EFFECTS OF MANAGEMENT PRACTICES ON GRASSLAND BIRDS:

AMERICAN BITTERN

Grasslands Ecosystem Initiative
Northern Prairie Wildlife Research Center
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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

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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and effects of habitat management on grassland birds were summarized from information in more than 4,000 published and unpublished papers.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.

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AMERICAN BITTERN
(*Botaurus lentiginosus*)

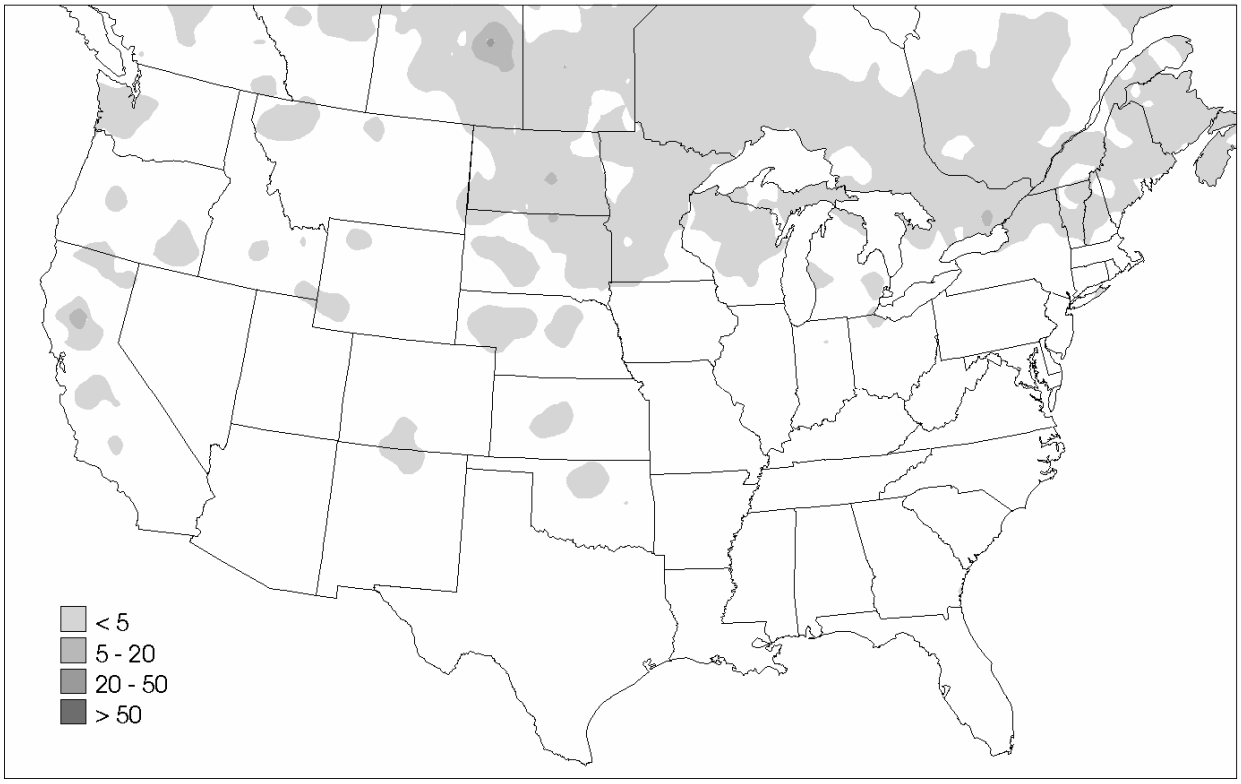

Figure. Breeding distribution of the American Bittern in the United States and southern Canada, based on Breeding Bird Survey data, 1985-1991. Scale represents average number of individuals detected per route per year. Map from Price, J., S. Droege, and A. Price. 1995. The summer atlas of North American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

Keys to management include protecting wetlands and adjacent uplands and maintaining idle upland habitat.

