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STRATEGY FOR THE CONSERVATION
OF NON-GAME BIRDS
IN THE STATE OF NEBRASKA

by

Jacqueline L. Canterbury

A THESIS

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A STRATEGY FOR THE CONSERVATION OF NON-GAME BIRDS IN THE
STATE OF NEBRASKA
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University of Nebraska, 2000

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Non-game birds comprise 93% of the 831 species recorded in the U.S.; of these, forest birds and neotropical migrants have received considerable attention. To develop a management plan for non-game birds in Nebraska, historically a predominately grassland ecosystem, it was necessary to determine species in need of conservation and assess their respective habitat status. Using BBS and PIF databases, we developed a prioritization scheme that identified 44 breeding species in need of conservation in Nebraska; 20 of the 44 are grassland birds. Because several species in need of conservation known to occur in the state were missing from these databases, we evaluated rare and/or endemic species. A rarity index established that most rare breeders in Nebraska are at the edge of their ranges. We identified 12 grassland endemic species; 8 breed in Nebraska and 7 of these are declining surveywide. Results highlight 39 priority species for Nebraska and indicate a need to increase attention to

endemic grassland species, at least in times of limited resources when the luxury of including edge-of-range rare species may not be feasible. Recommendations for conservation of the endemic grassland species include use of Bird Conservation Areas as a model.

Key words: Management plan, Nebraska, non-game birds, North American Breeding Bird Survey , Partners in Flight, priority species.

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I. Introduction

Throughout the New World attention is now being focused on the status of populations of non-game birds. Documented declines in songbirds have led to an increase in conservation attention. Neotropical migratory birds have become the focus of the largest conservation effort ever for non-game wildlife that is not endangered (Terborgh 1989).

Non-game birds refer to a taxonomically diverse group that collectively are not hunted for food or sport in the United States (Knopf 1996). This group comprises 772 (93%) of the 831 species recorded in the United States (Chandler 1986).

Birds contribute to ecosystems, and provide economic, recreational, scientific, and aesthetic value for society (Beissinger et al. 2000). They also serve as indicators of ecosystem health. However, in recent decades species have been federally listed as threatened or endangered because of a variety of factors, in particular habitat loss. Saving individual species can be expensive and politically challenging.

This thesis will serve as the basis of a plan to conserve birds in Nebraska. Unlike many plans that deal

with single species that are near extinction, this approach will be proactive. It will attempt to focus attention on a group of species and their representative habitats before they become endangered or threatened.

II. Literature Review

A. Reasons for the Decline of Non-game Birds

There are several theories contributing to the decline of non-game birds. These include changes in breeding habitat, loss of winter and migratory habitat, global climate change, pollution, and other causes.

1. Loss of Breeding Habitat

Land use changes that eliminate or fragment grasslands can reduce the populations of species that depend on them. Grasslands have undergone the most severe reduction of any midwestern habitat. The Midwest has provided some of the strongest data on the threats of fragmentation, because of the number of habitat islands in agricultural landscapes (Herkert 1994). Habitat fragmentation reduces a habitat landscape to a patchwork of smaller and isolated parcels. Suitable habitats are replaced by isolated blocks of grassland surrounded by inhospitable habitat such as heavily

farmed agricultural land or a housing development (Robinson 1997). Specific grassland birds avoid small fragments and are restricted to large areas. Those most influenced by grassland fragmentation are the northern harrier, short-eared owl, upland sandpiper, grasshopper sparrow, Henslow's sparrow, and bobolink (Herkert et al. 1993, Vickery 1999).

Another documented problem in fragmented habitats is brood parasitism. It is well documented for breeding Neotropical migrants in midwestern woodlots. For many forest species in the Midwest, parasitism levels are correlated with levels of forest fragmentation. Brown-headed cowbirds are obligate brood parasites; they lay their eggs in the nests of other birds, leaving their hosts to hatch and raise their young. Woodlots in the agricultural Midwest have some of the highest parasitism levels documented (Robinson et al. 1995).

2. Loss of Winter Habitat

Systematic reductions in the area of tropical forest and habitats where migrant songbirds spend the winter can reduce populations by decreasing opportunities to find food and shelter and avoid predators. (Robinson 1997).

Some ornithologists argue that the major cause of declines in North American songbirds is the loss of tropical

forests. Species like the wood thrush and cerulean warbler have been negatively impacted by a loss of winter habitat. Conservation of lowland forests in the West Indies, southern Central America, and the lower foothills of the Andes are especially critical for halting some declines. As the amount of tropical forest continues to shrink, the populations of some species of songbirds that chiefly winter there will drop, despite efforts taken here in temperate North America (Robinson 1997).

Loss of grassland habitat in the southern U.S. may be responsible for some of the declines of grassland species. Rice and other row crops have replaced coastal grasslands, and introduced fire ants have also reduced habitat suitability in many areas. Preserving the grasslands where these bird species winter may be as important as the conservation of breeding habitat. Also, losses of grasslands in southern South America may have contributed to the decline of grassland birds such as the bobolink (Robinson 1997).

3. Reduction in Migratory Stopover Habitat

Another trend that has an effect on non-game birds is the development of coastal areas around the world. About half of the U.S. population now lives in coastal areas, and

by the year 2010 this number will grow to about 127 million people. In the spring and fall, avian migrants must replenish energy reserves. The Gulf coast is an important stop-over site and loss of habitat has been significant, particularly in the last decade (Robinson 1997).

Small and isolated woodlots and forest preserves are also important stop-over sites for non-game birds. In Nebraska, many warblers make a brief but important visit to urban forests of older suburbs and city parks. They also use shelterbelts and similar forested environments. In the intensive croplands of the Midwest shelterbelts, riparian areas, and fencerows are often the only natural habitat available. It is critical to maintain the larger shelterbelts, which do not infringe on grasslands, and to maintain the older trees within both urban and rural environments.

4. Climate Change

Weather has a direct effect on avian reproduction. During years that are unusually wet or dry, the reproduction of birds can be diminished, and as a result, populations in subsequent years will decline. Such trends are most severe during prolonged droughts, which for many species reduces the availability of food and often water. Prolonged periods

that are unusually wet, on the other hand, may benefit wetland species, such as waterfowl, but cause problems for the Northern bobwhite quail, for example, that nests on the ground. Both severe drought and wet springs contribute to the number of young produced in a given year. How climate effects the annual variation of grassland birds is a topic of interesting magnitude.

5. Pesticides

Problems from pesticides are particularly likely in the wintering grounds of Central and South American countries, where pesticides such as DDT and DDE remain common. Recently, researchers in Argentina discovered that tens of thousands of wintering Swainson's hawks were being killed each year by a pesticide employed to control grasshoppers. The inadvertent poisoning of wintering dickcissels by grain farmers in Venezuela demonstrates how pesticides, such as DDT, can affect bird populations (Robinson 1997). The many agrochemicals now used in the Midwest certainly have negative consequences for songbird populations.

B. National Monitoring Efforts

Numerous studies of breeding birds have shown that a broad spectrum of species are experiencing serious

population declines (Finch et al. 1992). Much of the evidence for these declines has come from the Breeding Bird Survey (BBS) coordinated since 1966 by the U.S. Fish and Wildlife Service and the Canadian Wildlife Service (Robbins et al. 1986, 1989). The other major non-game bird conservation effort is the Neotropical Migrant Bird Conservation Program (Partners in Flight or PIF), a more recently (1990) formed multifaceted organization with specific conservation goals.

The BBS is an organized continent-wide census that was begun in 1966 (Robinson 1997). Its main purpose is to estimate population trends and monitor birds that nest in North America. It also provides sampling of bird populations by major physiographic regions across the continent. This provides an opportunity to determine the reasons for changes in avian populations and relate them to specific geographic areas or physiographic regions. For most species, regional as well as continental trends are shown. The three major regions are the Eastern, Central, and Western, bounded by the Mississippi River and the eastern base of the Rocky Mountains. Nebraska is in the Central BBS Region. On a finer scale, the BBS is divided into strata. Because the distribution of birds is influenced by habitat, physiographic regions are used.

Stratum boundaries are based largely on Aldrich's (1963) map of life areas of the United States (Robbins et al. 1986). Trends are estimated for 3 time periods: the entire survey interval (1966-1996), an early period (1966-1979), and a recent period (1980-1996). Trends are estimated using the route regression method described by Sauer et al. (1999). Trend estimations are found in Tables 5-7, and 11-12, with methodologies in Appendix 1.

In the first decade, BBS surveys did not reveal significant declines in bird populations. However, analysis of trends in the late 1970s and the 1980s identified declines in many species.

Partners in Flight (PIF) was created in 1990 in response to the concern for the declining populations of Neotropical migratory songbirds (Robbins et al. 1986, Askins et al. 1990) and the realization that conservation of these species requires efforts beyond the ability of any single agency or organization acting alone (Finch and Stangel 1992). In subsequent years, PIF has expanded its mandate to include all non-game landbirds. PIF is a coalition of agencies, conservation groups, academic institutions, and citizens, whose goal is to direct resources toward the conservation of birds and their habitats and to determine the causes of their decline.

In 1995, PIF began a comprehensive planning effort to conserve non-game birds and their habitats throughout the United States. The foundation of the strategy is a series of bird conservation plans called Flight Plans. These plans identify species and habitats most in need of conservation, using Breeding Bird Survey data.

Results of the BBS and PIF Flight Plans are not without controversy and confusion. While some species are decreasing, others are apparently increasing. It is difficult to separate long-term trends from the natural fluctuations of bird populations caused by drought and other natural events. Even though questions remain, most interpreters of the BBS agree on several points. One is that birds breeding in grassland habitats, such as bobolinks and meadowlarks, have shown the largest and most consistent declines (Robinson 1997).

C. **Ecoregions**

1. **Mapping Approaches**

Many attempts have been made during the last century to map the distribution of birds and associated natural communities of North America. One mapping approach was developed by Omernick (1987, 1995) for the Environmental Protection Agency. Omernick combined geology, physiography, vegetation, climate, soils, land use, wildlife, and

hydrology in the development of ecoregions for the United States, including Nebraska (Figure 1, Appendix 2).

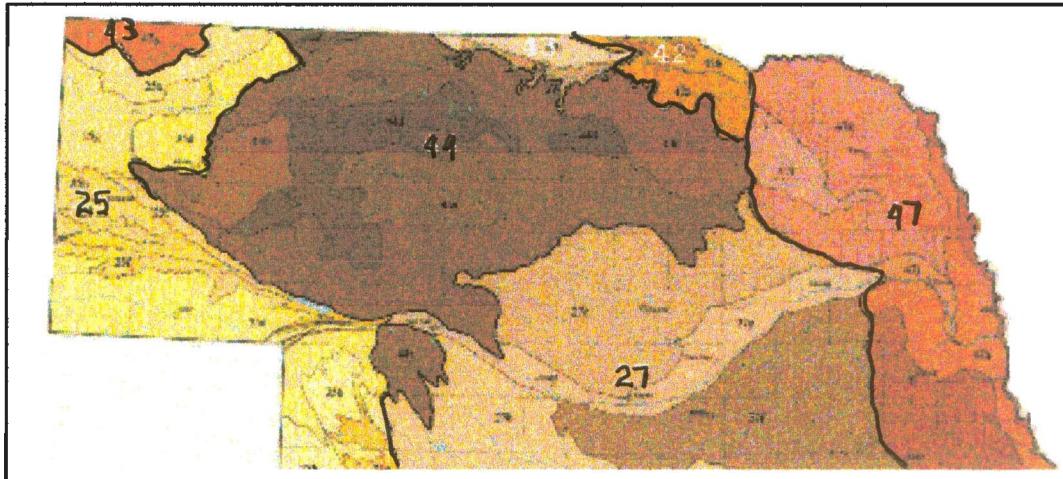


Figure 1. Ecoregions of Nebraska (Omernick 1995).

- 25 Western High Plains
- 43 Northwestern Great Plains
- 42 Northwestern Glaciated Plains
- 44 Nebraska Sandhills
- 27 Central Great Plains
- 47 Western Corn Belt Plains

Both the U. S. Fish and Wildlife Service (BBS) and Partners in Flight (PIF) developed regions for their plans to assess bird distributions. The geographical context was physiographic areas, modified from original strata devised by the BBS (Robbins et al. 1986). Six PIF strata include Nebraska (Figure 2).

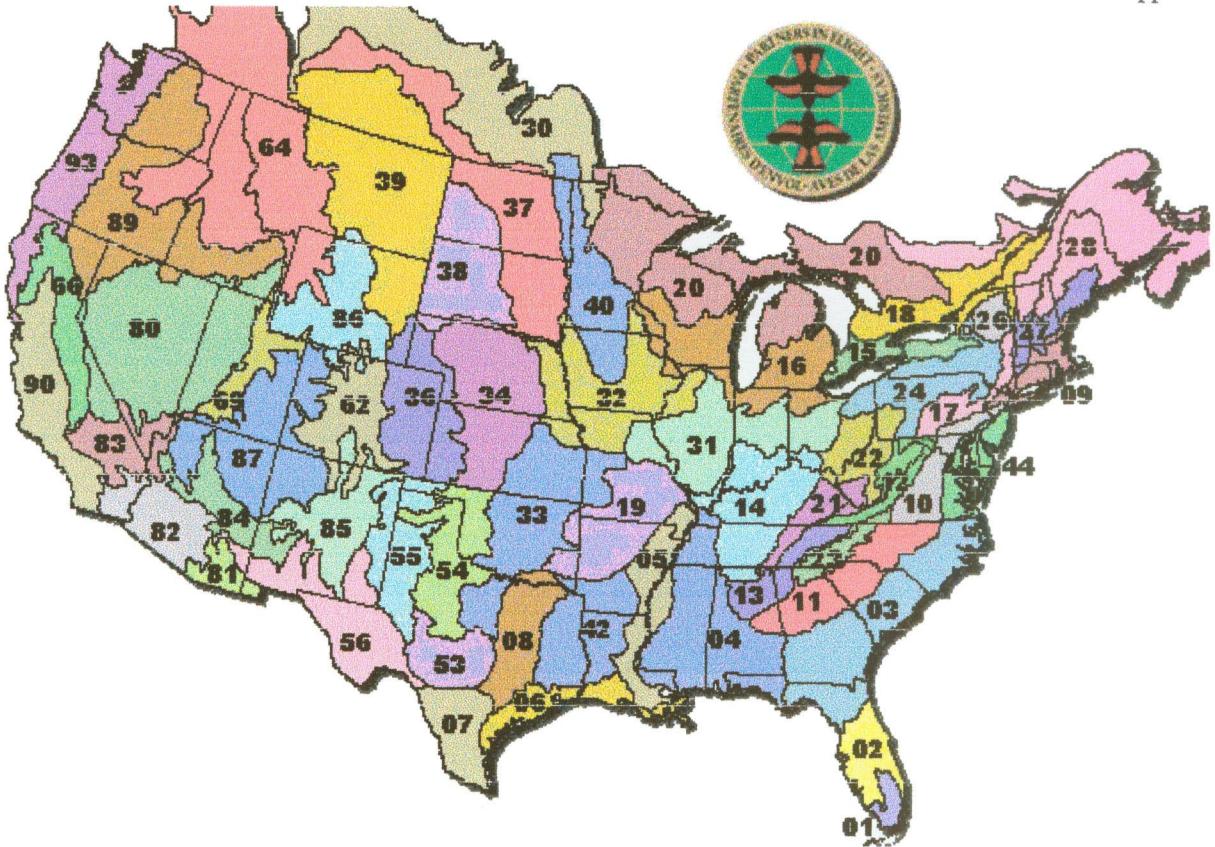


Figure 2. Partners In Flight Physiographic Areas. 32, 34, 36, 37, 38, include Nebraska. From Partners in Flight database, available at: <http://www.partnersinflight.org/>

Trend data can be obtained from BBS data for regions of interest including states, Canada, U.S. Fish and Wildlife Service regions, and BBS regions (Eastern, Central, and Western). Trend data can also be analyzed using physiographic strata, which are larger areas often encompassing several states.

Omernick (1995) divided Nebraska into the following six ecoregions (PIF physiographic areas [Figure 2] in parenthesis). They include the Western High Plains (36), the Central Great Plains (34), the Nebraska Sandhills (34),

the Northwestern Glaciated Plains (37), the Northwestern Great Plains (34 and 38), and the Western Corn Belt Plains (32). Partners in Fight 34, the largest PIF region, encompasses the Nebraska Sandhills, the Central Great Plains, and a portion of the Northwestern Great Plains.

a. The Western High Plains Ecoregion (PIF 36)

The Western High Plains, on the western edge of Nebraska, is higher and drier than the Central Great Plains to the east. It is a region of smooth to slightly irregular plains. Much of this region is in dry-land cropland, with irrigated agriculture along the North Platte River and areas adjacent to the Sandhills. The western panhandle has the highest elevation in the state and receives only about 14-17 inches of rainfall annually (Omernick 1995). This area is a mosaic of mixed-grass and shortgrass prairie and includes two significant areas for birds, the Wildcat Hills and the Pine Ridge Escarpment. Both of these areas are intrusions of Rocky Mountain vegetation from the west. The Wildcat Hills is a ponderosa pine (*Pinus ponderosa*) woodland with bluffs and escarpments. Mixed grasses occur between stands of ponderosa pine on ridge tops and side slopes.

The Pine Ridge, in the northwest corner of the state, is in the Western High Plains ecoregion. It is an escarpment

that extends across northwest Nebraska from Wyoming into South Dakota and is a rugged area of deep canyons and narrow valleys. Ponderosa pine cloaks the steeper slopes while deciduous trees intersect the stream courses. The coniferous forests of the Pine Ridge provide a peak of avian biodiversity in Nebraska, with about 128 breeding species documented in Sioux County (Johnsgard 1998b). Both the Pine Ridge and the Wildcat Hills add sharp contrast to the gentle prairies to the east and south (Wolfe 1993) and host endemic species such as Lewis's woodpecker, pinyon jay, dark-eyed junco, pygmy nuthatch, violet-green swallow, white-throated swift, red-crossbill, and cordilleran flycatcher.

b. The Central Great Plains Ecoregion (PIF 34)

To the east, the vegetation changes are evident. The Central Great Plains are lower in elevation and receive more precipitation than the drier Western High Plains to the west. Once a vast mixed-grass prairie, this region is now mostly cropland in the level areas and rangeland in the rougher terrain. Roughly one-third of Nebraska's mixed-grass prairie has survived, mainly because of the rough terrain (Steinauer 1992). The word "mixed" represents the combination of grasses that dominate this prairie. The drier plains, upper slopes, and hilltops support mid and

short grasses such as little bluestem (*Schizachyrium scoparium*) and buffalograss (*Buchloe dactyloides*). Wetter depressions, ravines, and lower slopes sustain the tall grasses (Steinauer 1992).

Included in this area are two important water systems, the Rainwater Basin and the Platte River Valley. The Rainwater Basin, south of the Platte River, has numerous shallow permanent and intermittent wetlands and is of global significance to waterfowl, shorebirds, and a myriad of migratory and breeding birds. An estimated 30 shorebird species use the Rainwater Basin wetlands during their annual spring migration to the far north. It encompasses an area of 4,200 square miles within 17 counties of south central Nebraska. Surveys in the early 1900's indicated that about 4,000 major wetlands totaling about 100,000 acres were present at the time of settlement. It is estimated that 90% of the wetlands have been destroyed (Farrar 1996).

