e.g., oldfields), fencerows, grassed waterways, terraces, ditches, and road rights-of-way. "Tame" denotes introduced plant species (e.g., smooth brome [*Bromus inermis*]) that are not native to North American prairies. "Hayland" refers to any habitat that was mowed, regardless of whether the resulting cut vegetation was removed. "Burned" includes habitats that were burned intentionally or accidentally or those burned by natural forces (e.g., lightning). In situations where there are two or more descriptors (e.g., idle tame hayland), the first descriptor modifies the following descriptors. For example, idle tame hayland is habitat that is usually mowed annually but happened to be undisturbed during the year of the study.

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