Breeding range:

American Bitterns breed from the southern Northwest Territories through central British Columbia east through Alberta, Saskatchewan, Manitoba, Ontario, Quebec, and southern New Brunswick, south through the Great Plains to northeastern New Mexico and southern Texas, west through northern Utah and Nevada to southcentral California, and east to the East Coast, extending from Maine south to western South Carolina (National Geographic Society 1987). (See figure for the relative densities of American Bitterns in the United States and southern Canada, based on Breeding Bird Survey data.)

Suitable habitat:

During the breeding season, American Bitterns use tall, dense, shallow- or deep-water emergent vegetation in wetlands; native vegetation in wet meadows; and moderately tall, dense, native or tame vegetation in uplands adjacent to wetlands (Bent 1963; Stewart 1975; Duebbert

and Lokemoen 1977; Hanowski and Niemi 1986, 1988; Faanes and Lingle 1995; Kent and Dinsmore 1996). They breed in seasonal, semipermanent, temporary, permanent, fen, and restored wetlands, and in hayland, cropland, Conservation Reserve Program grasslands, and idle grasslands (Stewart and Kantrud 1965; Stewart 1975; Duebbert and Lokemoen 1977; Faanes 1981; Kantrud and Stewart 1984; Hanowski and Niemi 1986, 1988; Luttschwager and Higgins 1992; VanRees-Siewert 1993; Faanes and Lingle 1995; Brininger 1996; VanRees-Siewert and Dinsmore 1996). In South Dakota, American Bitterns most often were located in semipermanent wetlands or wetlands with open water in the center, a band of emergent vegetation around the periphery, and idle grassland in the adjacent uplands (Weber 1978, Weber et al. 1982). Another study in South Dakota found that the occurrence of American Bitterns within semipermanent wetlands was related positively to the percentage of the wetland area that was vegetated (Naugle 1997). In North Dakota, American Bittern density was highest in fen wetlands, followed by temporary and semipermanent wetlands, seasonal wetlands, and permanent wetlands (Kantrud and Stewart 1984). Johnson et al. (unpublished data) found that in the Prairie Pothole region of North Dakota and South Dakota, American Bitterns preferred seasonal and semipermanent wetlands and avoided alkali wetlands, as well as other wetlands dominated by open water. Bitterns tended to be more common in wetlands that were not isolated from other wetlands.

Within wetlands and wet meadows, American Bitterns nest in rush (*Juncus*), sedge (*Carex* spp.), bulrush (*Schoenoplectus* spp.), prairie cordgrass (*Spartina pectinata*), sprangletop (*Scolochloa festucacea*), tall mannagrass (*Glyceria grandis*), common reed (*Phragmites australis*), reed canary grass (*Phalaris arundinacea*), bur-reed (*Sparganium eurycarpum*), or cattail (*Typha*) (Gabrielson 1914, Lewis 1930, Mousley 1939, Vesall 1940, Provost 1947, Middleton 1949, Boyer and Devitt 1961, Bent 1963, Stewart 1975, Duebbert and Lokemoen 1977, Faanes 1981, Manci and Rusch 1988, Brininger 1996, Azure 1998). Bitterns nest on floating platforms in shallow (3-91 cm) water (Provost 1947, Middleton 1949, Bent 1963, Stewart 1975, Brininger 1996). The average vegetation height above water within 1-10 m of wetland nests in northwestern Minnesota was 126 cm (Brininger 1996). Water depths within 1-10 m of wetland nests ranged from 8 to 65 cm (Brininger 1996, Azure 1998). In Minnesota, average vegetation values from 70 sampling points within seven territories were 11 cm water depth, 1.3 m vegetation height, 8.9% vegetation cover, 114 stems/m^2 grass density, and 4 stems/m^2 forb density (Hanowski and Niemi 1988). Two nests in a Minnesota wet meadow were located 61 m and 107 m from water (Vesall 1940). In northwestern Iowa, American Bitterns nested in 2- and 4-yr-old restored wetlands (VanRees-Siewert 1993, VanRees-Siewert and Dinsmore 1996). A significant positive relationship was found between the age of restored wetlands and the occurrence of American Bitterns.