In contrast, the Platte River is a shallow, wide, and braided river called *Kizhatuz* or wonderful river by the Pawnee and named *La Riviere Plate* or "flat river" by French explorers (Johnsgard 1984). The Platte River originates at the convergence of the North Platte and South Platte Rivers. From its source, the Platte flows east and empties into the Missouri River on the eastern side of Nebraska. Because of

its east-west orientation, the Platte River Valley accommodates movement of eastern and western birds that often converge, including black-headed and rose-breasted grosbeaks, indigo and lazuli buntings, eastern and western meadowlarks, and Baltimore and Bullock's orioles (Rising 1983). The U.S. Fish and Wildlife Service (1981) estimates that the central Platte Valley supports about 142 species of breeding birds, or about 71% of the species that breed in Nebraska. The Platte provides a variety of habitats for Nebraska's avifauna, including wooded and open sandbars, lowland forest, and prairie. It provides critical habitat for sandhill cranes, whooping cranes and bald eagles. According to Johnsgard (1984) 201 bird species occupy the Platte at some point in their life cycle.

c. The Northwestern Glaciated Plains Ecoregion (PIF 37)

The Glaciated Plains is a transition between the more moist plains to the east and the drier plains to the west and southwest. Only the southern tip of this larger region lies within Nebraska borders. The region contains seasonal wetlands called the Prairie Potholes.

d. The Northwestern Great Plains (PIF 34 and 38)

The Northwestern Great Plains contains the Missouri Plateau and a portion of the Niobrara River. The southern-most tip of the area reaches into northern Nebraska and borders the Sandhills. It is a semiarid plain of grassland, now largely replaced by wheat and alfalfa. The western portion is referred to as the shale mixed-grass prairie, which sits on clay formed from weathered shale. The vegetation is sparse. The central portion is called the Keya Paha Tablelands, a mosaic of Sandhills prairie and mixed-grass prairie (Kaul 1993). Dissecting the southern portion is the Niobrara River that originates in Wyoming and flows eastward to its junction with the Missouri River in eastern Nebraska. Because of a particular combination of geographic, geologic, and hydrologic conditions, the Niobrara contains numerous plant and animal species more typical of forests far to the east, north, and west than to other forests in the grasslands (Kaul et al. 1988). Three distinct woodland communities exist - the northern boreal forest with the distinctive paper birch, the eastern deciduous forest, and the ponderosa pine woodlands that extend from the western United States (Steinauer 1993).

Along the Niobrara River there is a significant sympatry of eastern and western species (Brogie and Mossman

1983). Hybrids of closely related eastern and western species come together along the Niobrara River. Examples of closely associated bird species include the indigo and lazuli buntings and the Baltimore and Bullock's orioles.

e. The Sandhills region (PIF 34)

The Sandhills region, about 19,300 square miles in area, sits in the northern center of Nebraska and extends slightly into South Dakota. It is the largest sand-dune area in the Western Hemisphere and is one of the largest grass-stabilized dune regions in the world (Bleed and Flowerday 1998). This region is the only extensive area of dunes in the world that is not a desert (Keech and Bentall 1988). Its east-west length is about 265 miles and its north-south width about 130 miles. The Sandhills region represents the largest remaining area of mixed-grass prairie remaining south of Canada (Johnsgard pers. communication). In this respect alone, the Sandhills is a unique ecosystem.

Another outstanding feature of the Sandhills region is the tremendous water reserves. While the average annual precipitation ranges from 25 inches in the east to 16 in the west, the region lies directly above the Ogallala aquifer, a groundwater reserve of about 700 to 800 million acre-feet of

water (Reed 1966). Small shallow lakes, marshes, and sub-irrigated meadows are abundant, because the water table reaches the land surface or is close to it in many interdunal valleys (Keech and Bentall 1988). Some lakes are watered by artesian wells, springs, and surface runoff; others depend upon the water table and fluctuate directly with its seasonal levels. Streams originate within the region and have a remarkably steady flow. Also present in the Sandhills are alkaline lakes. Few regions in the world provide the magnitude of alkaline mineralized eutrophic lakes as prevail in the Nebraska Sandhills (McCarraher 1977).

About 314 bird species have been reported from the Sandhills region. The high number of species is due to the diversity of vegetation that extends into the region and to the variation of dry upland grass mixed with wet meadows, lakes, and marshes created by the high water table. Seventeen percent of the species documented in the Sandhills are grassland adapted and 31% are wetland adapted species (Labetz 1998).

f. Western Corn Belt (PIF 32)

The Western Corn Belt of eastern Nebraska was once a continuation of the tallgrass prairie. In pre-agrarian

times, lush perennial grasslands covered the rolling hills of the eastern third of Nebraska where annual precipitation averages more than 25 inches. Tall grasses dominated the prairie, a French term for meadow. In the wet valleys, grasses were observed to be head-high with an abundance of forbs, the pea (*Fabaceae*) and sunflower (*Asteraceae*) families dominant. Geologically, this area is a combination of rolling till plains and hilly loess plains that extend into the Central Great Plains region.

The Western Cornbelt also includes the Missouri Aluvial Plain and River Valley. The Missouri River was the pathway to the West for Lewis and Clark. The same river and its tributaries provide the corridor for the eastern deciduous forest to meet the plains. Johnsgard (1998b) has suggested that biologically, the southeast corner of the state is the most diverse. Johnsgard analyzed the breeding species and estimated Nebraska's breeding birds to be the highest in the deciduous forests of the lower Missouri River with an estimated 138 breeding species. Also, about eight species of oak (*Quercus spp.*) and two species of hickory (*Carya spp.*) can be found (Rothenberger 1993). Kaul (1988) suggested a negative westward decline in plant species richness between the mouth of the Niobrara River and the union of the Missouri with the Mississippi River. Breeding bird species are reduced as well when one travels northward and westward to

about 110 species along the upper Platte River and the upper Niobrara River (Johnsgard 1998b).

D. Species and Habitats in Nebraska

1. Overview of Nebraska

The Great Plains Region, a component of the northern temperate grassland of North America, stretches three-thousand miles and encompasses about 20% of the land mass of the 49 conterminous United States (Willson 1995). It is bounded by the eastern slope of the Rocky Mountains on the west and the boundary between the tall-grass and mixed-grass prairie to the east, which is about 95°W longitude or 500-800 km east from the Rocky Mountain Front Range (Knopf and Samson 1997). Canada's boreal coniferous forest and the transition to perennial grassland dominate the northern half of the Great Plains. The prairies and plains of central North America represent one of the largest and most uniform of the continent's ecosystems (Johnsgard 1979).

Nebraska's area is approximately 77,510 square miles. The eastern one-third of the state lies in the Central Lowlands, an area of slight relief in the interior of North America, which extends eastward beyond Iowa and Illinois. The remainder of the state lies in the central Great Plains Region (Weaver 1965).

Nebraska lies upon a broad incline plain, sloping from west to east at a gradient of about nine feet per mile. Its altitude is 5,340 feet near the Wyoming border and 2,000 feet in the extreme southeast. The two largest river valleys in the state are the Missouri and the Platte, which like all Nebraska rivers, flow eastward or southeastward.

Nebraska sits mid-center in this grassland biome. Nebraska's grasslands can be separated into a western, drier, mixed-grass and shortgrass prairie and a more easterly and more mesic tall-grass component (Figure 3).

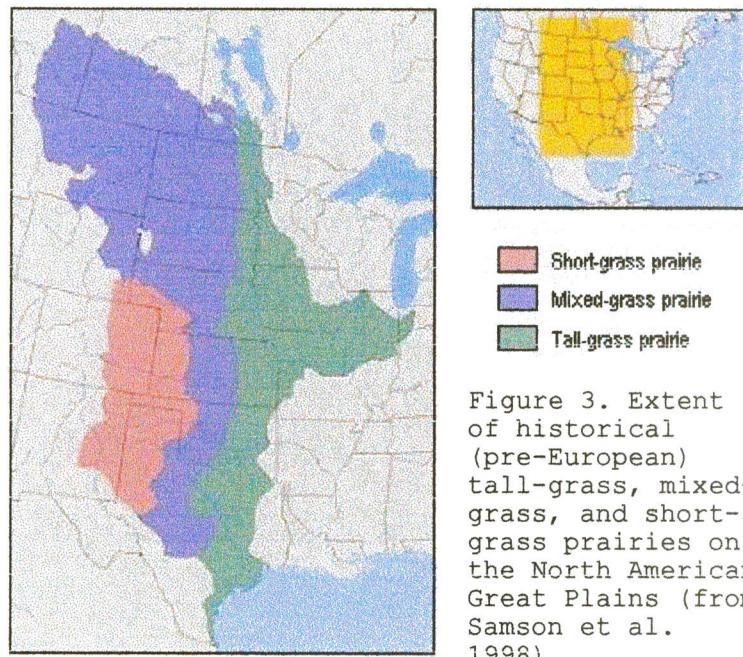


Figure 3. Extent of historical (pre-European) tall-grass, mixed-grass, and short-grass prairies on the North American Great Plains (from Samson et al. 1998)

To the west, the arid shortgrass plains changes to sage-scrub, as sage and arid-adapted shrubs share dominance with the prairie grasses. Mean annual precipitation varies

from 33 inches in the southeast to 23 inches in the northeast, decreasing westward to 17 and even 15 inches (Weaver 1965). Lying in the center of the Great Plains of North America, Nebraska shows a variety of geographic and ecological influences on its bird fauna. Though Nebraska is almost entirely grassland, it is dissected by river-bottom forests that provide natural passageways for forest-adapted species to enter the plains and sometimes cross them (Johnsgard 1979). Several studies on hybridization in the Great Plains (Sibley and Short 1959, 1964; Short 1965) have suggested that these forested riverine systems serve as gene-flow corridors. Mengel (1970) has referred to the Plains as a great isolating agent for birds, a sea of grass separating the eastern deciduous forest continent from the western montane forest and woodland islands. The northern taiga serves as a land bridge that connects the two.

2. Habitats in Nebraska

a. General

Ecological classifications of the state's major vegetational communities give rise to smaller communities or habitats. Although there are a great variety of natural habitats, the more prominent kinds can be grouped into broad

categories. The distinctions between them are based on the kind and amount of vegetation they possess. The vegetation is determined by many factors including climate, fire and grazing regimes. Birds occupying a given habitat, as a rule, are adapted to exploit the specific conditions within it. For the purpose of this thesis, five habitats, used by PIF, will be used to group birds in order to guide management. The five habitats include grassland, woodland, wetland, scrub, and urban. A description of each habitat follows.

b. Grassland

Nebraska was originally dominated by perennial grasslands, which in pre-settlement times covered about 95% of Nebraska's surface. Nearly 30% of these grasslands were of Sandhills prairie, the tall-grass prairie species may have comprised about 30%, and the mixed-grass and short grass were the remainder (Johnsgard in press). The dominance of grass is the result of rainfall that is insufficient to grow trees, but copious enough to prevent deserts (Welty 1982). Grasses associated with broadleaved forbs dominate prairie vegetation. Trees and shrubs are almost absent, but a few may occur in valleys and other moist depressions.

C. Forest and Woodland

When European settlement began, it is likely that forests or woodlands were limited to the river valleys. Today, Nebraska has about 1 million acres of forest, which covers about 2% of the state's total land area. Since 1983, forests and woodlands have increased by 30% (Schmidt and Wardle 1998) because of the suppression of wildfires, the expansion of forest along rivers and streams, the reversion of some marginal croplands to pasture or other uses that permit the establishment of trees. Nebraskans have not only planted woodlots, orchards, firewood plantations, windbreaks, shelterbelts, and wildlife habitat, they have also planted community forests in cities. Nebraska has one of the largest human-planted forests in the United States, some 32,000 acres near Halsey in the Nebraska Sandhills (Schmidt and Wardle 1998).

Nebraska is a grassland state, with continental responsibility for its' grassland resources. However, woodlands and forests are now an integral part of the state's avifauna. Shelterbelts, woodlands, and woody draws have been found to provide some benefits to wildlife (Johnson and Beck 1988, Haas 1997) though a parallel concern is the negative effect on grassland birds. About 108 bird

species are known to use shelterbelts at some time in their life cycle (Johnson and Beck 1988).

Coniferous woodlands occupy rocky outcrops and steep escarpments in the Pine Ridge and Wildcat Hills and flow easterly along the central Niobrara Valley. The common tree species of the Pine Ridge and Wildcat hills is ponderosa pine. According to the U. S. Forest Service, there are currently about 180,000 acres of ponderosa pine in Nebraska (Schmidt and Wardle 1998). Deciduous woodlands are found along river bluffs and floodplains in eastern Nebraska and floodplains only westward (Steinauer 1992). Western woodland vegetation is characteristic of the Rocky Mountains and adjacent plains; eastern vegetation is a remnant of the rich eastern deciduous forests (Kaul 1995). The extension of the eastern forests form a transition zone between the oak/hickory forest of the Missouri River and the grasslands of the west. These woodlands serve as corridors along which a number of birds, mammals and insects move westward to the edge of the prairies (Rothenberger 1998).

The majority of Nebraska's forest communities are found in narrow bands along rivers, floodplains and their buffers. Cottonwood (*Populus deltoides*), and elm (*Ulmus sp.*) dominate the floodplains along the Platte River, the Missouri River, the Loup River, the Niobrara River and the Republican River.

Schmidt and Wardle (1998) estimate that as of 1994 there were about 100,000 acres of this forest type in Nebraska. Along the central Niobrara River, coniferous forests overlap with deciduous forests, giving way to ponderosa pine in the western extreme.

d. Wetland

Despite a small surface area, wetlands are an important ecological component of the Great Plains landscape, providing resources to a myriad of bird species that breed or migrate through the area. Historic records indicate that ephemeral, temporary, and seasonal wetlands were a prominent feature throughout the plains and in Nebraska. However, many wetlands have been destroyed and fragmented, affecting the ecological processes and associated species (Knopf and Samson 1997).

Nebraska's diverse wetland resources include marshes, lakes, rivers, and stream backwaters, oxbows, wet meadows, fens, forested wetlands, and seep areas. Approximately 176 bird species use Nebraska wetlands at some point during their life cycle (LaGrange 1997). Nebraska has three major wetland complexes of global importance. The Rainwater Basin of south-central Nebraska provides important stop-over habitat for waterfowl, shorebirds, and wading birds. The Central Platte River serves as a staging area for 80% of all

North American sandhill cranes and stop-over habitat for 42% of confirmed whooping crane observations in the United States. Over half of the 300 species documented on the Platte River are Neotropical migrant landbirds that winter south of the United States (Lingle 1994).

The third major wetland complex is in the Sandhills of north-central Nebraska. It overlies several aquifers of the Ogallala Formation that contain about one billion acre-feet of water. The above ground wetlands include wet meadows, shallow marshes, and open water lakes, both freshwater and alkaline (LaGrange 1997). These wetlands provide habitat for an estimated 300 species of birds (U. S. Fish and Wildlife Service 1981, 1986).

e. Scrub-successional

Prairie shrublands are communities in which the dominant plants consist of a shrub layer less than five meters tall (Steinauer and Rolfsmeier 1999). Shrub communities in Nebraska vary, but several occur throughout the Great Plains. In western Nebraska, a shrubland may develop into a very open savannah-like stand of ponderosa pine in the Wildcat Hills. The short-grass prairie of Western Nebraska is referred to as the dry steppe province characterized by rolling plains with occasional valleys.

This area has scattered trees and shrubs producing a unique ecosystem (Bailey 1995). The scrub community can occur along edges of woodlands, or in ravines of tall-grass prairies. No doubt the prairie fires historically restricted this community, but fire suppression in current times has fostered growth. Scrub communities can also be found along roadsides and in shelterbelts in Nebraska, historically used for wind protection.

Also included in this habitat assemblage are successional species. These species depend on the disturbances of the natural landscape. For example, the Kirkland's warbler breeds only in stands of young pine ranging from 1 and 6 meters high. The pines exist for only about 15 years after a region is logged or swept by fire. Controlled burning can initiate habitat succession beneficial to the warbler and to the Northern bobwhite quail (Robinson 1997).

f. Urban

Urban habitat was created with the dominance of humans. Buildings, bridges, and chimneys all provide habitat for a few avian species. Chimney swifts now almost exclusively use chimneys; historically they tree cavities. The American robin, blue jay, and house sparrow have benefited from human

associations. Many familiar structures now provide nesting, roosting, and feeding opportunities for a limited number of non-game birds.

3. Nebraska Avifaunal Analysis

Of Nebraska's approximately 216 breeding species, the largest single component is arboreal, using woodlands and forests, while limnic (aquatic and shoreline-adapted) species make up the second largest component. Species associated with grasslands comprise a smaller breeding component, and xeric-adapted forms with semi-desert scrub are the least numerous (Johnsgard 1998a). Most of Nebraska's arboreal species, which comprise about 45% of the state's official check-list of 427 species (Nebraska Ornithologist's Union Records Committee 1998), are eastern or northern in the geographic breeding affinities, whereas a small percentage are of western or southern origin. Of the limnic-adapted species, which make-up about 32% of the state's total avifauna, a considerable portion are either northern or widespread in breeding affinities, and many of these are migrants in the state. Species that occur in grasslands, which make up the largest vegetational component of the state, comprise only about 10% of the state's total avifauna (Johnsgard 1998a).

III. Objective

The objective of this thesis is to formulate a management strategy for the conservation of non-game birds in Nebraska.

IV. Species Occurrence in Nebraska

A. Introduction

As the initial step in the process of developing a management plan for non-game birds in Nebraska, it is necessary to identify the species documented in the state at present, their status (breeding, migrant, accidental), frequency of occurrence, and distribution.

B. Materials and Methods

1. Breeding occurrence

Mollhoffs (2000) Nebraska Breeding Bird Atlas, with 191 range maps, was used as the basis for calculating breeding occurrence. Because the atlas project was conducted from 1989 - 1989, I added 25 additional and rare species for a state total of 216 breeding species.

To determine the percent occurrence of species by ecoregion, I placed a transparent map of Omernick's ecoregions over 191 Nebraska Breeding Bird Atlas range maps, which use blocks to identify each documented breeding bird. The atlas uses standard evidence for coding each breeding bird. All blocks were counted and the number of birds observed in Omernick's 6 ecoregions were summed. I used the sum of the breeding observations ("Possible", "Probable", and "Confirmed" breeding categories) and divided them by the total observations for each species. The "Observed" category was omitted because associated behaviors did not indicate breeding.

Relative abundance of each breeding species in Nebraska was classified using a combination of the 1998 Nebraska Ornithological Union (N.O.U.) bird list (Nebraska Ornithologist's Union Records Committee 1998) and *The Birds of Nebraska* (Johnsgard 1998a). The N.O.U. list uses the term "Regular" (acceptably reported in 9 to 10 of the past 10 years) to define abundance. This term did not adequately describe relative abundance of birds in Nebraska. For example the N.O.U. list used Regular to define the abundance of the Lewis's woodpecker, but its distribution is very restricted and breeding records are rare. I therefore added

a finer description from Johnsgard's publication (1998a) of Abundant, Common, Uncommon, Occasional, or Rare.

For each ecoregion, occurrence of breeding birds was analyzed by two methods. First, the proportion of species present in each ecoregion was determined. Second, using a Chi-square test, I determined if there was an association between bird presence and ecoregion.