Within uplands, American Bitterns nest in both grassland and shrubland (Duebbert and Lokemoen 1977, Knapton 1979, Kantrud and Higgins 1992, Svedarsky 1992). In Manitoba, Montana, North Dakota, and South Dakota, American Bitterns nested in mid to tall (30-99 cm), dense, idle grasslands where the average maximum height of the leaf canopy (effective vegetation height) was >60 cm, 100% vertical visual obstruction was usually >50 cm, and litter cover was >50% (Kantrud and Higgins 1992). They avoided nesting in areas where vegetation height or 100% vertical visual obstruction values were <30 cm or where the total cover contained >10% dead vegetation. Dominant plant species around nests were smooth brome (*Bromus inermis*), wheatgrass (*Agropyron*), alfalfa (*Medicago sativa*), and big bluestem (*Andropogon gerardii*) (Duebbert and Lokemoen 1977, Kantrud and Higgins 1992). Nests were

partially or completely concealed by vegetation on the side, but partially or completely exposed on top, and no nests were found in cover <30 cm tall (Duebbert and Lokemoen 1977). Dominant plant species around grassland nests in northwestern Minnesota were smooth brome, reed canary grass, timothy (*Phleum pratense*), redtop (*Agrostis stolonifera*), quackgrass (*Agropyron repens*), switchgrass (*Panicum virgatum*), sweet clover (*Melilotus* spp.), and big bluestem (Svedarsky 1992, Brininger 1996, Azure 1998). Average vegetation height within 1-10 m of grassland nests was about 73 cm (Brininger 1996). Average vertical visual obstruction values of vegetation ranged from 44 to 99 cm around nests in North Dakota and Minnesota (Messmer 1985, Svedarsky 1992, Azure 1998). Nests were located in tall (>60 cm) vegetation (Svedarsky 1992). An American Bittern nested successfully in an interstate road right-of-way in southcentral North Dakota (Oetting and Cassel 1971). In Saskatchewan, nests were located in hayfields and dense western snowberry (*Symphoricarpos occidentalis*) 80-100 m from water (Knapton 1979). In Manitoba, adult behaviors indicative of breeding (territorial male present, breeding pair present, nest building activity, egg laying, egg incubation, or distraction display) were recorded in native grassland and hayland, but not in cropland or woodland (Jones 1994).

During molt, American Bitterns move away from their breeding territories to isolated areas, such as islands (Brininger 1996). Azure (1998) documented American Bitterns molting in dense stands of cattail. A table near the end of the account lists the specific habitat characteristics for American Bitterns by study.

Area requirements:

American Bitterns prefer relatively large (≥3 ha) wetlands, ranging in size from 3 to 182 ha (Brown and Dinsmore 1986, Daub 1993). Seven wetlands used by American Bitterns for nesting in northern Minnesota ranged from 1 to 100 ha and averaged 36.7 ha (Hanowski and Niemi 1986). Weber (1978) found that the occurrence of American Bitterns in South Dakota wetlands was related to the area of adjacent idle grassland. Male and female home ranges in northwestern Minnesota averaged 415 ha and 337 ha, respectively (Brininger 1996). In another study in northwestern Minnesota, the average home range size of 20 radio-marked male American Bitterns was 127 ha (Azure 1998). Average size of the core use area (defined as the area of the home range in which bitterns were located 50% of the time) was 25 ha.

Brown-headed Cowbird brood parasitism:

No known records of brood parasitism by Brown-headed Cowbirds (*Molothrus ater*) exist.

Breeding-season phenology and site fidelity:

American Bitterns may arrive on the breeding grounds as early as mid-March, but more commonly from mid-April to early May, and leave for the wintering grounds from late August to early December (Bent 1963, Knapton 1979, Johnsgard 1980, Gibbs et al. 1992). In North Dakota, the peak breeding season extends from mid-June to late July (Stewart 1975). One American Bittern female renested in northwestern Minnesota; this was the first documented case for the species (Azure 1998, Azure et al. 2000). Brininger (1996) found that 41% of 22 radio-marked adult American Bitterns in northwestern Minnesota returned to breeding territories occupied in previous years. No fledglings returned to their natal breeding grounds. Azure (1998) found that four of seven male American Bitterns returned to their previous breeding home

ranges in successive years in northwestern Minnesota; of six radio-marked females, none returned to their previous breeding home ranges.

Species' response to management:

American Bitterns avoid annually burned, mowed, heavily grazed, and tilled areas in North Dakota (Duebbert and Lokemoen 1977, Messmer 1985). A study comparing idle grasslands to areas under various grazing systems found that American Bitterns nested only in idle mixed-grass, and were absent from short-duration (involved a system of pastures rotated through a grazing schedule of about 1 wk grazed and 1 mo ungrazed, repeated throughout the season), twice-over (involved grazing a number of pastures twice per season, with about a 2-mo rest in between grazing), and season-long (involved leaving cattle on the same pasture all season) grazing systems (Messmer 1985). One nest was found in a pasture under the short-duration system, but it had been initiated before cattle began grazing the area. American Bitterns appeared to prefer idled strips or blocks over mowed areas in grassland fields enrolled in the Conservation Reserve Program in South Dakota (Luttschwager and Higgins 1992).

Management Recommendations:

Protect wetlands from drainage through conservation easements, land purchases, tax incentives, management agreements, continuation of the Wetland Reserve Program, and enforcement of wetland-protection regulations (Brown and Dinsmore 1986, Hands et al. 1989, Gibbs et al. 1992, Daub 1993).

Maintain a complex of wetlands of sufficient size (wetlands 20-30 ha in size up to 180 ha) to provide habitats at various stages of succession (Brown and Dinsmore 1986, Hands et al. 1989). American Bitterns occurred in wetlands ranging in size from 3 to 182 ha (Brown and Dinsmore 1986, Daub 1993).

Protect wetlands from siltation, eutrophication, chemical contamination, and other forms of pollution (Gibbs et al. 1992).

Maintain water levels at <61 cm throughout the breeding season (April-August) (Hands et al. 1989, Azure 1998). Avoid complete drawdowns before mid-August (Azure 1998). During molting, bitterns need relatively deep, stable waters to provide adequate food and protection from predators (Azure 1998). Use slow drawdowns to mimic natural wetland succession (Fredrickson and Reid 1986).

If stock ponds are a part of a management plan, manage for growth of emergent vegetation (Weber 1978). In South Dakota, American Bitterns most often were located in semipermanent wetlands or wetlands with open water in the center, a band of emergent vegetation around the periphery, and idle grassland in the adjacent uplands (Weber 1978, Weber et al. 1982).

Maintain a wide vegetative margin around wetlands to protect breeding habitat and to deter nest

predators (Daub 1993).

To maintain tall, dense, upland vegetation, disturbance (e.g., mowing, burning, and grazing) should not occur more often than every 2-5 yr (Duebbert and Lokemoen 1977).

Although American Bitterns nested only in idle grasslands, the twice-over deferred rotation grazing system may be the best grazing system in terms of providing overall bird nesting cover in uplands (Messmer 1985). Encourage adoption of no-tillage or minimum-tillage practices instead of conventional-tillage (annual) practices, so that breeding habitat is undisturbed during the nesting season (Kantrud and Higgins 1992).

Table. American Bittern habitat characteristics.