1. Migrant Occurrence

Migrant birds are those passing through the state in spring or fall or both, but normally not remaining to breed. To determine migrant occurrence of birds in Nebraska, I used the Nebraska Game and Parks Commission's list of migrant birds, originally developed from a PIF database.

2. Accidental Occurrence

Accidental occurrence is a term of relative abundance documented from state records (Johnsgard 1998a). To determine accidental occurrence of birds in Nebraska, I used Bray et al. (1986) and the Official List of the Birds of Nebraska (Ornithologist's Union Records Committee 1998).

C. Results

1. Breeding Occurrence (Table 1, 2)

The 10 most common, or at least most easily observed breeding birds in Nebraska (Table 1) are mourning dove, barn swallow, eastern kingbird, western meadowlark, red-winged blackbird, common grackle, brown-headed cowbird, American robin, kildeer, and northern flicker. The rarer and more localized breeding birds are the spotted towhee, bald eagle, common moorhen, merlin, Lewis's woodpecker, scissor-tailed flycatcher, plumbeous vireo, Clark's nutcracker, Cassin's sparrow, black-necked stilt, cordilleran flycatcher, dark-eyed junco, white-faced ibis, and Townsend's solitaire. Several of the rare species, including Clark's nutcracker, Lewis's woodpecker, prairie falcon, merlin, white-throated swift, pygmy nuthatch, dark-eyed junco and cordilleran flycatcher are localized in the Western High Plains ecoregion, specifically the Pine Ridge and Wildcat Hills. The mountain plover, king rail, and brown creeper were not detected during Mollhoff's 1984-89 survey, but certainly breed in Nebraska (Johnsgard pers. communication).

The Western High Plains and the Sandhills account for the highest proportion of breeding species. There were 163 species present in the Western High Plains and 160 in the Sandhills (Table 2).

There is a significant relationship ($X^2 = 87$, $P = < .0001$) between the presence of breeding birds in Nebraska and region. Although the Chi-square data does not allow comparison of specific regions, it does allow us to state that there are significant differences among regions. More than 70% of the documented species were present in two regions; the Western High Plains and the Sandhills. The Western High Plains accounted for 75% and the Sandhills accounted for 74% respectively of the breeding species present (Table 2).

2. Migrant (Table 3)

Migrant birds in Nebraska were distributed throughout the six ecoregions.

3. Accidental (Table 4)

Accidental species can be documented anywhere, without reference to ecoregion.

D. Conclusion

The Western High Plains and the Sandhills ecoregions had the highest proportion of species. Both regions have remaining habitat, unlike the eastern tallgrass prairie,

which is 98% gone. Of all the native prairie types, the shortgrass prairie of the Western High Plains persists over the greatest area, for it originally occurred on arid lands too dry for farming.

The Sandhills region is predominately private land, and large ranches are the norm. The Sandhills is the largest remaining intact mixed-grass prairie south of Canada (Johnsgard pers. communication).

Another factor that may account for the proportion of species in both the Western High Plains and the Sandhills ecoregion is their habitat diversity. The Western High Plains is both topographically and ecologically diverse. Along with grasslands, the high plains contain scattered pine woodlands with bluffs and escarpments in the Pine Ridge and Wildcat Hills and sagebrush (*Artemisia* sp.) and greesewood (*Sarcobatus vermiculatus*) in various locations.

The Sandhills, in north-central Nebraska, also has a variety of habitats. The different vegetation that extends into the region, including both coniferous and deciduous forests, and the dry upland grasses mixed with wet meadows, lakes, and marshes created by the high water table, provide a myriad of niches for breeding birds. About 314 bird species have been historically recorded in the Sandhills ecoregion (Labedz 1998).

V. Species Prioritization

A. Introduction

To focus management resources properly, it is necessary to establish bird conservation priorities so that limited human and financial resources can be directed efficiently (Beissinger et al. 2000). Of the 427 bird species that use Nebraska during their life cycle, some will require more conservation effort than others. Because it is unrealistic to write a conservation plan for all 427 birds that use Nebraska at some point in their life cycle, or even for each species that has shown long-term declines, Partners in Flight (PIF) developed a species prioritization process that identifies those birds most in need of conservation. By ranking species, and periodically reviewing them, agencies can simplify conservation planning for multiple species by focusing on a subset within Nebraska (Beissinger et al. 2000).

The Partners in Flight Species Prioritization Scheme was first developed in 1991, and has been continually reviewed and refined in the years following its inception (Carter et al. 2000). The system ranks each species of North American breeding bird based upon seven measures of conservation vulnerability. These factors include: 1) relative abundance, 2) size of breeding range, 3) size of

non-breeding range, 4) threats to the species in breeding areas, 5) threats to the species in non-breeding areas, 6) population trend, and 7) relative density in a given region.

A species is given a score of 1-5 in each category, with 1 indicating the least amount of vulnerability with regard to that parameter and 5 the most. Scores in each category are then summed to produce a composite score ranging from 7-35. Species with relatively high overall scores are considered most vulnerable to extinction.

PIF developed a list of birds (using Breeding Bird Survey data) by physiographic region, and then created a composite score ranging from 7-35 for each species. Species scores by physiographic region are available from the Colorado Bird Observatory (CBO) at:

<http://www.cbobirds.org>.

After taking into account the factors described above, a finer list of criteria was developed by PIF (Carter et al. 2000) in which species in a given physiographic area are identified as priority species for a state or region.

B. Materials and Methods

To prioritize birds for Nebraska, I used the PIF prioritization process developed in 1991 (Carter et al. 2000). I used the scores developed by PIF and available at

CBO for each PIF region within Nebraska. I reviewed the final composite scores for 3 physiographic regions (32, 34, 36) and then I sorted all species that had a final score of 18 or greater. After the initial screening process, I evaluated those species against more specific criteria to develop a final species priority list for Nebraska. For a detailed description of the specific criteria used in the final sorting process see Appendix 3.

C. Results (Tables 5,6,7,8,9)

Using the PIF criteria, 3 physiographic regions were used to develop a specific list of priority birds for Nebraska. The broad PIF regions that include Nebraska are: PIF region 32 representing eastern Nebraska, PIF region 34 in Central Nebraska, and PIF 36 representing western Nebraska. PIF 37 and PIF 38 were not included because their physiographic boundaries include less than 10% of the land base of the state.

The species were listed in ranked order in three PIF regions (Tables 5,6,7). Scores varied for different reasons. For example, the greater prairie-chicken scored high in all 3 PIF regions for almost all criteria, while the dickcissel scored high in 2 regions primarily because of negative

range-wide population trends and because it has a large proportion of its breeding population in the physiographic region. As with many other grassland birds, dickcissel population trends have generally declined since 1966 (Sauer et al. 1995). The northern harrier is an area-sensitive species that has generated concern throughout its range. The piping plover ranked high in all 3 regions because of continued threats to breeding. This is a threatened species at the federal and state levels. Changes in annual river flows of the Missouri and the Platte from dams and irrigation have destroyed much of the historic breeding habitat. The Harris' sparrow is ranked in 2 regions. Though this sparrow does not breed in the state, Nebraska serves as an important winter and migration stopover site between its breeding range in the Canadian Arctic and its winter range in the southern Midwestern states.

Table 8 lists the 44 management priority species for the state of Nebraska. Scores for individual species were averaged over all 3 PIF regions to develop this comprehensive list. The greater prairie-chicken, the Bell's vireo, the northern harrier, the short-eared owl, and the grasshopper sparrow were identified as priority species across all regions. PIF region 32, the Dissected Till Plains, had the largest number of priority species (26).

Region 34 had 24 identified priority species, and region 36, the Central Shortgrass Prairie, had 17 priority species identified for Nebraska.

Most government agencies and some private organizations maintain lists of animal and plant species experiencing declines and threats to their long-term survival, e.g. endangered, threatened, species of special concern, rare, or sensitive. Nebraska's priority species were ranked (Table 9) indicating total priority score and concern status for a variety of agencies. The list identifies species on the Partners in Flight Watch List, The Nature Conservancy global rank, the U. S. Fish and Wildlife species of management concern, and the U.S. Forest Service sensitive species list, which includes the Oglala National Grasslands and the Nebraska National Forest. Appendix 4 identifies the agencies involved and the monitoring information currently available.

D. Conclusion

A ranking scheme such as that developed by PIF can play a useful role in prioritizing state conservation efforts. Managers could be overwhelmed by the number of species to be considered simultaneously, with each species having different needs (Beissinger et al. 2000). By ranking

species, and re-evaluating the ranking, we can simplify conservation planning by focusing on a subset of the birds that exist in Nebraska.

The 44 priority species identified for Nebraska offer a simplified strategy for conservation planning. The 44 species represent the major ecosystems of Nebraska and if continually reevaluated can provide a mechanism for conservation planning over a variety of scales.

VI. Habitat Prioritization

A. Introduction

After a priority species list is developed, it is helpful to group species into broadly classified habitats. This allows conservation efforts to be aimed at vulnerable habitats. It is thought that if conservation efforts are devised for the most vulnerable species in a particular habitat, the needs of other species within the same habitat will be met (Fitzgerald and Pashley 2000).

B. Materials and Methods

Using Table 9, I sorted the priority species by habitat classification as identified by PIF. I also sorted all priority species by migratory status.

C. Results (Table 10)

Table 10 lists the priority species and categorizes them into representative habitats and migratory status.

Figure 4 identifies the habitats in Nebraska that contain the highest proportion of priority species.

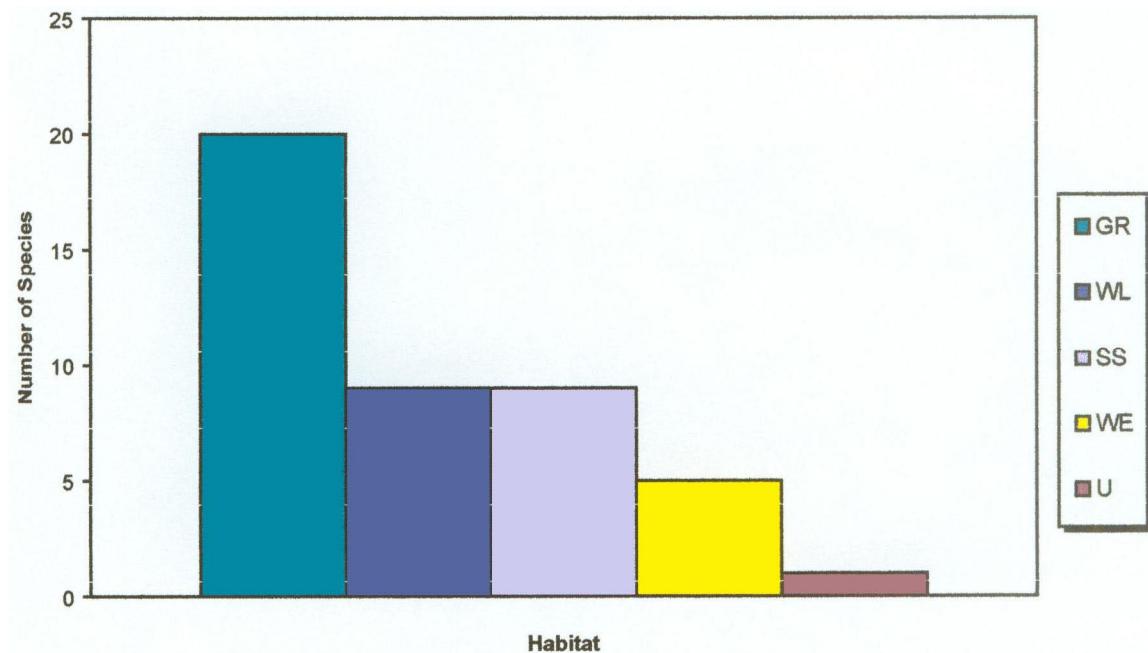


Figure 4. Habitat and priority birds in Nebraska. This figure includes the relative numbers of management priority species among representative habitats in Nebraska. GR=grassland, WL=woodland, SS=scrub-successional, WE=wetland, U=urban.

Grasslands account for 20 of the 44 species or about 45% of the total priority species. Woodlands account for 9 species (20%), shrub habitats 9 species (20%), and wetlands 5 species (14%). Urban habitat supports the smallest number of species.

Figure 5 identifies the proportion of priority species that are Neotropical migrants, short-distance migrants, and resident species. The highest proportion of identified priority species for Nebraska are short-distance migrants, followed by Neotropical migrants.

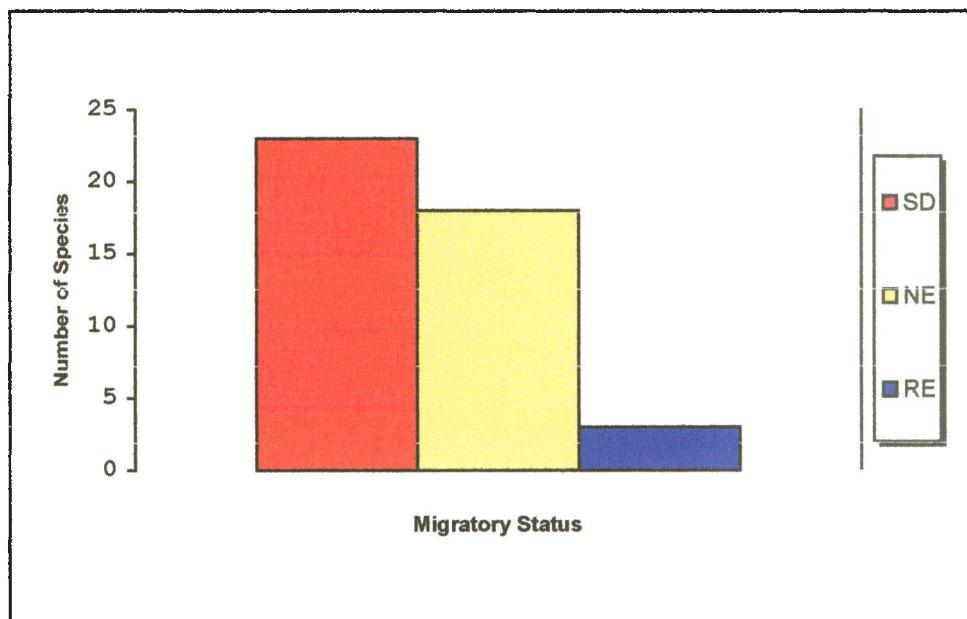


Figure 5. Distribution of priority species relative to migratory Status. This figure includes the relative numbers of management priority species across migratory status. SD=short distant migrant, NE=Neotropical migrant, RE=resident.

D. Conclusion

1. Habitat

The spectrum of priority birds among habitat (Figure 4) is interesting for several reasons. First, forests and woodlands in Nebraska comprise less than 5% of the state's land area, yet support almost half of the state's breeding avifauna (Johnsgard 1998). The high number of birds using the state's forests and woodlands may account for the proportion of woodland birds in need of conservation (20%). Second, historically, about 95% of Nebraska was dominated by perennial grassland, yet grasslands support only about 12% of the breeding avifauna of 26 grassland-adapted species identified by PIF. Despite this original paucity of birds, grasslands now account for almost one-half (45%) of the priority species in need of conservation attention.

By managing for high priority habitats, such as grasslands, managers can provide for the habitat needs of all high priority species of a particular habitat. They can also manage for all species within a habitat by managing for the species with the largest home range size, such as the greater prairie-chicken.

2. Migratory status

Research has made a correlation between migratory status and declines in North American songbirds. Some ornithologists argue that a major cause of the declines in forest-dwelling Neotropical songbirds is loss of tropical forests in their wintering habitats (Robbins et al. 1989).

Grassland birds differ in that many remain year-round within the confines of the United States. Most of the species that breed on the grasslands also spend the winter on the continent (MacArthur 1959). Loss of grassland habitat within the southern United States may be responsible for some of the declines of grassland species. The problem of grassland bird decline may be entirely associated with North American processes (Knopf 1994).

The species of concern in this management plan reflect the full spectrum of habitat requirements of birds in Nebraska, and they demonstrate the need to maintain a

diversity of habitat types for the conservation of non-game birds. However, grassland birds may represent the species with the most significant needs at this time. Most grassland birds have been declining steadily since the Breeding Bird Survey was initiated in 1966, and were probably declining during the decades preceding it. Grassland birds show the most consistent declines of any group of birds monitored by the BBS. Fewer than 30% of the species show increasing populations, and declines prevail throughout North America. (Robinson 1997).

Data from the Breeding Bird Survey show that, between 1966 and 1993, Henslow's sparrows have declined 91% range wide, grasshopper sparrows 66%, and dickcissels 39% (Fig. 6). Henslow's sparrows and grasshopper sparrows are among the fastest declining North American songbirds (Peterjohn et al. 1994). The Henslow's sparrow has more specialized habitat and management needs than the other two species (Kahl et al. 1985, Smith 1992). The grasshopper sparrow, which is rare and declining more rapidly than the dickcissel, seems to be the more sensitive to habitat changes and management methods (Skinner et al. 1984, Swengel and Swengel 1998).

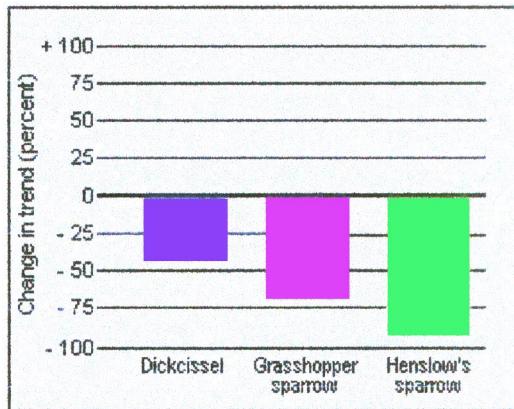


Figure 6. Percent decline of three grassland sparrows in the U.S. Geological Survey Breeding Bird Survey between 1966 and 1993 (Peterjohn et al. 1994). (From Swengel and Swengel 1998).

VII. Endemic and Rare Species in Nebraska

A. Introduction

Based upon the species analysis presented in Chapters IV-VI, it became apparent that some species might not have been identified in the prioritization process. Robbins et al. (1966) noted that species that are rare, nocturnal, very local, or are limited in range were not reliably sampled by the BBS. Because PIF relies heavily on the BBS database, some birds may have been overlooked in the process. Therefore, I also considered both endemic and rare species in Nebraska.

Endemic species are important because they are have evolved in and are adapted to a specific set of habitat requirements. More importantly, endemic grassland birds are confined to grasslands. As a group, grassland birds in general (Askins 1993), and endemic grassland birds specifically (Knopf 1994), have shown steeper, more consistent, and more geographically widespread declines than any other ecological guild of North American species.

The endemic birds of the prairies have evolved within a mosaic of greatly varied patterns of disturbance, mostly grazing. The primary plains grazers included prairie dogs, antelope, and bison. The McCown's longspur and mountain plover occur at sites of heavy grazing; the lark bunting and chestnut-collared longspur occur in sites of moderate grazing disturbance (Knopf 1994, 1996).

Rare species are often considered more vulnerable to extinction because of their low numbers. Rarity, however, is not a simple concept. A species may be rare in a variety of ways based on different distributional patterns (Rabinowitz et al. 1986). Additionally, a rare species may have a restricted range because it is highly specific, it may have a small population size, or a combination of these characteristics.

For the purpose of clarity, the rare and endemic species will be presented separately.

B. Materials and Methods

1. *Endemic Species*

For endemic species, I used Mengel's (1970) classification of primary endemic birds. I identified the associated continental, regional, and Nebraska trends using BBS data (Sauer et al. 1999).

C. Results (**Table 11**)

The primary endemic species (Mengel 1970) and associated BBS trends are presented in Table 11. From this analysis, it is apparent that 8 of the 12 primary endemic birds breed in Nebraska and that, of those, survey-wide

trend data suggest a negative trend for 7. The Nebraska BBS, in contrast, does not detect 3 of the endemic species (Sauer et al. 1999). As important, all of the Nebraska's grassland endemics as identified in Table 11 are on the priority species list, with the exception of the Wilson's phalarope, a wetland species.

D. Conclusion

Mengel (1970) has noted that the Great Plains grasslands support only 37 grassland-adapted species (that evolved there but range more widely) and 12 grassland endemics, a rather low number considering the vastness of the grasslands. Only 5% of all North American bird species are thought to have evolved in the Great Plains region (Mengel 1970).

Grassland-adapted species that have been in serious decline nationally from 1966 to 1993 include the greater prairie-chicken (-85.3%), the long-billed curlew (-36.5%), loggerhead shrike (-54.7%), Bell's vireo (-40.4%), field sparrow (-57%), lark sparrow (-61.2%), grasshopper sparrow (-67.8%), lark bunting (-44.1%) and dickcissel (-35.8%). The collective average national rate of decline for these nine species is -53.6%; however, the overall trend for these same species in Nebraska is +1.1%. All of these species are grassland-dependent birds, and most of them are concentrated

in the Nebraska Sandhills. The Henslow's Sparrow is also in very sharp decline nationally (-74.7%), but is clearly increasing both its range and abundance in southeastern Nebraska, perhaps because of the Conservation Reserve Program (CRP). The 1985 and 1990 U.S. Farm Bills include provisions to fund a cropland-idling program. Over 36 million acres have been enrolled nationwide since 1985, and up to 25% of cropland has been converted to grass (Reynolds et al. 1994).

Further work on non-birds could focus attention on grassland endemic species, which have experienced declines and may be more prone to extinction because of the dramatic reduction of native prairie and associated species. As indicated, all are on the priority list for Nebraska except the Wilson's phalarope.

Monitoring efforts are encouraged that detect species such as the Cassin's sparrow, mountain plover, and McCown's longspur; species that have been documented as breeding in Nebraska (Johnsgard 1998a), are not monitored by the Nebraska BBS, and are on the priority species list.

B. Materials and Methods**2. Rare Species**

For the purpose of identifying Nebraska's rarer breeding species, we constructed a rarity index representing the sum of the three sets of Ducey's numbers (<1920, 1921-60, >1961) plus those of Mollhoff (2000). Any species for which the total of these sets of numbers was \leq 20 was considered rare. Nebraska BBS trend data for species for which it is available were recorded.

C. Results (Table 12)

A list of rare species is presented in Table 12. The summary of three data sources suggests that the number of species now breeding in Nebraska is above 200, which concurs with the occurrence totals of 216 breeding species (Table 1). From the rarity list it is apparent that the majority of rare species identified for Nebraska are at the edge of their range.

There are 8 species that I identified as priority species for Nebraska on the rarity list (\leq 20 records). Five of the 8 total species identified as rare are grassland endemics. The 5 endemic species with a rarity index of \leq 20 include the McCown's longspur, the chestnut-collared

longspur, the Brewer's sparrow, the mountain plover, and the Cassin's sparrow. The other species identified as rare, other than the grassland endemic species, are at the edge of their range. They include the prothonotary warbler, the cerulean warbler, and the scissor-tailed flycatcher.

D. Conclusion

The species identified represent species that are rare in Nebraska for various reasons, including those at the edges of their overall ranges (the majority of the listed species), those species having inherently small and scattered populations (several large falcons and hawks), species that are endemic to grasslands, species that are elusive and easily overlooked (such as the king rail and brown creeper), or are ones that have suffered serious population declines (such as the several threatened and endangered species on the list, including the mountain plover, the least tern, and the piping plover). The majority of the species identified as rare are at the edge of their range in Nebraska, with the exception of the least bittern, sharp-shinned hawk, brown creeper, spotted towhee, and dark-eyed junco. Those species may have low estimated numbers because they are hard to detect.

The range of the cerulean warbler extends into the southeast corner of the state. The range of the scissor-tailed flycatcher extends into the southern aspect of Nebraska. The prothonotary warbler extends slightly into eastern portion of the state. These priority species are at the edge of their ranges in Nebraska. Focusing attention on edge of range species may be a difficult, yet important conservation effort.

VIII. Conservation Issues and Recommendations for Nebraska

A. Introduction

There are important conservation concerns facing the state of Nebraska. Many issues influence the habitats and the avifaunal diversity of the state, and therefore of the Great Plains as a whole. The significant conservation issues will be identified and broad recommendations will be made by habitat including grassland, woodland, wetland, and scrub-successional.

B. Conservation Issues

The landscape of Nebraska has undergone significant alteration from descriptions provided in early accounts. Grasslands have been cultivated, wetlands drained, fire suppressed, and the native grazing community transformed

(Knopf 1994). Eastern Nebraska has been almost exclusively transformed to cropland, with accounts of only 2% of the native tall-grass prairie remaining (Samson et al. 1998). The proportion of native short-grass prairie in western Nebraska is comparatively high. Compared to the eastern grassland landscape, western Nebraska is merely fragmented rather than obliterated (Knopf 1994).

Wetland loss has been similar to the loss of the prairie. At the time of statehood in 1867, Nebraska contained an estimated 2,910,000 acres of wetlands covering about 6% of the state (Dahl 1990). Through much of the state's history wetlands were viewed as an impediment to transportation, agriculture, and development (LaGrange 1997). The net result of all these activities statewide was a reduction in wetlands by an estimated 35%, to 1,905,000 acres covering only 3.9% of the state (Dahl 1990).

Fire suppression has enabled woody vegetation to encroach on grasslands. Almost 3% of the Great Plains is now fragmented and forested by shelterbelts (Baer 1989), changing the distribution of birds in Nebraska. Much of the woody vegetation consists of exotic tree species such as Siberian elm (*Ulmus pumila*) and Russian olive (*Elaeagnus angustifolia*). More importantly, the introduction of exotic tree species in native grasslands results in population

declines of narrow endemics that evolved with native grasslands (Knopf 1992).

Animal profiles have also undergone dramatic changes over time in Nebraska. Historically, humans systematically reduced estimated populations of 30 million bison (*Bison bison*) to a mere 281 animals (Roe 1951). Beginning in the 1860s, cattle replaced bison and resulted in grasslands being fenced and cattle confined (Knopf 1994). Intensive efforts to eradicate the prairie dog (*Cynomys ludovicianus*), the other major herbivore, followed elimination of the bison. All of these changes have altered the original landscape and no doubt contributed to changes in population trends of non-game birds in Nebraska.

Trends of bird population are among the best available for any taxonomic group (Samson and Knopf 1996). Both the Breeding Bird Survey (BBS) and the Christmas Bird Count (CBC) data provide coordinated annual inventories of birds in the United States. As a group, grassland birds in general and endemic grassland birds specifically have shown steeper and more geographically widespread declines than any other guild of birds in North America. One-third of the Continental population of prairie birds is currently declining at a statistically significant rate. These steep declines sustain the view that the native prairies of the

Great Plains may be one of the most imperiled ecosystems in North America (Samson and Knopf 1996).

C. Recommendations by Habitat for Nebraska

1. *Forest and Woodlands*

Nebraska's forests and woodlands now represent about 1,830,000 acres including commercial forests, non-commercial forests, wooded strips, windbreaks and non-forest land with trees (Adams 1993).

There are several dominant issues for conservation identified for migrant birds in the Central Hardwood Region. First is that conservation planning must recognize the spatial structure of bird populations in the forests of the Midwest and emphasize enhancement and preservation of regional source populations. This is important because fragmentation of a source habitat could have severe repercussions (Thompson et al. 1995).

Logging is another important conservation issue. Loggers cut about 20 million board feet of ponderosa pine in Nebraska in 1994 and 30 million board feet of cottonwood (Schmidt and Wardle 1998). It is important that land managers are aware of the silvicultural regimes used by the

logging industry, and that avian conservation is an integral part of land-use decisions.

Recommendations:

- Identify and maintain large remnant tracts of older forest, particularly along river drainages.
- Do not further fragment large tracts of forest.
- Maintain large woodlots, shelterbelts, and small forest tracts, when they do not interfere with grassland function.
- Develop research on forest bird community composition, species density, reproductive success, habitat structure, and landscape conditions (Fitzgerald and Pashley 2000) with emphasis on the SE and NW aspects of Nebraska, which offer the highest species diversity.
- Identify the source and sink populations of landbirds in forest tracts.

2. Grasslands

Grasslands had varying levels of disturbance, even before the arrival of Europeans. They were grazed heavily, but intermittently, by huge herds of bison, which left the landscape in a habitat mosaic ranging from heavily grazed to un-grazed. Grasslands were also exposed to fires. Climate and fire are thought to be critical to their existence. Generally, a west-to-east continuum exists in North America; grazing has been the dominant ecological force on western

short-grass areas, and fire has been the primary force to the east (Vickery et al. 1999). It is with this perspective that management of prairies should be viewed (Berkey et al. 1993).

Since 1830, declines of the tallgrass prairie within specific states and provinces are estimated to be 82% to 99.9%, and exceed those reported for any other major ecological community in North America (Samson and Knopf 1994). The tall-grass prairie was originally about 67,730,000 hectares. The current area is about 2,169,894 hectares - or about a 97% decline. Less than 1% of the pre-settlement tall-grass prairie remains in Manitoba, Illinois, Indiana, and North Dakota. The Nature Conservancy's Natural Heritage Data Center Network estimates that Nebraska originally had about 6,100,000 hectares of tall-grass prairie. Only 123,000 hectares remain, which is a 98% loss of native tallgrass prairie for the state (Samson et al. 1998).

Declines in mixed-grass prairie are similar, but slightly less dramatic. In its original extent, the mixed-grass prairie type constituted about 62,800,000 hectares. About 22,580,800 of the area remains, which represents a 64% loss. For Nebraska, original estimates are for about

7,700,000 hectares of native mixed-grass prairie. There are 1,900,000 hectares, or 25%, remaining (Samson et al. 1998).

Declines in the shortgrass prairie have been significantly less than those of tall-grass and mixed-grass prairies. However, perhaps in no other system than shortgrass prairie are evolutionary impacts of grazing so apparent (Knopf 1996). The endemic birds of the shortgrass prairie express life-history characteristics and habitat use in response to grazing (Figure 7). The mountain plover responds to highly disturbed sites, the chestnut-collared longspur to moderately grazed areas, and the Baird's sparrow to sites with taller grasses (Samson et al. 1998).

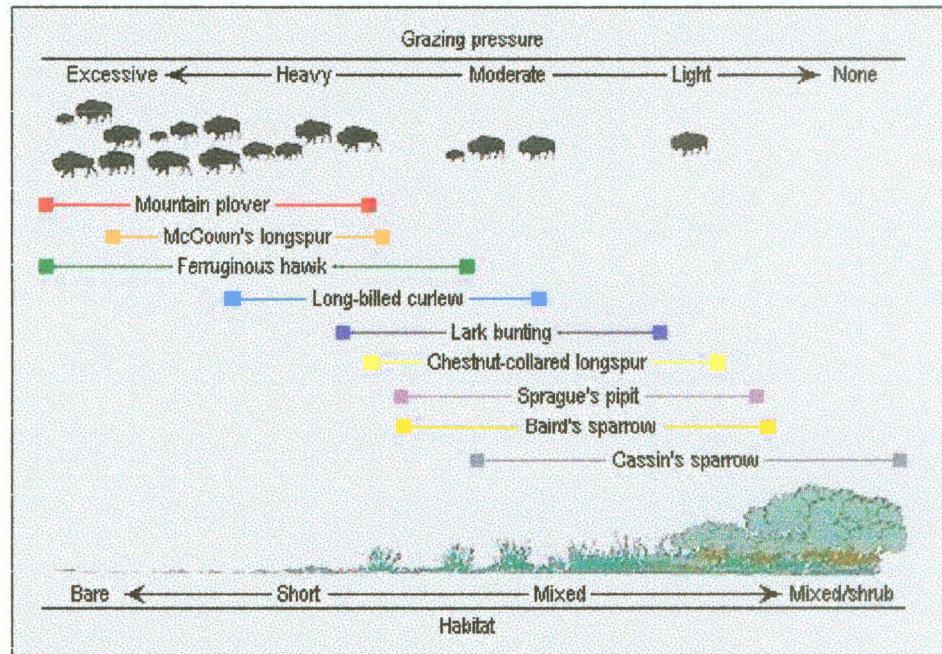


Figure 7. Importance of co-evolution between grazing and native prairie bird distributions and abundances (from Knopf 1996).

European settlement has dramatically altered the natural grasslands in Nebraska. Farming was the most direct agent, particularly in the more eastern, more mesic part of the state. Other impacts have been less direct, but equally destructive. Among these are intentional or accidental introductions of exotic plant species, which have invaded native grasslands and disrupted the original plant communities. Grazing by free-ranging bison has been replaced by grazing by cattle, often confined within small pastures. Prairie fires have been suppressed, which has allowed the intrusion of woody vegetation, especially in the moister parts of the state. These impacts have differentially affected the native grasslands (Berkey et al. 1993).

Most of the land managed by the Nebraska Game and Parks Commission and other public natural resource management agencies are relatively small islands within a mosaic of private land. Often the land is left idle, without the benefits of a shifting pattern of grazing and prairie fires. The consequences of idling grassland and suppressing fire may be summarized in three scenarios of succession, depending on the prevailing precipitation regime. In the more mesic areas, especially in eastern Nebraska, the

grassland is ultimately transformed to woodland with an understory of various shrubs and introduced grasses. The second scenario, in somewhat drier areas, has succession proceed to a shrub community. In the third scenario, the grassland becomes choked with an accumulation of litter without periodic burning (Berkey et al. 1993).

Bird communities change dramatically under these vegetation successions from grassland. The effect of the first scenario is an increase in the numbers of woodland-edge species, such as the eastern and western kingbird, the house wren, and the brown thrasher. The second scenario favors species such as the common yellowthroat. Few species benefit from the third scenario. In contrast, virtually all primary grassland bird species suffer with any of these successional changes. The ferruginous hawk, the willet, the burrowing owl, the Baird's sparrow, and the chestnut-collared longspur are only a few of the species that decline with successional changes (Berkey et al. 1993).

The intrusion of tall, woody vegetation into a prairie landscape influences a bird community in different ways. First is the direct loss of prairie plant species, through competition for light, water, or nutrients. Then, we may lose insect species that used those plants, which many non-game birds use as a major food source. Some prairie bird

species completely avoid areas with woody vegetation. Woody vegetation can fragment the grassland, creating a landscape pattern that is too small for area-sensitive prairie birds, such as the greater prairie-chicken. And finally, trees offer vantage points from which brown-headed cowbirds can survey the surrounding area and locate nests to parasitize. In conclusion, the intrusion of woody vegetation into the prairie has far-reaching consequences to grassland bird communities (Berkey et al. 1993).

Dramatic changes in some grassland bird populations were not noted until the 1960s. Songbird populations were quite stable, considering the prairie was all but gone. Surveys in Illinois showed breeding populations in 1957-58 to be as numerous as in 1906-1909 (Gerard 1995). After the 1960's the area of managed grasslands dropped sharply by as much as 50% per decade. As cash-grain farming increased in an area, the size of crop fields doubled, and the fencerows decreased. The declines in prairie avifauna have corresponded with the shifts in agricultural practices, including conversion of perennial grassland to cropland, the expansion of lands planted to row crops, and the clearing of field edges (Gerard 1995). Before these dramatic changes in agricultural practices, species such as upland sandpipers that required short grass lived in pastures, and those that

needed taller grass, such as bobolinks, inhabited hayfields. Since then, however, the farm acreage that is devoted to pasture and hayfields has fallen as the emphasis shifted to row crops like corn and wheat and soybeans. With the availability of faster-growing grass seeds, hayfields are also harvested much earlier, affecting the productivity of grassland birds (Robinson 1997).

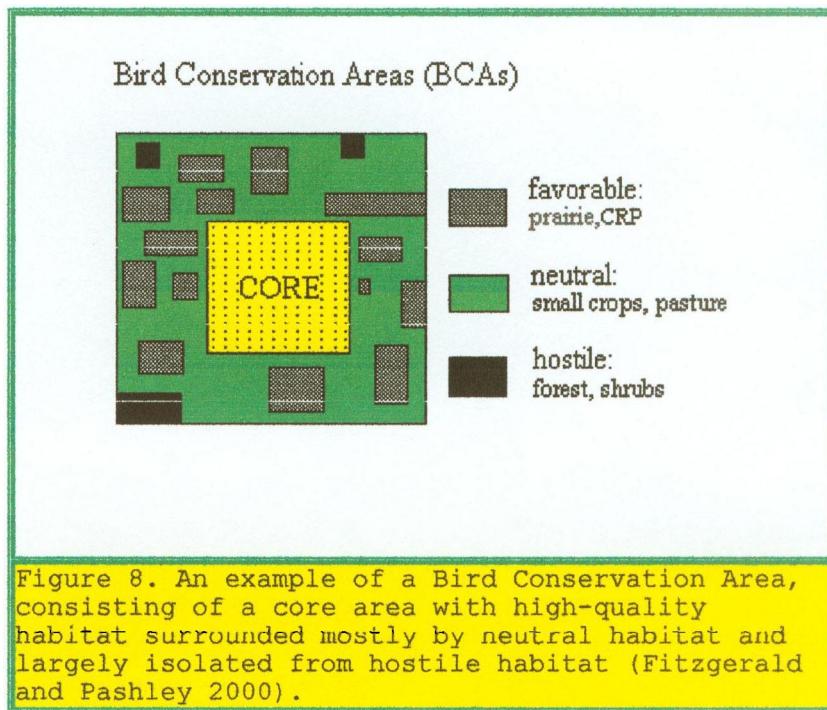
One result of these evolving shifts in land-use is very large, continent-wide decreases in the populations of grassland birds. In fact, birds that breed in grasslands are the only habitat group showing consistent declines (Sauer et al. 1999). Over the past few years, trends for a few species have reversed as more and more acres have been set aside as part of the Conservation Reserve Program (CRP), which subsidizes farmers not to grow crops on marginal farmland. The policy has benefited several of Nebraska's priority species, including the grasshopper sparrow, and the dickcissel (Best et al. 1997).

Declines of tall-grass adapted species should have been greater, considering the dramatic loss of habitat. However, this has been buffered by the expansion of agricultural grasslands into previously forested areas in the eastern United States, which has allowed many species of grassland

birds to expand their historic ranges eastward (Vickery 1993).

Recommendations:

In an attempt to reverse population declines of grassland birds, the management concept of Bird Conservation Areas (BCA's) has been suggested (Fitzgerald and Pashley 2000). The notion behind BCA's is that core areas of quality habitat (such as native prairies) that are isolated from hostile habitats (such as woody vegetation) will result in reproductive rates sufficient to maintain population levels of breeding birds (Figure 8). The BCA concept implies that the value of high-quality core areas depends on the habitat composition of the landscape matrix in which the core areas are embedded. This concept has not been validated for grassland birds, but conservation reserves have been recommended to protect species of special interest, to preserve biodiversity, and to preserve large and functioning ecosystems (Meeffe 1997).