Author(s)	**Location(s)**	**Habitat(s) Studied***	**Species-specific Habitat Characteristics**
Azure 1998	Minnesota	Conservation Reserve Program (CRP; idle seeded-native), flooded rice field, hayland, idle tallgrass, idle tame, pasture, wetland, woodland	Nested in upland hayland and idle wild rice (*Zizania palustris*) fields; dominant vegetation within 1 m of nests consisted of wheatgrass (*Agropyron* spp.) and reed canary grass (*Phalaris arundinacea*); 100% vertical visual obstruction values ranged from 49 to 99 cm; nested in wetlands in cattail (*Typha*), common reed (*Phragmites australis*), and sedge (*Carex*); average water depth at nests was 31 cm; were observed most frequently in emergent vegetation and habitat edges
Bent 1963	Rangewide	Cropland, hayland, idle grassland, pasture, wet meadow, wetland	Preferred wetlands dominated by cattail, but also used wet meadows and relatively dry, upland meadows
Brininger 1996	Minnesota, North Dakota	CRP (idle seeded-native/tame), idle tame, wetland	Nested on floating platforms in wetlands dominated by cattail, hardstem bulrush (*Schoenoplectus acutus*), sedge, common reed, and whitetop (*Cardaria pubescens*); average vegetation height within 1-10 m of wetland nests was about 126 cm; nested on the ground in grasslands dominated by smooth brome (*Bromus inermis*), reed canary grass, timothy (*Phleum pratense*), redtop (*Agrostis stolonifera*), and quackgrass (*Agropyron repens*); average vegetation height within 1-10 m of grassland nests was about 75 cm
Duebbert and Lokemoen 1977	North Dakota, South Dakota	Cropland**,** idle tame	Preferred tall (>60 cm), dense cover; dominant nest vegetation was smooth brome, alfalfa (*Medicago sativa*), intermediate wheatgrass (*Agropyron intermedium*), and

			tall wheatgrass (*Agropyron elongatum*)
Faanes 1981	Minnesota, Wisconsin	Cropland, idle, idle tallgrass/tame, shrub carr, tame hayland, tame pasture, wet meadow, wetland, woodland	Nested in seasonal, semipermanent, and permanent wetlands dominated by hardstem bulrush, river bulrush (*Schoenoplectus fluviatilis*), softstem bulrush (*S. tabernaemontani*), common reed, reed canary grass, or cattail; nested in upland areas such as hayland, oldfields, oat fields, and idle grasslands
Faanes and Lingle 1995	Nebraska	Cropland, idle mixed-grass, idle shortgrass, idle tallgrass, pasture, tame hayland, wet meadow, wetland, woodland	Were most common in large semipermanent and permanent wetlands with dense emergent vegetation
Gibbs et al. 1992	Rangewide	Cropland, hayland, idle, pasture, wetland	Used shorelines of freshwater wetlands dominated by tall, emergent vegetation
Hanowski and Niemi 1986, 1988	Minnesota	Idle tallgrass, peatland, shrub carr, wetland	Occupied areas with shrubs and cattails; average habitat measurements from 70 sampling points within seven territories were 1.3 m vegetation height, 8.9% ground cover, 11 cm water depth, 97 cm phanerophyte (graminoids, forbs, or shrubs >40 cm tall that were present each year) height; median vegetation densities were 114 stems/m^2 graminoid density, 4 stems/m^2 forb density, and 17.1 stems/m^2 phanerophyte density; seven wetlands used for nesting ranged from 1 to 100 ha and averaged 36.7 ha
Kantrud and Higgins 1992	Manitoba, Montana, North Dakota, South	Burned mixed-grass, cropland, hayland, idle mixed-grass, idle tame, mixed-grass	Nested in idle, seeded upland grasslands with mid to tall grass heights (30-99 cm); dominant vegetation at nest sites was smooth brome, wheatgrass, and alfalfa; nests usually had 100% vertical visual obstruction >50 cm,