The BCA suggests a 4,000 ha management unit at the center, with an 800 ha block of grassland called the core. The core is centered upon one or more prairie-chicken leks. The matrix is the 3,200 ha area surrounding the core (Winter et al. 1998). The concept is that large patches within the landscape will meet the minimum needs of high priority species. The core size is based on the needs of the home range of the greater prairie-chickens (Fitzgerald and Pashley 2000).

Another conservation method available, particularly in the Sandhills, which has an abundance of large private ranches, is the conservation easement. The conservation easement is a legally recorded incentive-based restriction

landowners voluntarily place on their property that limits land to specific uses. Easements can protect natural resources such as topsoil, water quality, wildlife habitat or scenery. Incentive-based approaches correlate with economic self-interest; farmers and ranchers can benefit from providing environmental protection on their land. Conservation easements have the potential to be effective conservation tools on private land in Nebraska.

Recommendations:

- Focus management on grassland and wetland species, especially endemics, in preference to those of other habitat affinities and distributions.
- Identify and protect large grassland sites. Avoid further loss and fragmentation of existing grassland habitats.
- Identify and protect 3 remnant tall-grass prairie conservation areas by 2005. Area size of 4,000ha is recommended. The Nebraska Game and Parks Commission might select the Pawnee Prairie and Burchard Lake Prairie.
- Use Colorado Bird Observatory (CBO) and Prairie Partners, which is a cooperative venture between CBO and private landowners, to identify important shortgrass prairie conservation areas. Identify 3 shortgrass conservation areas by 2005.
- Explore conservation of the mixed-grass prairie(Sandhills) using the conservation easement and or partnerships.
- Maintain and manage ecosystems according to their historical disturbance regime.

- Work with private ranchers to identify economically viable grazing techniques that also benefit birds.
- Maintain and foster the Conservation Reserve Program.
- Actively manage grasslands to control woody encroachment through the use or fire, grazing, and mowing, when applicable.
- Within a regional context, protect and manage enough sites to provide sufficient diversity of grassland habitats ranging from wet meadows to dry, xeric grasslands.
- At the local level, large grassland sites should be managed to include a mosaic of management prescriptions, including both recently disturbed (burned, grazed, mowed) and undisturbed areas, including completely rested grasslands.
- Mowing and haying on public grasslands should not be conducted during the height of breeding season (May 1-July 15). On private lands, encourage deferred mowing.
- Maintain reservoirs of prairie dog colonies, even where prairie dogs are controlled.
- Encourage a more varied grazing regime to create varied grassland mosaics.
- Encourage the use of native plants, particularly along roadsides. Work cooperatively with the Department of Roads to maintain native grasslands along road corridors.
- Research the validity of Bird Conservation Areas for the conservation of grassland birds.
- Research the effects of habitat structure and composition on avian communities and the effects of landscape context (e.g., block distribution, surrounding land use, and proximity to hostile environments) on avian numbers and productivity. Use the established BCA as a monitoring benchmark.

- Research factors associated with highly variable population numbers of grassland birds (climate, habitat changes, nesting success).
- Develop a monitoring strategy for breeding and migrant birds.
- Determine the importance of Nebraska for wintering birds.

3. *Scrub-successional*

Birds that use shrub habitats can adapt to newly disturbed areas and often they benefit from human activities. Game management and even residential development can create suitable habitat for scrub-successional species.

As a result of these practices, there have been increases in populations of scrub-successional birds. But some of the fastest-declining species in North America, such as the Bell's vireo and Harris' sparrow, are found among this group. According to BBS trend data (Sauer et al. 1999), species that use scrub habitat in the southeast aspect of Nebraska are experiencing declines of less than -1.5% per year. The southeast aspect of the state is showing the steepest decline for scrub-successional birds in the state.

Most of the declines of these and other species can be traced to more specific, regional changes in land-use patterns. In the Midwest, shrubby areas have disappeared as

intensive road-to-road row crops have replaced the more diverse agricultural landscapes of hedgerows and wooded stream corridors that were favored through the 1950s. Declines of some reflect the retreat of species from areas that they had never inhabited until humans arrived and transformed the landscape (Robinson 1997), a point to consider in management recommendations.

Recommendations:

- Combine game management with the conservation of declining scrub-successional birds. Policies that protect shrubby fields and edges may benefit both of them.
- Maintain a mix of scrub and grassland habitat, if it does not interfere with grassland function.

4. Wetlands

Wetlands are dynamic and productive systems that produce more plant and animal life per area than woodlands, prairies, or cropland (LaGrange 1997). LaGrange (1997) estimates that 50% of Nebraska's bird species use wetlands at some point during their life cycle. Nebraska is unique in its possession of major wetland complexes that are of international importance.

There have been changes to wetlands since the arrival of the original Europeans. The loss of a small percentage of the region's wetlands no doubt had a negligible effect. But as losses accelerated, a threshold was crossed and negative impacts began to occur. Particularly noticeable were the reductions in waterfowl. As wetlands were diminished, water quality deteriorated, and increased flooding occurred in some watersheds (LaGrange 1997).

The development of the High Plains aquifer for irrigation, particularly between 1940-1980, poses a threat to wetlands in Nebraska. Declines of water vary with locale, exceeding 30 meters in some parts of the central and southern High Plains; 6 meters in southwestern Kansas, east-central New Mexico, and the Oklahoma and Texas panhandles; and 3 to 6 meters in northeastern Colorado, northwestern Kansas, and southwestern Nebraska. This gradual and sustained reduction of groundwater will have a dire effect on wetlands and wetland birds (Samson et al. 1998).

Another current issue is the contamination of wetlands with pesticides. Over 100,000 metric tons of pesticides (herbicides, insecticides, and fungicides) were applied in the mid-continent in 1991, often to control non-indigenous plants and animals. In the spring and summer of 1991, concentrations of several herbicides exceeded U.S.

Environmental Protection Agency standards in about half of the streams sampled in the upper Missouri River basin (Huntzinger 1996). Effects of these pollutants on the quality of human life and on the integrity of the ecological community are largely unknown (Samson et al. 1998).

The larger rivers in the Great Plains have been subjected to water removal for irrigation and other consumptive uses. In most of these river systems, the loss of water has altered the timing and extent of flows, downstream temperatures, levels of dissolved nutrients, sediment transport and deposition, and the structure of plant and animal communities. Few major Plains rivers exhibit the conditions that existed before agricultural development and water management (Samson et al. 1998).

Agricultural drainage and flood control have doubtless been the greatest destroyers of wetland habitat in the country as a whole, but other factors, particularly loss of habitat in coastal marshes, have significantly reduced both the quantity and the quality of wetlands useful to wildlife. This directly affects those birds that use wetlands as breeding, stop-over, or winter habitat (Robinson 1997).

The Great Plains contributes to overall continental diversity by providing wetland habitat for migratory species

that cross the continent. Many shorebirds require a complex of wetlands that they use as stop-over sites to build up their depleted energy reserves. The dynamic nature of wetlands on the Plains probably had an influence on the evolution of shorebird migration (Knopf and Samson 1995).

No doubt, one reason there are few wetland birds on Nebraska's priority list is that wetland birds are not easily monitored by standard census techniques. Dense vegetation reduces the visibility of some species. Many species lack territorial songs or rarely call; others that make diagnostic sounds do so only at night. And some species, such as rails, are elusive, offering little chance for seeing or hearing. Others are colonial, resulting in tremendous spatial variability in their numbers. Thus, no single technique works well for censusing all wetland species. Accurate censusing of wetland birds requires a variety of techniques, including nocturnal surveys, nest counts, intensive efforts involving walking or canoeing through marshes and stream courses, and the use of recorded calls to elicit responses (Bibby et al. 1992).

Recommendations

- Protect the biotic integrity of wetlands through conservation efforts.
- Develop alternative ways to protect wetlands, including the use of conservation easements for private lands. Use Colorado Bird Observatory and Prairie partners as a tool to conserve western wetlands.
- Develop monitoring strategies for wetland birds.

IX. Monitoring

Conservation and management of Nebraska's avifauna depends on adequate monitoring information. From a global perspective, Nebraska is important because it hosts an array of grassland endemic species and serves as a migratory stop-over site and wintering area for many non-game birds.

The priority species list, presented in this thesis, and developed from PIF trend data, is an adequate first step, but may not represent all the avifauna in Nebraska in need of conservation. There are large gaps in criteria information used to establish priority ranking because of inadequate monitoring of many important species.

In Nebraska, 216 avian species have historic or recent breeding records. The Breeding Bird Survey does not monitor 41% of the breeding species, even though the Survey is the best and most extensive existing North American bird-monitoring program (Table 13).

Population trend uncertainty scores (PTU) are an indication of the effectiveness of the population trend scores (PT) for Breeding Bird Survey data. PTU scores were developed by PIF (Carter et al. 2000) for all species and can be used to judge the quality of the associated trend data. PTU scores range from 1-8. A score of 1 indicates sufficient data; a score of 8 indicates no data. A detailed description of PTU criteria can be found in Appendix 4.

I analyzed the Nebraska Breeding Bird Survey and identified PTU values for each species. Of the 215 avian breeding species, there are 89 unmonitored species (a PTU score of 8) and 67 species whose trends are unknown or have insufficient data (A PTU score of 5-7). A total of 73% of the avian species in Nebraska are unmonitored by the BBS, their trend is unknown, or there are insufficient data.

Public agencies in Nebraska do not have formal monitoring plans for non-game birds. I surveyed many of the public and private organizations in Nebraska and describe the results in Appendix 5. Neither the U.S. Forest Service or the U. S. Fish and Wildlife Service have monitoring plans or formally monitor non-game birds. The most active groups in Nebraska seem to be the private non-profits, though no consistent monitoring programs exist for the majority of the 216 breeding species.

Of the 12 primary grassland endemics (Mengel 1970), ⁸ breed in Nebraska. Of those, 5 (62%) are monitored. The McCown's longspur, Cassin's sparrow, and mountain plover are not monitored by the BBS. Most of the nocturnal species are not monitored, and wetland species are under sampled. In addition, BBS routes poorly sample western Nebraska and the Sandhills.

Better data will detect more species, which may determine that a significant proportion of species are not declining in Nebraska, or it may suggest the addition of species to the conservation priority list. Good information will allow managers to make better decisions and prevent species from being federally listed as threatened or endangered.

Recommendations

- Develop and implement a monitoring strategy for Nebraska's non-game birds based on that designed for both Colorado and Montana by the Colorado Bird Observatory. Their strategy divides monitoring among agencies by habitat.
- Standardize the collection of bird and habitat monitoring among agencies.
- Develop a variety of monitoring programs with different levels of intensity; BBS routes, point counts, BBIRD, and mist-netting.
- Establish trigger points to use monitoring results to launch research or management action.

- Expand BBS coverage, particularly in the Sandhills and western Nebraska.
- Implement monitoring for migrant species, and verify Nebraska's importance for wintering birds. This can be done with point counts and the expansion of the Christmas Bird Count

X. Conclusion

Appendix 6 contains species accounts for all 44 priority species. These accounts give a brief description of range, habitat, and trend data, focusing on Central BBS and Nebraska BBS trend results. Species occurrence by ecoregion is referenced along with the corresponding habitat. Species account information came from several sources including the United States Geological Survey, Patuxent Wildlife Research Center, the Northern Prairie Research Center, and The Nature Conservancy, all of whom provide internet access to literature synthesis of North American grassland birds. Patuxent, which also has the North American Breeding Bird Survey results and analysis, is available at: <http://www.mbr-pwrc.usgs.gov>. The Northern Prairie Research Center is available at: <http://www.npwrc.usgs.gov>. The Nature Conservancy is available at: <http://www.tnc.org>. For simplicity, scientific names for avian species were not given in the text. Refer to Appendix 7 for a complete list.

A detailed review of 26 individual management practices used in North Dakota (Berkey et al. 1993), primarily by the U.S. Fish and Wildlife Service, but also by the North Dakota Game and Fish Department and private conservation organizations, is available at:
<http://www.npwrc.usgs.gov/resource/othrdata/wildmgmt/wildmgmt.htm> (Version 16JUL97). (Berkey et al. 1993.)

Partners in Flight bird conservation plans are available for many of the PIF physiographic regions and some states. Many of the plans contain specific management recommendations for priority species. The plans are available at: <http://www.partnersinflight.org/pifbcps.htm>

This thesis presents evaluation of data that forms the basis of a plan to conserve birds in Nebraska with its unique grassland ecosystems. In contrast to the many historical and existing conservation plans and strategies that deal with single species near extinction, I took a broader approach and focused on habitat. This approach both simplifies long range planning and covers numerous species in need of conservation rather than single ones with a necessarily narrower, and therefore more complicated, management focus.

The final priority species list (Table 8) identified 44 species as being of priority for conservation in Nebraska.

Of those, three are considered rare in the state and two others, the bald eagle and the piping plover, are already covered by existing conservation plans, leaving 39 that are both in need of conservation and not covered elsewhere. The analyses conducted further indicate that 20 of the original 44 (or 45%) are grassland species and that a statistically significant distribution exists, in which the Western High Plains and the Sandhills contain the largest proportions of these priority grassland species.

Although much of Nebraska's avifauna represents species at the edges of their range, the grassland species, particularly the endemics, have no alternative other than the prairie. Of the 20 grassland species listed, eight are endemic to Nebraska, seven are declining region-wide, and two at least (the greater prairie-chicken and the lark bunting) have distributions that are centered in or near Nebraska. Managing for a species such as the lark bunting obviously would not make sense because its territories would not encompass a significant number of other species. However, because the greater prairie-chicken, particularly, is a large-territory - or umbrella - species, it represents a unique opportunity for Nebraska, by focusing attention on one species, to make a major impact on a myriad of others that thrive in the same habitat conditions. The bobolink,

the dickcissel, the northern harrier, and the meadowlarks are among those whose habitat needs would be met by a system of management focused on the greater prairie-chicken. Use of the Bird Conservation Area model would accomplish this, even within the agricultural constraints that exist in Nebraska as well as in other prairie states.

Many grassland species have suffered population declines as severe as birds of eastern forests, which have received far more attention and should be identified for conservation efforts here where the prairie is the historically predominate ecosystem. The priority woodland species identified by the list of 44 (20%) are, however, also very important, and Nebraska's responsibility for those birds must also be acknowledged. For example, the red-headed woodpecker, the eastern kingbird, and the eastern phoebe all have statistically significant declining trends, and woodland habitat should be monitored and managed to conserve these species. The other major habitat found in Nebraska is wetlands. The species that depend on wetlands may well be under-represented in the priority lists, in part because of inaccessibility and/or secretive habits. It is recommended that expanded monitoring be implemented to determine the extent to which conservation efforts are indicated in Nebraska's wetlands.

A tall order? Of course, particularly in times of limited resources. Because resources are limited and because Nebraska offers this unique opportunity to make a major contribution to the conservation of a group of birds that exist only in the prairies, the recommendation is to focus attention initially on the grassland species that fall under the greater prairie-chicken as an umbrella. Other habitats should not be ignored but perhaps not targeted for enhanced attention at present.

Table 1. The proportion (%) of breeding records in each of Omernick's (1995) six ecoregions from 1984-1988 (Molhoff 2000) in Nebraska

Species ^a	Sample Size ^b	Relative Abundance ^c N.O.U./Johnsgard	Western High Plains ^d	Central Great Plains	Northwestern Glaciated Plains	Northwestern Great Plains	Nebraska Sandhills	Western Corn Belt Plains
Pied-billed Grebe (52)		Regular/Common	9	18			53	20
Eared Grebe (28)		Regular/Common	13	10			77	
Western Grebe (19)		Regular/Common	12				88	
Clark's Grebe		Regular	X					
Double-crested Cormorant (16)		Regular/Uncommon	6	3	3		78	10
American Bittern (36)		Regular/Common		14			81	5
Least Bittern (10)		Regular/Rare		18			45	36
Great Blue Heron (198)		Regular/Common	16	32	3	1	32	16
Snowy Egret (2)		Regular/Rare		33	33		33	
Cattle Egret (?)		Regular/Uncommon		17			67	17
Green-backed Heron (81)		Regular/Common	6	44	2	1	12	35
Black-crowned Night-heron (28)		Regular/Common	6	19			75	
Yellow-crowned Night-heron		Regular						X
White-faced Ibis (1)		Regular/Rare					100	
Turkey Vulture (98)		Regular/Uncommon	21	35	4	2	15	23
Canada Goose(46)		Regular/Common	19	15			53	13
Trumpeter Swan (9)		Regular/Rare					100	
Wood Duck (193)		Regular/Uncommon	8	49	3	1	19	20
Gadwall (41)		Regular/Common	7	19			72	2
American Wigeon (19)		Regular/Common	11	5			73	11
Mallard (250)		Regular/Common	19	31	3	2	35	10
Blue-winged Teal (151)		Regular/Common	9	22		2	55	12
Cinnamon Teal (7)		Regular/Uncommon	38	13			50	
Northern Shoveler (52)		Regular/Common	14	19	4		54	9
Northern Pintail (76)		Regular/Common	12	29	1		57	1
Green-winged Teal (37)		Regular/Uncommon	10	31	5		44	10
Canvasback (11)		Regular/Uncommon					100	
Redhead (39)		Regular/Common	8	20			72	
Ring-necked Duck		Rare					X	
Lesser Scaup		Rare					X	
Hooded Merganser		Casual						X
Ruddy Duck (37)		Regular/Uncommon	3	18	3			
Mississippi Kite		Rare	X					
Bald Eagle (2)		Regular/Rare	50	50				
Northern Harrier (64)		Regular/Uncommon	26	29	2	3	28	12
Sharp-shinned Hawk (7)		Regular/Rare	29		29		43	
Cooper's Hawk (17)		Regular/Rare	28	50	6		6	11
Red-shouldered Hawk		Rare					X	
Broad-winged Hawk		Rare					X	

Table 1. continued

Species ^a	Sample Size ^b	Relative Abundance ^c N.O.U./Johnsgard	Western High Plains ^d	Central Great Plains	Northwestern Glaciated Plains	Northwestern Great Plains	Nebraska Sandhills	Western Corn Belt Plains
Swainson's Hawk (139)		Regular/Common	24	34	2	1	37	2
Red-tailed Hawk (249)	12	Regular/Common	46	2	1	11	28	
Ferruginous Hawk (10)	60	Regular/Uncommon	10	10	10	20		
Golden Eagle (17)	71	Regular/Uncommon		6	17	6		
American Kestrel (255)	20	Regular/Common	30	4	2	20	24	
Prairie Falcon (14)	100	Regular/Rare						
Merlin (2)	100	Regular/Rare						
Peregrine Falcon		Regular/Rare					X	
Gray Partridge (13)	8	Regular/Rare	8	23		23	38	
Ring-necked Pheasant (339)	15	Regular/Common	44	2	1	21	17	
Sharp-tailed Grouse (81)	18	Regular/Common	6	1	2	73		
Greater Prairie - Chicken (52)	8	Regular/Common to Uncommon	13	2	4	69	4	
Wild Turkey (132)	26	Regular/Common	26	8	1	25	14	
Northern Bobwhite (239)	8	Regular/Common to Rare	50	5	5	10	27	
King Rail		Casual/Rare					X	
Virginia Rail (19)	5	Regular/Uncommon	15			55	25	
Sora (23)	17	Regular/Common	22			35	26	
Common Moorhen (3)		Accidental/Rare	33					
American Coot (80)	6	Regular/Common	21	1	1	55	67	
Sandhill Crane		Regular/Regular						
Piping Plover (29)		Regular/Uncommon to Rare	37	17		10	37	
Kildeer (387)	15	Regular/Common	34	3	2	27	19	
Mountain Plover	X	Casual/Rare			X			
Black-necked Stilt (2)		Regular/Rare						
American Avocet (20)		Regular/Common						
Willet (33)	24	Regular/Common	28				48	
Spotted Sandpiper (124)	3	Regular/Common					97	
Upland Sandpiper (234)	14	Regular/Common	40	2	2	20	22	
Long-billed Curlew (67)	10	Regular/Common	28	5	2	44	11	
Common Snipe (30)	12	Regular/Uncommon to Rare					87	
American Woodcock (15)	11	Regular/Uncommon	17				69	3
Wilson's Phalarope (68)	13	Regular/Common	13	13			74	
Forster's Tern (8)	13	Regular/Common to Uncommon	15	1			67	4
Least Tern (38)	2	Regular/Uncommon	39				92	8
Black Tern (40)	6	Regular/Common	18	2			10	29
Rock Dove (182)	14	Regular/Common	50	3	1	67	7	

Table 1. continued

Species ^a	Sample Size ^b	Relative Abundance ^c N.O.U./Johnsgard	Western High Plains ^d	Central Great Plains	Northwestern Glaciated Plains	Northwestern Great Plains	Nebraska Sandhills
Eurasian Collared-dove		Accidental/Very Rare		X			
Mourning Dove (440)		Regular/Abundant	18	33	3	1	28
Black-billed Cuckoo (102)		Regular/Uncommon	12	27	8	1	24
Yellow-billed Cuckoo (198)		Regular/Common to Uncommon	6	44	6	1	16
Common Barn Owl (26)		Regular/Uncommon	23	42			27
Eastern Screech Owl (118)		Regular/Common	7	55	1	1	17
Great Horned Owl (222)		Regular/Common to Uncommon	12	48	2	0.5	19
Burrowing Owl (69)		Regular/Uncommon	44	20		1	34
Barred Owl (19)		Regular/Uncommon to Rare		37	5		
Long-eared Owl (7)		Regular/Uncommon to Occasional		14			29
Short-eared Owl (5)		Regular/Uncommon	60				20
Common Nighthawk (201)		Regular/Common to Abundant	22	23	4	0.5	42
Common Poorwill (15)		Regular/Common	67		7		27
Chuck-will's-widow (8)		Regular/Regular		38			
Whip-poor-will (22)		Regular/Common		9	18		
Chimney Swift (207)		Regular/Common	7	47	2		15
White-throated Swift (7)		Regular/Common	100				
Ruby-throated Hummingbird (11)		Regular/Uncommon					
Belted Kingfisher (196)		Regular/Common	18	41	5	0.5	13
Lewis's Woodpecker (1)		Regular/ Extremely Rare	100				
Red-headed Woodpecker (357)		Regular/Common	13	40	3	1	21
Red-bellied Woodpecker (109)		Regular/Common	3	56	6		1
Downy Woodpecker (246)		Regular/Common	12	43	3	1	16
Hairy Woodpecker (102)		Regular/Common	16	39	2		12
Yellow-shafted Flicker (335)		Regular/Common	12	44	4	1	19
Red-shafted Flicker (30)		Regular/Common	57	13		10	17
Pileated Woodpecker		Accidental/Rare					
Western Wood Pewee (39)		Regular/Common	82			8	10
Eastern Wood Pewee (103)		Regular/Common		37	6	1	13
Willow Flycatcher (39)		Regular/ Uncommon to Rare		49	2		16
Least Flycatcher		Regular/Rare				X	X
Cordilleran Flycatcher (2)		Casual/Extremely Rare	100				
Eastern Phoebe (135)		Regular/Common	5	56	3	1	11
Say's Phoebe (50)		Regular/Common	62	20		8	4

Table 1 continued

Species ^a	Sample Size ^b	Relative Abundance ^c N.O.U./Johnsgard	Western High Plains ^d	Central Great Plains	Northwestern Glaciated Plains	Northwestern Great Plains	Nebraska Sandhills	Western Corn Belt Plains
Great Crested Flycatcher (157)		Regular/Common	6	41	6	2	16	29
Cassin's Kingbird (10)		Regular/Uncommon to Rare	100					
Western Kingbird (363)		Regular/Common	19	35	4	2	31	8
Eastern Kingbird (424)		Regular/Common	14	34	3	1	29	19
Scissor-tailed Flycatcher (1)		Casual/Rare						100
Loggerhead Shrike (200)		Regular/Common	20	28	2	2	37	11
White-eyed Vireo		Casual/-						X
Bell's Vireo (133)		Regular/Common	6	45	4		23	22
Yellow-throated Vireo (7)		Regular/Uncommon						100
Plumbeous Vireo (3)		Regular/Rare	100					
Warbling Vireo (264)		Regular/Common	7	45	3	1	20	24
Red-eyed Vireo (80)		Regular/Common	22	17	8	1	15	37
Blue Jay (333)		Regular/Common	11	43	4	2	19	21
Pinyon Jay (10)		Regular/Uncommon	100					
Chihuahuan Raven		Accidental/Rare						
Clark's Nutcracker (3)		Casual/Rare	100					
Black-billed Magpie (151)		Regular/Common	25	42	5	2	19	7
American Crow (288)		Regular/Common	13	39	3		21	23
Homed Lark (261)		Regular/Common	27	18	2		42	9
Purple Martin (58)		Regular/Cornrnmon	3	25	2		8	62
Tree Swallow (56)		Regular/Common	2	16	4		34	42
Rough-winged Swallow (311)		Regular/Common	13	34	3	29	19	
Violet-green Swallow (9)		Regular/Common	100					
Bank Swallow (85)		Regular/Cornrnmon	5	33	2	24	36	
Cliff Swallow (193)		Regular/Common	24	40	4	18	14	
Barn Swallow (433)		Regular/Cornrnmon	16	35	3	1	18	
Black-Capped Chickadee (277)		Regular/Common	12	38	4	21	24	
Tufted Titmouse (18)		Regular/Common				48	10	
Red-breasted Nuthatch (21)		Regular/Common to Uncom	52					
White-breasted Nuthatch (160)		Regular/Uncommon	7	47	4	1	13	28
Pygmy Nuthatch (8)		Regular/Uncommon	100					
Brown Creeper		Regular/-		X				

Table 1 continued

Species	N-observed	Relative Abundance N.O.U/Johnsgard	Western	Central	Northwestern	Northwestern	Nebraska	Western
			High Plains	Great Plains	Glaciated Plains	Great Plains	Sandhills	Corn Belt Plains
Rock Wren (40)	Regular/Common	72	20				8	
Carolina Wren (5)	Regular/Uncommon		20				20	60
House Wren (342)	Regular/Common	13	42	4	1	19		21
Sedge Wren (14)	Regular/Uncommon		37				13	50
Marsh Wren (46)	Regular/Uncommon	6	10	2			72	10
Blue-grey Gnatcatcher (14)	Regular/Common		13	1				86
Eastern Bluebird (143)	Regular/Uncommon to 100	13	41	4	1	15		26
Mountain Bluebird (16)	Regular/Common	100						
Townsend's Solitaire (1)	Regular/Uncommon	100						
Wood Thrush (42)	Regular/Common to Uncommon	5	12	7			7	69
Swainson's Thrush	Regular/Rare	X*						
American Robin (393)	Regular/Common	15	41	3	1	21		19
Grey Catbird (228)	Regular/Common	4	35	17			16	28
Northern Mockingbird (61)	Regular/Uncommon	26	44				5	25
Sage Thrasher	Casual/Rare	X						
Brown Thrasher	Regular/Common to Uncommon	14	44	4	1	18		19
European Starling (336)	Regular/Common	17	37	3	2	22		21
Cedar Waxwing (67)	Regular/Common to Uncommon	9	28	6	1	15		41
Northern Parula	Regular/Uncommon							X
Yellow Warbler (276)	Regular/Common	17	37	3	1	22		20
Yellow-rumped Warbler (5)	Regular/Uncommon	100						
Yellow-throated Warbler	Regular/Rare							X
Cerulean Warbler (4)	Regular/Rare							100
Black and White Warbler (14)	Regular/Uncommon	57	7	7			14	14
American Redstart (31)	Regular/Common	30		3	6	18		42
Prothonotary Warbler (7)	Regular/Uncommon						14	86
Ovenbird (27)	Regular/Common to Uncommon	29		7			37	28
Louisiana Waterthrush (4)	Regular/ Uncommon to Rare							100
Kentucky Warbler (9)	Regular/ Uncommon to Rare							100
Common Yellowthroat (340)	Regular/Common	11	41	3	1	24		20
Yellow-breasted Chat (67)	Regular/Common	40	21	7	3	25		4
Summer Tanager (7)	Regular/Uncommon							100
Scarlet Tanager (18)	Regular/Uncommon		5	5			5	85
Western Tanager (12)	Regular/Rare	92			8			
Spotted Towhee (1)	Regular/Rare		100					
Rufous-sided Towhee(140)	Regular/Common	18	37	6	3	14		22

Table 1 continued

Species ^a	Sample Size ^b	Relative Abundance ^c N.O.U/Johnsgard	Western High Plains ^d	Central Great Plains	Northwestern Glaciated Plains	Northwestern Great Plains	Nebraska Sandhills	Western Corn Belt Plains
Cassin's Sparrow (3)		Casual /Rare	100					
Chipping Sparrow (133)		Regular/Common	21	20	3	1	17	37
Clay-colored Sparrow		Regular/Rare						
Brewer's Sparrow (6)		Regular/Common	67				33	
Field Sparrow (190)		Regular/Common	1	31	5	1	24	33
Vesper Sparrow (40)		Regular/Common	21	7	5		17	50
Lark Sparrow (310)		Regular/Common	22	21	4	2	39	
Lark Bunting (155)		Regular/Common	38	11	1	5	44	
Grasshopper Sparrow (319)		Regular/Common	16	29	3	1	36	15
Henslow's Sparrow		Casual /Rare					X	
Song Sparrow (77)		Regular/Common		42	5		9	44
Swamp Sparrow (27)		Regular/Uncommon to Rare		17			73	10
Dark-eyed Junco (3)		Regular/Rare	100					
McCown's Longspur (9)		Regular/ Uncommon	100					
Chestnut-collared Longspur (8)		Regular/Common to Uncommon	63				37	
Northern Cardinal (204)		Regular/Common	3	51	4		13	29
Rose-breasted Grosbeak (135)		Regular/Common	1	39	7		6	47
Black-headed Grosbeak (52)		Regular/Common	38	46		4	12	
Blue Grosbeak (152)		Regular/Uncommon	23	29	4		24	20
Lazuli Bunting (22)		Regular/Uncommon	82	9			9	
Indigo Bunting (179)		Regular/Uncommon	4	34	6	1	17	38
Dickcissel (305)		Regular/Common	9	47	4	0.5	15	25
Bobolink (133)		Regular/Common to Uncommon	5	33	4	1	41	17
Red-winged Blackbird (422)		Regular/Common	14	38	3	1	26	18
Eastern Meadowlark (101)		Regular/Common to Uncommon	1	22	6		34	37
Western Meadowlark (424)		Regular/Common	19	32	3	1	27	18
Yellow Headed Blackbird (84)		Regular/Common	9	18	1	1	58	13
Brewer's Blackbird (10)		Regular/Common to Uncommon	59	8		33		
Common Grackle (410)		Regular/Common	14	40	3	1	25	17
Great-tailed Grackle (113)		Regular/Uncommon		72	7			21
Brown-headed Cowbird (406)		Regular/Common	13	35	3	1	30	18
Orchard Oriole (355)		Regular/Common	16	39	3	1	25	16
Baltimore Oriole		Regular/Common	7	44	4	0.5	22	22
Bullock's Oriole (48)		Regular/Common	84			4	12	
House Finch (37)		Regular/Common	33	53			14	
Red Crossbill (14)		Regular/Common to Uncommon	81		6		13	
Pine Siskin (21)		Regular/Uncommon	57	13			13	17
American Goldfinch (354)		Regular/Common	15	37	4	1	22	21
House Sparrow (38)		Regular/Common	19	40	2	1	20	18

a Breeding birds documented by Molhoff (2000); details of methodology in text

b Sample size of breeding birds identified by Molhoff (2000); the sum of possible, probable, and confirmed breeding behavior categories

c Relative abundance; Nebraska Ornithologists' Union Records Committee (1998), Johnsgard (1998a).

d Omernick's (1995) six ecoregions that include Nebraska (see text for descriptions)

e X = Breeding birds documented in region, not by Molhoff (2000)

Table 2. Number of breeding species present, and proportion of bird species in Nebraska's six ecoregions

	Western High Plains	Central Great Plains	Northwestern Glaciated Plains	Northwestern Great Plains	Sandhills	Western Corn Belt Plains
Species Present ^a	163	145	115	86	160	146
Percent ^b	75	67	53	39	74	67

^a Species present, based on a total of 216 breeding bird species (Mollhoff 2000) recorded in Omernick's (1995) six ecoregions

^b Percent is the proportion of breeding species present in each ecoregion, based on a total of 216 species

Table 3. Migrant birds observed in six ecoregions of Nebraska (Omenick 1995) and relative abundance among years as reported by the Nebraska Ornithologists's Union Records Committee (1998)

Migrant Species ^a	Relative Abundance ^b	Ecoregion ^c					
		Western Corn Belt Plains	Nebraska Sand Hills	Central Great Plains	Western High plains	Northwestern Glaciated Plains	Northwestern Great Plains
Red-throated Loon	Rare						
Pacific Loon	Casual		M		M		
Common Loon	Regular	M	M	M	M	M	M
Horned Grebe	Regular			M			
Red-necked Grebe	Rare	M		M			
American White Pelican	Regular	M	M	M	M	M	M
Neotropic Cormorant	Rare						
Great Egret	Regular	M	M	M	M	M	
Little Blue Heron	Regular	M	M	M	M	M	
Tundra Swan	Casual	M				M	
Greater White-fronted Goose	Regular	M	M	M	M	M	M
Snow Goose	Regular	M	M	M	M	M	M
Ross' Goose	Regular	M	M	M	M	M	M
American Black Duck	Regular	M	M			M	
Eurasian Wigeon	Casual	M	M	M	M	M	M
Greater Scaup	Regular	M	M	M		M	
Oldsquaw	Regular	M	M	M	M	M	M
Black Scoter	Casual						
Surf Scoter	Regular	M	M	M	M		M
White-winged Scoter	Regular	M	M	M		M	M
Common Goldeneye	Regular	M	M	M	M	M	M
Barrow's Goldeneye	Casual						
Bufflehead	Regular	M	M	M	M	M	M
Red-breasted Merganser	Regular	M	M	M	M	M	M
Common Merganser	Regular						

Table 3. continued

Migrant Species	Relative Abundance	Ecoregion					
		Western Corn Belt Plains	Nebraska Sand Hills	Central Great Plains	Western High plains	Northwestern Glaciated Plains	Northwestern Great Plains
Osprey	Regular	M	M	M	M	M	M
Northern Goshawk	Regular	M	M	M	M	M	M
Rough-legged Hawk	Regular	M	M	M	M	M	M
Gyrfalcon	Casual	M	M	M	M	M	M
Whooping Crane	Regular	M	M	M	M	M	M
Black-bellied Plover	Regular	M	M	M	M	M	M
American Golden-Plover	Regular	M	M	M	M	M	M
Snowy Plover	Casual	M	M	M	M	M	M
Semipalmated Plover	Regular	M	M	M	M	M	M
Greater Yellowlegs	Regular	M	M	M	M	M	M
Lesser Yellowlegs	Regular	M	M	M	M	M	M
Solitary Sandpiper	Regular	M	M	M	M	M	M
Whimbrel	Casual	M	M	M	M	M	M
Hudsonian Godwit	Regular	M	M	M	M	M	M
Marbled Godwit	Regular	M	M	M	M	M	M
Ruddy Turnstone	Regular	M	M	M	M	M	M
Red Knot	Casual	M	M	M	M	M	M
Sanderling	Regular	M	M	M	M	M	M
Semipalmated Sandpiper	Regular	M	M	M	M	M	M
Western Sandpiper	Regular	M	M	M	M	M	M
Least Sandpiper	Regular	M	M	M	M	M	M
White-rumped Sandpiper	Regular	M	M	M	M	M	M
Baird's Sandpiper	Regular	M	M	M	M	M	M
Pectoral Sandpiper	Regular	M	M	M	M	M	M
Dunlin	Regular	M	M	M	M	M	M
Stilt Sandpiper	Regular	M	M	M	M	M	M
Buff-breasted Sandpiper	Regular	M	M	M	M	M	M

Table 3. continued

Migrant Species	Relative Abundance	Ecoregion					
		Western Belt Plains	Corn Sand Hills	Central Great Plains	Western High plains	Northwestern Glaciated Plains	Northwestern Great Plains
Short-billed Dowitcher	Casual	M	M	M	M	M	M
Long-billed Dowitcher	Regular	M	M	M	M	M	M
Red-necked Phalarope	Regular	M	M	M	M	M	M
Red Phalarope	Casual						
Laughing Gull	Casual						
Franklin's Gull	Regular	M	M	M	M	M	M
Bonaparte's Gull	Regular	M	M	M	M	M	M
Ring-billed Gull	Regular	M	M	M	M	M	M
California Gull	Regular	M	M	M	M	M	M
Herring Gull	Regular	M	M	M	M	M	M
Thayer's Gull	Casual	M	M	M	M	M	M
Iceland Gull	Casual						
Lesser Black-backed Gull	Casual	M	M	M	M	M	M
Glaucous Gull	Regular	M	M	M	M	M	M
Great Black-backed Gull	Casual						
Black-legged Kittiwake	Casual						
Caspian Tern	Regular	M	M	M	M	M	M
Common Tern	Regular	M	M		M	M	M
Snowy Owl	Regular	M	M		M	M	M
Northern Saw-whet Owl	Regular	M	M	M	M	M	M
Calliope Hummingbird	Rare	M					
Broad-tailed Hummingbird	Casual		M		M		M
Rufous Hummingbird	Casual		M		M		
Yellow-bellied Sapsucker	Regular	M	M	M	M	M	M
Olive-sided Flycatcher	Regular	M	M	M	M	M	M
Yellow-bellied Flycatcher	Casual	M	M			M	

Table 3. continued

Migrant Species	Relative Abundance	Ecoregion					
		Western Corn Belt Plains	Nebraska Sand Hills	Central Great Plains	Western High plains	Northwestern Glaciated Plains	Northwestern Great Plains
Acadian Flycatcher	Regular	M	M			M	
Alder Flycatcher	Regular						
Northern Shrike	Regular	M	M	M	M	M	M
Blue-headed Vireo							
Philadelphia Vireo	Regular	M				M	
Winter Wren	Regular	M	M		M	M	M
Golden-crowned Kinglet	Regular	M	M	M	M	M	M
Ruby-crowned Kinglet	Regular	M	M	M	M	M	M
Veery	Regular	M	M	M	M	M	M
Gray-cheeked Thrush	Regular	M	M	M	M	M	M
Swainson's Thrush	Regular	M	M	M	M	M	M
Hermit Thrush	Regular	M	M	M	M	M	M
Varied Thrush	Casual						
American Pipit	Regular	M	M	M	M	M	M
Sprague's Pipit	Casual	M	M	M	M	M	M
Bohemian Waxwing	Casual	M	M	M	M	M	M
Blue-winged Warbler	Casual	M	M			M	
Golden-winged Warbler	Regular	M	M				
Tennessee Warbler	Regular	M	M	M	M	M	M
Orange-crowned Warbler	Regular	M	M	M	M	M	M
Nashville Warbler	Regular	M	M	M	M	M	M
Chestnut-sided Warbler	Regular	M	M	M	M	M	M
Magnolia Warbler	Regular	M	M	M	M	M	M
Cape May Warbler	Casual	M	M				
Black-throated Blue Warbler	Casual	M	M		M	M	
Townsend's Warbler	Casual			M	M	M	M