	Dakota	pasture	effective vegetation height >60 cm, and litter cover >50%; avoided nesting where height or vertical visual obstruction was <30 cm or where the total cover contained >10% dead vegetation; occasionally nested in forb or shrubby areas
Kantrud and Stewart 1984	North Dakota	Wetland complex	Highest densities were in fen wetlands, followed by temporary and semipermanent wetlands, seasonal wetlands, and permanent wetlands
Lewis 1930	Oklahoma	Idle, wetland	Nested in wetlands containing cattails and sedges
Luttschwager and Higgins 1992	South Dakota	CRP (idle seeded-native, idle tame, seeded-native hayland, tame hayland)	Nested in idle strips and blocks within mowed fields
Manci and Rusch 1988	Wisconsin	Wetland	Observed in shallow water and among dry cattails
Messmer 1985	North Dakota	Idle mixed-grass/tame, mixed-grass/tame pasture	Nested in idle pasture containing smooth brome and western snowberry (*Symphoricarpos occidentalis*); average 100% vertical visual obstruction around nests was 53 cm, compared to 42.5 cm for one nest found in a short-duration pasture (involved a system of pastures rotated through a grazing schedule of about 1 wk grazed and 1 mo ungrazed, repeated throughout the season)
Middleton 1949	Michigan	Wet-meadow pasture	Nested on floating platforms in wet meadows containing scattered clumps of cattails
Naugle 1997	South Dakota	Cropland, CRP (idle seeded-native, idle tame), idle mixed-	Occurrence within semipermanent wetlands was related positively to the percent of the wetland area that was vegetated

		grass, idle tallgrass, idle tame, mixed-grass pasture, tallgrass pasture, tame pasture, wetland	
Provost 1947	Iowa	Idle tallgrass, tallgrass pasture, wet-meadow pasture, wetland	Nested on floating platforms among bulrushes and bur-reeds (*Sparganium eurycarpum*) in water that was 20-33 cm deep
Stewart 1975	North Dakota	Idle, idle hayland, idle mixed-grass, idle tame, tame hayland, wetland	Nested in 13-91 cm of water among hardstem bulrush, river bulrush, sprangletop (*Scolochloa festucacea*), tall mannagrass (*Glyceria grandis*), and cattail interspersed with the above plant species; used upland areas such as retired cropland, idle prairie, and idle haylands
Stewart and Kantrud 1965	North Dakota	Wetland	Highest densities were found on fresh and slightly to moderately brackish semipermanent wetlands with closed stands of emergent cover, with clumps of emergent cover interspersed with open water, or with peripheral bands of emergent cover encircling expanses of open water
Svedarsky 1992	Minnesota	Idle mixed-grass, idle mixed-grass/tame, idle tallgrass, idle tame, wetland (restored)	Nested in tall (>60 cm), dense (44 cm mean 100% vertical visual obstruction) upland vegetation consisting of quackgrass/redtop, switchgrass (*Panicum virgatum*), timothy/reed canary grass, sweet clover (*Melilotus*)/smooth brome, and big bluestem (*Andropogon gerardii*); 80% of observations were in wetland edges with gradual slopes and emergent vegetation (cattails and softstem bulrush); were never observed near trees, the flood-pool dike, or in water >15 cm deep
VanRees-Siewert 1993,		CRP (idle tame),	Nested in 2- and 4-yr-old restored wetlands; were present

VanRees-Siewert and Dinsmore 1996	Iowa	wetland (restored)	in 2-, 3-, and 4-yr-old restored wetlands; occurrence was related positively to the number of years since restoration
Vesall 1940	Minnesota	Wet meadow	Nested in wet meadows containing prairie cordgrass (*Spartina pectinata*)
Weber 1978, Weber et al. 1982	South Dakota	Cropland, idle mixed-grass, idle shortgrass, idle tallgrass, mixed-grass pasture, shortgrass pasture, tallgrass pasture, tame hayland, wetland, woodland	Preferred large, semipermanent wetlands with dense stands of emergent vegetation

*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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