Table 3. continued

Migrant Species	Relative Abundance	Ecoregion					
		Western Corn Belt Plains	Nebraska Sand Hills	Central Great Plains	Western High plains	Northwestern Glaciated Plains	Northwestern Great Plains
Black-throated Green Warbler	Regular	M	M	M		M	M
Blackburnian Warbler	Regular	M	M		M	M	M
Pine Warbler	Casual	M	M				
Palm Warbler	Regular	M	M		M	M	M
Bay-breasted Warbler	Regular	M	M			M	
Blackpoll Warbler	Regular	M	M	M		M	
Worm-eating Warbler	Casual						M
Northern Waterthrush	Regular	M	M	M	M	M	M
Connecticut Warbler	Regular	M	M				
Mourning Warbler	Regular	M	M	M	M	M	M
MacGillivray's Warbler	Regular		M		M		M
Hooded Warbler	Casual	M					
Wilson's Warbler	Regular	M	M	M	M	M	M
Canada Warbler	Regular	M	M			M	
American Tree Sparrow	Regular	M	M		M	M	M
Clay-colored Sparrow	Regular	M	M		M	M	M
Savannah Sparrow	Regular						
Baird's Sparrow	Rare	M					
Le Conte's Sparrow	Regular	M	M			M	
Nelson's Sharp-tailed Sparrow	Casual	M	M			M	
Fox Sparrow	Regular	M	M			M	
Lincoln's Sparrow	Regular	M	M	M	M	M	M
White-throated Sparrow	Regular	M	M	M	M	M	M
White-crowned Sparrow	Regular	M	M	M	M	M	M
Harris' Sparrow	Regular	M	M	M	M	M	M
Lapland Longspur	Regular	M	M	M	M	M	M
Snow Bunting	Regular	M	M	M	M	M	M
Rusty Blackbird	Regular	M	M	M	M	M	M

Table 3. continued

Migrant Species	Relative Abundance	Ecoregion					
		Western Corn Belt Plains	Nebraska Sand Hills	Central Great Plains	Western High plains	Northwestern Glaciated Plains	Northwestern Great Plains
Gray-crowned Rosy Finch	Casual		M	M			M
Purple Finch	Regular	M	M		M	M	M
Cassin's Finch	Regular				M		M
White-winged Crossbill	Casual	M	M		M		
Common Redpoll	Regular	M	M		M	M	M
Evening Grosbeak	Regular	M	M		M	M	M

^a M = migrant^b Frequency of occurrence; Regular = acceptably reported in 9-10 of past 10 years (1988-1998)

Casual=acceptably reported in 4-7 of past 10 years (Nebraska Ornithologists' Union Records Committee (1998))

^c Omernick's ecoregions (1995); see text for description

These categories are not meant to be exact, but are designed to give an indication of occurrence among ecoregions in Nebraska

Table 4. Accidental breeding records in Nebraska in Omernick's (1995) six ecoregions

Species	Ecoregion					
	Western Corn Belt Plains	Nebraska Sand Hills	Central Great Plains	Western High plains	Northwestern Glaciated Plain	Northwestern Great Plains
Red-throated Loon	A ^a		A		A	
Yellow-billed Loon	A					
Red-necked Grebe	A					
Brown Pelican	A	A				
Neotropic Cormorant		A				
Anhinga	A		A			
Tricolored Heron				A		
Roseate Spoonbill	A		A			
Wood Stork	A					
Black-bellied Whistling-Duck	A		A			
Bean Goose	A					
Emperor Goose						
Brant			A			
Barnacle Goose	A					
Mottled Duck			A			
Garganey						
King Eider	A					
Common Eider		A				
Harlequin Duck	A					
Black Vulture		A	A			
White-tailed Kite	A			A		
Harris's Hawk	A				A	
Sage Grouse					A	
Yellow Rail	A					
Black Rail	A	A	A			
Clapper Rail		A				
Purple Gallinule	A					
Common Crane			A			
Sharp-tailed Sandpiper				A		
Curlew Sandpiper						

Table 4. continued

Species	Ecoregion					
	Western Corn Belt Plains	Nebraska Sand Hills	Central Great Plains	Western High plains	Northwestern Glaciated Plains	Northwestern Great Plains
Ruff			A	A	A	
Pomarine Jaeger	A	A				
Parasitic Jaeger	A	A				
Long-tailed Jaeger	A	A				
Little Gull	A	A				
Black-headed Gull				A	A	
Mew Gull	A	A				
Glaucous-winged Gull			A			
Ross's Gull	A	A				
Sabine's Gull	A	A				
Ancient Murrelet	A					
Band-tailed Pigeon				A		
Eurasian Collared-Dove	A				A	
White-winged Dove					A	
Inca Dove		A			A	
Common Ground Dove	A	A				
Groove-billed Ani	A	A			A	
Northern Hawk Owl	A	A				
Great Gray Owl		A				
Boreal Owl			A		A	
Calliope Hummingbird				A		
Acorn Woodpecker					A	
Red-naped Sapsucker					A	
Williamson's Sapsucker	A					
Three-toed Woodpecker					A	
Pileated Woodpecker						
Hammond's Flycatcher						A
Vermilion Flycatcher						A
Ash-throated Flycatcher						A
Black-capped Vireo						A

Table 4. continued

Species	Ecoregion					
	Western Corn Belt Plains	Nebraska Sand Hills	Central Great Plains	Western High plains	Northwestern Glaciated Plains	Northwestern Great Plains
Cassin's Vireo						
Cave Swallow		A				
Gray Jay				A		
Steller's Jay	A	A		A		
Common Raven	A	A	A	A		
Mountain Chickadee		A	A	A		
Canyon Wren				A		
American Dipper				A		
Curve-billed Thrasher				A		
Phainopepla				A		
Virginia's Warbler			A	A		
Prairie Warbler	A	A			A	
Swainson's Warbler	A		A			
Black-throated Sparrow	A		A	A		
Sage Sparrow				A		
Baird's Sparrow	A	A	A	A	A	A
Golden-crowned Sparrow		A		A		
Smith's Longspur	A	A		A		A
Painted Bunting						
Scott's Oriole						
Hooded Oriole						
Pine Grosbeak	A					
Hoary Redpoll	A	A	A			
Lesser Goldfinch				A		

^a Accidental = acceptably reported in 0-2 of the past 10 years, 1988-1998 (Nebraska Ornithologist's Union Records Committee 1998)

Table 5. Priority species for Partners in Flight physiographic area 36, the Central Shortgrass Prairie.

Species	Criteria ^a	Total ^b Score	Residency ^c Status	Area ^d Importance	Pop. ^e Trend	BBS Trend ^f 1966-1999	% Pop ^g
Mountain Plover	1a	28	b	5	2	2.1	56
McCown's Longspur	1a	28	b	5	3	3.4	28
Greater Prairie-Chicken	1b	27	b	2	3	14.5	6
Piping Plover	1b	26	b	3	3	na ^h	na
Long-billed Curlew	1b	25	b	4	5	9.2**	5
Ferruginous Hawk	1b	24	b	5	3	5.3	14
Lark Bunting	1b	24	b	5	5	1.9**	33
Swainson's Hawk	1b	23	b	5	3	-3	12
Bell's Vireo	1b	23	b	2	3	na	na
Cassin's Sparrow	1b	24	b	5	4	-5.4	18
Burrowing Owl	1b	22	b	5	3	-3.5	25
Northern Harrier	2a	21	b	4	5	-3.5	3
Grasshopper Sparrow	2a	20	b	5	4	-2.4	12
Lark Sparrow	2a	19	b	4	4	-3	6
Short-eared Owl	3a	19	b	2	3	na	<1
Red-headed Woodpecker	3a	18	b	2	3	2.6	<1
Brewer's Sparrow	3a	18	b	2	4	-7.1	1

^a Criteria: the criteria by which a species qualifies for inclusion as a priority species (details in text).^b Total score: the sum of the seven variables that are used to rank species in the Partners in Flight species prioritization process (details in text) 7=low, 35=high vulnerability^c RS: residency status. b = species breeds in the physiographic area; w = species winters in the physiographic area.^d AI: area of importance score, a measure of intraspecific relative abundance among physiographic areas. 1=low, 5=high^e PT : the species' population trend score for the physiographic area.^f BBS trend: population trend as measured by the North American Breeding Bird Survey (BBS) from (Sauer et al. 1999).^{*} = PT significant at 0.10; ** = PT significant at 0.05 na=not available^g %pop : percentage of the species' breeding population that occurs in the physiographic area during breeding season based on mean abundances on BBS routes (available from PIF).^h na= data not available

Table 6. Priority species for Partners in Flight physiographic area 34, the Central Mixed Grass Prairie.

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Species	Criteria ^a	Total Score ^b	Residency Status ^c	Area ^d Importance	Pop. ^e Trend	BBS Trend ^f 1966-1996	% Pop ^g
Greater Prairie-Chicken	1a	30	b	5	3	11.1	79
Piping Plover	1b	26	b	3	3	na ^g	na
Trumpeter Swan	1b	25	b	2	3	na	na
Harris' Sparrow	1b	25	w	4	5	na	na
American White Pelican	1b	24	b	4	4	-8.5**	7
Long-billed Curlew	1b	23	b	4	3	-9.6	5
Swainson's Hawk	1b	23	b	3	5	-3.6**	3
Scissor-tailed Flycatcher	1b	22	b	2	4	-5.1**	<1
Bell's Vireo	1b	22	b	2	2	0	6
Dickcissel	1b	22	b	5	5	-7.2**	17
Chestnut-collared Longspur	1b	22	b	3	3	na	na
Red-headed Woodpecker	2b	21	b	5	2	1.2	18
Western Kingbird	2a	21	b	5	5	-1.7**	8
Grasshopper Sparrow	2a	21	b	5	4	-1.5	23
Northern Bobwhite	2a	21	b	4	5	na	na
Western Meadowlark	2a	20	b	5	5	na	na
American Tree Sparrow	2a	20	w	5	5	na	na
Northern Harrier	2a	20	b	3	5	-7.8**	1
Orchard Oriole	2a	20	b	5	3	1.2	8
Upland Sandpiper	2b	20	b	5	1	3.2	21
Baltimore Oriole	2b	19	b	5	2	0.7	11
Short-eared Owl	3a	19	b	2	3	na	<1
Willet	3a	19	b	3	3	-13.7	2
Least Tern	3b	16	b	2	3	na	na

^aCriteria: the criteria by which a species qualifies for inclusion as a priority species (details in text).^bTotal score: the sum of the seven variables that are used to rank species in the Partners in Flight species prioritization process (details in text) 7=low, 35=high vulnerability^cRS: residency status. b = species breeds in the physiographic area; w = species winters in the physiographic area.^dAI: area of importance score, a measure of intraspecific relative abundance among physiographic areas. 1=low, 5=high^ePT : the species' population trend score for the physiographic area .^fBBS trend: population trend as measured by the North American Breeding Bird Survey (Sauer et al. 1997).^g* = PT significant at 0.10; ** = PT significant at 0.05; na = not available.^g%pop : percentage of the species' breeding population that occurs in the physiographic region in breeding season (available from PIF).

Table 7. Priority species for Partners in Flight physiographic area 32, the Dissected Till Plains

Species	Criteria ^a	Total ^b Score	Residency ^c Status	Area ^d Importance	Pop. ^e Trend	BBS Trend ^f 1966-1999	% Pop ^g
Greater Prairie-Chicken	1b	27	b	2	3	na ^h	2
Henslow's Sparrow	1b	25	b	2	3	-1.9	4
Piping Plover	1b	25	b	2	3	na	na
Cerulean Warbler	1b	25	b	2	3	na	<1
Dickcissel	1b	25	b	5	5	-3.3**	17
Red-headed Woodpecker	1b	24	b	5	5	-3.8**	19
Harris' Sparrow	1b	24	w	3	na	na	na
Short-eared Owl	1b	23	w	4	na	na	na
Bell's Vireo	1b	23	b	2	3	-2.6	3
Prothonotary Warbler	1b	22	b	2	3	na	na
Field Sparrow	1b	22	b	4	5	-1.9*	5
Bobolink	1b	21	b	2	5	-5.0**	2
Northern Bobwhite	2a	21	b	4	5	-2.6**	8
Brown Thrasher	2a	21	b	5	5	-2.2**	12
Baltimore Oriole	2a	21	b	5	4	-1	11
Grasshopper Sparrow	2a	20	b	3	5	-4.2*	7
Chimney Swift	2a	20	b	4	4	-1.1	5
Loggerhead Shrike	2a	20	b	3	5	-8.6**	3
Orchard Oriole	2a	20	b	3	5	-5.5*	3
Short-eared Owl	3a	20	b	3	3	na	na
Northern Harrier	2a	20	w	4	na	na	na
Long-eared Owl	2a	20	w	5	na	na	na
Bald Eagle	2a	20	w	5	na	na	na

American Tree Sparrow	2a	20	w	5	na	na	na	101
Eastern Phoebe	2a	19	b	3	5	-4.9*	2	
Eastern Kingbird	2a	19	b	5	5	-2.3**	6	
Least Tern	3b	16	b	2	3	na	na	

*Criteria: the criteria by which a species qualifies for inclusion as a priority species (details in text).

^bTotal score: the sum of the seven variables that are used to rank species in the Partners in Flight species prioritization process.

7=low, 35=high vulnerability

^{RS}: residency status. b = species breeds in the physiographic area; w = species winters in the physiographic area.

^dAI: area of importance score, a measure of intraspecific relative abundance among physiographic areas. 1=low, 5=high

^ePT : the species' population trend score for the physiographic area.

^fBBS trend: population trend as measured by the North American Breeding Bird Survey from (Sauer et al. 1997).

* = PT significant at 0.10; ** = PT significant at 0.05; na = not available.

^g%pop : percentage of the species' breeding population that occurs in the planning unit during breeding season based on mean abundance on BBS routes (available from PIF).

^h na=data not available

Table 8. Scores of management priority species across Partners in Flight (PIF) physiographic regions 32, 34, 36, based on PIF criteria.

PIF 32	PIF 34	PIF 36	Average ^a	Priority Species
27	30	27	28	Greater Prairie-Chicken
		28	28	Mountain Plover
		28	28	McCown's Longspur
25	26	26	26	Piping Plover
		25	25	Trumpeter Swan
24	25		25	Harris' Sparrow
25			25	Henslow's Sparrow
25			25	Cerulean Warbler
25	22		24	Dickcissel
		23	24	Long-billed Curlew
		24	24	Ferruginous Hawk
		24	24	Lark Bunting
24			24	American White Pelican
		24	24	Cassin's Sparrow
23	22	23	23	Bell's Vireo
		23	23	Swainson's Hawk
24	21		23	Red-headed Woodpecker
		22	22	Burrowing Owl
		22	22	Snowy Plover
22			22	Field Sparrow
22			22	Scissor-tailed Flycatcher
22			22	Chestnut-collared Longspur

PIF 32	PIF 34	PIF 36	Average ^a	Priority Species
22			22	Prothonotary Warbler
	21		21	Western Kingbird
21			21	Brown Thrasher
21	21		21	Northern Bobwhite
20	20	21	21	Northern Harrier
21			21	Bobolink
	20		20	Upland Sandpiper
20	21	20	20	Grasshopper Sparrow
21	19		20	Baltimore Oriole
	20		20	Western Meadowlark
20			20	Loggerhead Shrike
20	20		20	Orchard Oriole
20	20		20	American Tree Sparrow
20			20	Chimney Swift
20			20	Long-eared Owl
20			20	Bald Eagle
22	19	19	20	Short-eared Owl
19			19	Eastern Kingbird
19			19	Eastern Phoebe
		19	19	Lark Sparrow

PIF 32	PIF 34	PIF 36	Average ^a	Priority Species
	19		19	Willet
		18	18	Brewer's Sparrow
16	16		16	Least Tern

^a The final score is the average across the three PIF regions, but only for species that occurred ≥ 1 region.

Table 9. Management priority species in Nebraska developed from a Partners in Flight (PIF) database and the Partners in Flight, Nature Conservancy, U.S. Fish and Wildlife Service, and U.S. Forest Service status of concern.

Score ^a	Species ^b	Nebraska	PIF ^c	TNC ^d	USFWS ^e	ONG	USFS ^f NNF
28	Greater Prairie - Chicken			G4			Yes
28	Mountain Plover	Threatened	Yes*	G2			Yes
28	McCown's Longspur		Yes				Yes
26	Piping Plover	Threatened		G3			
25	Trumpeter Swan		Yes	G4			
25	Harris' Sparrow		Yes			Yes	Yes
25	Henslow's Sparrow		Yes*	G3, G4	Yes		
25	Cerulean Warbler		Yes*		Yes		
24	Dickcissel		Yes	G5		Yes	Yes
24	Long-billed Curlew		Yes*	G5		Yes	Yes
24	Ferruginous Hawk			G4		Yes	Yes
24	Lark Bunting		Yes			Yes	Yes
24	American White Pelican			G3			Yes
24	Cassin's Sparrow		Yes				
23	Bell's Vireo		Yes*	G5	Yes		Yes
23	Swainson's Hawk			G4		Yes	Yes
23	Red-headed Woodpecker		Yes	G5	Yes	Yes	Yes
22	Burrowing Owl			G4	Yes	Yes	Yes
22	Field Sparrow		Yes		Yes		Yes
22	Scissor-tailed Flycatcher						
22	Chestnut-collared Longspur			G5		Yes	Yes
22	Prothonotary Warbler		Yes*				
21	Western Kingbird						
21	Brown Thrasher						
21	Northern Bobwhite			G5		Yes	Yes
21	Northern Harrier			G5	Yes	Yes	Yes

Score ^a	Species ^b	Nebraska	PIF ^c	TNC ^d	USFWS ^e	USFS ^f	
						ONG	NNF
21	Bobolink		Yes	G5	Yes	Yes	Yes
20	Upland Sandpiper			G5	Yes	Yes	Yes
20	Grasshopper Sparrow		Yes		Yes	Yes	Yes
20	Baltimore Oriole						
20	Western Meadowlark						
20	Loggerhead Shrike		Yes	G4, G5	Yes	Yes	Yes
20	Orchard Oriole		Yes			Yes	Yes
20	American Tree Sparrow						
20	Chimney Swift		Yes			Yes	Yes
20	Long-eared Owl			G5		Yes	Yes
20	Bald Eagle	Threatened		G4		Yes	Yes
20	Short-eared Owl		Yes	G5	Yes	Yes	Yes
19	Eastern Kingbird						
19	Eastern Phoebe						
19	Lark Sparrow		Yes			Yes	Yes
19	Willet						
18	Brewer's Sparrow		Yes	G4		Yes	
16	Least Tern	Endangered		G4			

^a Scores are based on PIF criteria; the maximum score is 28.

When applicable, individual scores were averaged across PIF regions to develop a final score.

^b Same species as in Table 7.

^c Partners in Flight Watchlist (Carter et al. 1996) *= Highest priority avian species

^d The Nature Conservancy/Natural Heritage Program global rank: G2=imperiled,
G3=vulnerable, G4=apparently secure, G5=secure

^e USFWS Species of Management Concern. See Office of Migratory Bird Management (1995)

^f USDA Forest Service species of concern in the Great Plains. See Sidle (2000)
ONG=Oglala National Grassland
NNF=Nebraska National Forest

Table 10. Priority species scores for 44 birds in Nebraska,
developed using the PIF database and identified by habitat and migratory status

Score ^a	Species ^b	Habitat ^c	Migratory Status ^d
28	Greater Prairie-Chicken	GR	Resident
28	Mountain Plover	GR	Neotropical
28	McCown's Longspur	GR	Short distance
26	Piping Plover	WE	Short distance
25	Trumpeter Swan	WE	Short distance
25	Harris' Sparrow	SS	Short distance
25	Henslow's Sparrow	GR	Short distance
25	Cerulean Warbler	WL	Neotropical
24	Dickcissel	GR	Neotropical
24	Long-billed Curlew	GR	Short distance
24	Ferruginous Hawk	GR	Short distance
24	Lark Bunting	GR	Neotropical
24	American White Pelican	WE	Short distance
24	Cassin's Sparrow	GR	Short distance
23	Bell's Vireo	SS	Neotropical
23	Swainson's Hawk	GR	Neotropical
23	Red-headed Woodpecker	WL	Short distance
22	Burrowing Owl	GR	Short distance
22	Field Sparrow	GR	Short distance
22	Prothonotary Warbler	WL	Neotropical

Score	Species	Habitat	Migratory Status
22	Scissor-tailed Flycatcher	SS	Neotropical
22	Chestnut-collared Longspur	GR	Short distance
21	Western Kingbird	WL	Neotropical
21	Brown Thrasher	SS	Short distance
21	Northern Bobwhite	SS	Resident
21	Northern Harrier	GR	Short distance
21	Bobolink	GR	Neotropical
20	Upland Sandpiper	GR	Neotropical
20	Grasshopper Sparrow	GR	Neotropical
20	Baltimore Oriole	WL	Neotropical
20	Western Meadowlark	GR	Short distance
20	Loggerhead Shrike	GR	Short distance
20	Orchard Oriole	SS	Neotropical
20	American Tree Sparrow	SS	Short distance
20	Chimney Swift	UR	Neotropical
20	Long-eared Owl	WL	Resident
20	Bald Eagle	WL	Short distance
20	Short-eared Owl	GR	Short distant
19	Eastern Kingbird	WL	Neotropical
19	Eastern Phoebe	WL	Short distance
19	Lark Sparrow	SS	Neotropical

Score	Species	Habitat	Migratory Status
19	Willet	WE	Short distance
18	Brewer's Sparrow	SS	Neotropical
16	Least Tern	WE	Short distance

^a Scores are based on PIF criteria ; maximum score is 35

^b Species list developed from Partners in Flight database

^c Habitat codes: GR=grassland, WL=woodland, SS=successional-scrub,
Wetland=wetland,open water

^d Neotropical migrants=breed in the United States and winter south of the U.S.
Central and South America. Short distance=breed and winter in the U.S.
Resident=breed and winter in Nebraska

Table 11. Grassland endemic birds and their associated population trends from 1996-1999, as identified by the Breeding Bird Survey.^a

	Survey-wide BBS	Central BBS	Nebraska BBS
Ferruginous Hawk	+4.0	+4.1	+6.7
Mountain Plover	-	-1.4	-
Long-billed Curlew	-1.5	-3.9	-8.9
Marbled Godwit*	-0.5	+0.8	-
Wilson's Phalarope	-2.2	-3.4	-5.2
Franklin's Gull*	+10	-1.6	-
Sprague's Pipit*	-	-	-
Cassin's Sparrow	-2.3	-2.4	-
Baird's Sparrow*	-2.7	-3.3	-
Lark Bunting	-2.6	-2.6	-1.6
McCown's Longspur	-3.1	+5.8	-
Chestnut-Collared Longspur	-1.6	-1.9	+9.7

^a Endemic birds from Mengel 1970. Trend data from the Breeding Bird Survey 1966-1999, Sauer et al. 1999.

* = No recent breeding records for Nebraska.

- = Species too infrequent to estimate.

Table 12. A rarity index for Nebraska birds, from breeding observations reported by Ducey (1988) and (Mollhoff (2000), with associated Nebraska BBS trends.

	Ducey 1988 (County Records) ^a			Mollhoff 2000 ^b	Rarity Index ^c (Total prior records)	BBS 1966-1998 ^d	
	Pre-1920	1921-60	Post-1960	1984-88 records		Routes	Trend
Pied-billed Grebe	9	2	10	55		4	+ 1.6
<u>Horned Grebe</u>	1		1		2		
Eared Grebe	5	2	3	31			
Western Grebe	1	2	6	26			
(Clark's Grebe)					(Breeding occurs but was not documented during cited studies)		
Double-c. Cormorant		6	3	31		7	+15.3**
American Bittern	6	4	3	37		5	+ 8.9
<u>Least Bittern</u>	4	3	1	11	19		
Great Blue Heron	4	7	30	198		25	+ 4.4
<u>Great Egret</u>		1			1		
<u>Snowy Egret</u>	2		1	3	6		
<u>Little Blue Heron</u>	1		1		2		
Cattle Egret			1		1		
Green Heron	9	5	4	82		7	+ 4.0
Black-c. Night-heron	6	6	6	32		3	- 5.0
<u>Yellow-c. Night heron</u>			2		2		
<u>White-faced Ibis</u>	1		2	1			

	Ducey 1988 (County Records) ^a	Molhoff 2000 ^b	Rarity Index ^c	BBS 1966-1998 ^d
Turkey Vulture	8	2	7	113
Canada Goose	6	1	12	47
(Snow Goose)	1 (dubious record)			
Trumpeter Swan	2	3	9	
Wood Duck	2	1	13	194
Gadwall	2	3	13	42
American Wigeon	1	1	4	19
Mallard	8	9	24	250
Blue-winged Teal	8	8	19	154
<u>Cinnamon Teal</u>	1	1	8	10
Northern Shoveler	5	5	10	57
Northern Pintail	1	8	13	77
Green-winged Teal	3	1	3	39
Canvasback	1	1	4	11
Redhead	5	3	4	40
Ring-necked Duck	4 (extirpated?)		4	
<u>Lesser Scaup</u>		1 (extralimital)		1
<u>Hooded Merganser</u>	1			1
<u>Common Merganser</u>	2	1 (extralimital)		3

	Ducey 1988 (County Records) ^a	Molhoff 2000 ^b	Rarity Index ^c	BBS 1966-1998 ^d
Ruddy Duck	4	3	8	38
(Osprey)	2 (extirpated)			- 6.3
(Swallow-tailed Kite)	4 (extirpated)			
(Mississippi Kite)		(Has bred during 1990's at Ogallala)		
Bald Eagle	5	2	2	9
Northern Harrier	13	6	13	65
Sharp-shinned Hawk	2	2	7	11
Cooper's Hawk	8	2	2	18
Red-shouldered Hawk	4	2	1	7
Broad-winged Hawk	2	1	1	4
Swainson's Hawk	5	10	19	140
Red-tailed Hawk	10	6	33	249
Ferruginous Hawk	2	1	9	10
Golden Eagle	5	3	14	18
American Kestrel	7	4	16	255
Merlin		3	3	6
Prairie Falcon	3	2	7	14
Peregrine Falcon	1			1
Gray Partridge		13		14

	Ducey 1988 (County Records) ^a	Molhoff 2000 ^b	Rarity Index ^c	BBS 1966-1998 ^d
(Chukar Partridge)	3 (unsuccessfully introduced)			
Ring-necked Pheasant	11	27	339	-1.2
(Sage Grouse)	1	2 (extirpated)		
(Ruffed Grouse)	2 (extirpated)			
Greater Prairie-chicken	1	5	8	+16.6
Sharp-tailed Grouse	5	3	9	+4.4
Wild Turkey	1	10	134	+4.4
Northern Bobwhite	8	17	19	-1.1
(Scaled Quail)		1 (unsuccessfully introduced)		
King Rail	2		2	
Virginia Rail	3	3	4	20
Sora	6	3	5	23
<u>Common Moorhen</u>	3	2	3	8
American Coot	11	5	15	86
Sandhill Crane	2			2
Piping Plover	4	8	24	30
Killdeer	11	10	33	387
<u>Mountain Plover</u>	3	1		4
<u>Black-necked Stilt</u>	2	2		4

	Ducey 1988 (County Records) ^a			Molhoff 2000 ^b	Rarity Index ^c	BBS 1966-1998 ^d	
American Avocet	1	3	5	25	4	-9.2	
(Greater Yellowlegs)	1	(dubious or extralimital record)					
(Lesser Yellowlegs)	1	1 (dubious or extralimital records)					
(Solitary Sandpiper)	1	(dubious or extralimital record)					
Willet	3	3	3	33	5	-4.7	
Spotted Sandpiper	7	2	6	126	4	+41.7**	
Upland Sandpiper	9	8	24	234	36	+1.9	
Long-billed Curlew	5	6	12	68	14	-8.2	
(Marbled Godwit)	1	(dubious or extralimital record)					
Common Snipe	2	1	6	35	7	+20.3*	
American Woodcock	3	3		15			
Wilson's Phalarope	3	4	7	72	5	-3.6	
(Franklin's Gull)		1 (extralimital record)					
(Ring-billed Gull)		1 (dubious or extralimital record)					
Forster's Tern	3	1	3	13	3	-2.1	
Least Tern	6	12	27	41			
Black Tern	5	2	3	54	6	-13.7	
Rock Dove	2	13		182	31	+22.5	
(Eurasian Collared-dove)	(Bred during 1990's at Kearney)						

	Ducey 1988 (County Records) ^a			Molhoff 2000 ^b	Rarity Index ^c	BBS 1966-1998 ^d	
Mourning Dove	15	27	53	440		44	-0.8
(Carolina Parakeet)	1 (extinct)						
Black-billed Cuckoo	6	3	11	102		17	-2.2
Yellow-billed Cuckoo	9	11	14	198		33	-0.4
Barn Owl	13	7	35	26			
Eastern Screech-owl	12	4	16	118			
Great Horned Owl	18	17	37	222		30	-4.8
Burrowing Owl	14	4	18	70		13	+0.3
Barred Owl	6	2	3	19			
Long-eared Owl	6	3	7	7			
Short-eared Owl	6	4	5	16			
(N. Saw-whet Owl)	2 (extralimital records)						
Common Nighthawk	10	3	17	202		28	-4.8**
Common Poorwill	1	1	5	15			
<u>Chuck-will's-widow</u>			1	8	9		
Whip-poor-will	4		1	22			
Chimney Swift	7	3	11	210		29	-0.7
<u>White-throated Swift</u>	3	3	1	7	12		
<u>Ruby-th. Hummingbird</u>	3	1	3	11	18		

	Ducey 1988 (County Records) ^a			Molhoff 2000 ^b	Rarity Index ^c	BBS 1966-1998 ^d	
Belted Kingfisher	7	2	12	197		12	-12.4**
<u>Lewis' Woodpecker</u>	2	1	1	1	5		
Red-headed Woodpecker	10	9	26	357		40	-0.6
Red-bellied Woodpecker	2	4	10	109		11	+6.1
(Yellow-bellied Sapsucker)	2 (extralimital records)						
Downy Woodpecker	11	8	22	247		24	+0.4
Hairy Woodpecker	8	5	12	102		11	-4.6
Northern Flicker	10	10	29				
Yellow-shafted Flicker				335		34	-1.7
Red-shafted Flicker				30		7	-18.1
(Piliated Woodpecker)	(Bred in 1999 at Fontenelle Forest)						
Western Wood-pewee	2	2	3	39		4	-0.2
Eastern Wood-pewee	4	2	7	103		7	+20.3
<u>Acadian Flycatcher</u>	1	1			2		
(Alder Flycatcher)	4	4 (dubious or extralimital records)					
Willow Flycatcher	3	1	3	42		7	+4.3
<u>Least Flycatcher</u>	2				2		
<u>Cordilleran Flycatcher</u>	1			2	3		
Eastern Phoebe	12	9	20	135		17	-13.5
Say's Phoebe	12	14	15	50		11	-1.7

	Ducey 1988 (County Records) ^a			Molhoff 2000 ^b	Rarity Index ^c	BBS 1966-1998 ^d	
Great Cr. Flycatcher	10	6	9	157		16	+1.7
<u>Cassin's Kingbird</u>				10	10		
Western Kingbird	12	15	34	363		44	-2.9**
Eastern Kingbird	13	10	35	424		44	-0.1
<u>Scissor-tailed Flycatcher</u>		5	1	2	8		
Loggerhead Shrike	8	8	26	200		42	-0.9
(White-eyed Vireo)	4 (extralimital records)						
Bell's Vireo	11	11	11	133		15	+0.8
<u>Plumbeous Vireo</u>	1	1	1	3	6		
Yellow-throated Vireo	7	3	2	9			
Warbling Vireo	7	8	12	265		27	+6.0*
Red-eyed Vireo	4	11	8	81		12	-11.5**
Blue Jay	9	9	23	333		40	+0.7
<u>Pinyon Jay</u>	3	1	1	10	15		
Clark's Nutcracker		1		3	4		
Black-billed Magpie	5	6	17	151		24	-14.2**
American Crow	12	8	16	288		43	+1.9
(Chihuahuan Raven)		1	1 (probably extirpated)				
(Common Raven)	1 (extirpated)						

	Ducey 1988 (County Records) ^a		Molhoff 2000 ^b	Rarity Index ^c	BBS 1966-1998 ^d
Horned Lark	18	13	23	261	41 -3.1
Purple Martin	11	7	16	59	10 -2.7
Tree Swallow	6		8	57	4 -17.4
<u>Violet-green Swallow</u>	1	1	1	10	13
Northern R-w. Swallow	11	4	18	311	29 +1.3
Bank Swallow	13	4	13	86	15 -17.9
Barn Swallow	16	12	42	433	44 -1.1
Cliff Swallow	16	17	28	193	25 +2.2
Black-capped Chickadee	12	12	18	277	29 -1.6
Tufted Titmouse		1	3	18	4 -2.6
Red-breasted Nuthatch			3	21	
White-breasted Nuthatch	4	2	9	160	14 +6.0
<u>Pygmy Nuthatch</u>		1	2	8	11
<u>Brown Creeper</u>	3		2		5
Rock Wren	10	5	5	40	3 -4.6
<u>Carolina Wren</u>		2	3	5	10 +15.0
<u>Bewick's Wren</u>	1	2 (possibly extirpated)			
House Wren	10	15	40	342	38 +1.3
Sedge Wren	3		2	16	3 +14.3

	Ducey 1988 (County Records) ^a	Molhoff 2000 ^b	Rarity Index ^c	BBS 1966-1998 ^d
Marsh Wren	4	5	8	48
Blue-gray Gnatcatcher	4	2	4	15
Eastern Bluebird	11	8	23	144
Mountain Bluebird	3	1	3	16
Townsend's Solitaire	1	1		1
Swainson's Thrush	1	1		2
(Hermit Thrush)	1	(dubious record or extralimital record)		
Wood Thrush	13	7	4	43
American Robin	11	19	45	393
Gray Catbird	10	10	17	228
Northern Mockingbird	14	6	9	61
(Sage Thrasher)		(Breeding probably occurs but not documented)		
Brown Thrasher	14	20	31	363
European Starling		7	22	336
Cedar Waxwing	2	5	6	67
Blue-winged Warbler	2			2
(Tennessee Warbler)		1 (extralimital record)		
(Nashville Warbler)	1	1 (extralimital record)		
Northern Parula		1		1

	Ducey 1988 (County Records) ^a	Molhoff 2000 ^b	Rarity Index ^c	BBS 1966-1998 ^d
Yellow Warbler	13	12	15	278 32 +1.0
<u>Chestnut-sided Warbler</u>	1	1	2	
<u>Yellow-rumped Warbler</u>	1	1	8	13
(Prairie Warbler)	2 (extralimital records)			
(Yellow-throated Warbler)	(Breeding occurs but was not documented in cited studies)			
<u>Cerulean Warbler</u>	2	1	4	7
Black-and white Warbler	8	1	14	
American Redstart	14	2	4	33
<u>Prothonotary Warbler</u>	3	1	7	11
Ovenbird	4	2	6	27
(Northern Waterthrush)	3 (extralimital records)			
<u>Louisiana Waterthrush</u>	4	1	4	10
<u>Kentucky Warbler</u>	4	1	9	14
Common Yellowthroat	13	7	14	340 39 -0.3
Yellow-breasted Chat	9	7	1	67
<u>Summer Tanager</u>	1		2	7 10
Scarlet Tanager	7	3	3	18
<u>Western Tanager</u>	1			12 13
Rufous-sided Towhee	15	11	11	144

	Ducey 1988 (County Records) ^a			Molhoff 2000 ^b	Rarity Index ^c	BBS 1966-1998 ^d	
Eastern Towhee (split from Rufous-sided Towhee)						9	+2.7
Spotted Towhee (split from Rufous-sided Towhee)				1	1	7	-17.3
<u>Cassin's Sparrow</u>				1	3	4	
Chipping Sparrow	9	9	12	135		23	+1.4
<u>Clay-colored Sparrow</u>	1	1	1		3		
<u>Brewer's Sparrow</u>		3	2	6	10		
Field Sparrow	15	10	14	190		26	+5.0*
Vesper Sparrow	14	5	5	42		14	+2.7
Lark Sparrow	12	23	28	310		37	+0.8
Lark Bunting	17	8	16	157		34	-1.3
<u>Savannah Sparrow</u>	1				1		
(Baird's Sparrow)	1 (extralimital record)						
Grasshopper Sparrow	11	9	21	319		43	-1.1
(Henslow's Sparrow)	(Breeding occurs but was not documented in cited studies)						
Song Sparrow	1	3	9	81		10	+15.7
Swamp Sparrow	3	2	2	29			
<u>Dark-eyed Junco</u>	2		2	4	8		
<u>McCown's Longspur</u>	1		2	9	12		
<u>Chestnut-c. Longspur</u>	1	1	2	8	12	4	+18.5

	Ducey 1988 (County Records) ^a			Molhoff 2000 ^b	Rarity Index ^c	BBS 1966-1998 ^d	
Northern Cardinal	9	16	21	204		25	+3.3
Rose-breasted Grosbeak	14	16	11	135		15	-4.1**
Black-headed Grosbeak	12	12	6	52		4	-13.1
Blue Grosbeak	8	18	13	152		31	-1.7
Lazuli Bunting	2		1	22			
Indigo Bunting	12	9	10	179		20	-3.9**
Dickcissel	13	15	19	305		37	-0.7
Bobolink	11	2	8	133		25	+3.6
Red-winged Blackbird	16	17	38	422		44	+0.2
Eastern Meadowlark	1	5	8	101		20	-9.4**
Western Meadowlark	14	12	23	424		44	-0.8*
Yellow-headed Blackbird	13	6	12			18	+0.1
Brewer's Blackbird	4	1	6	12		3	-12.8
(Rusty Blackbird)				1 (extralimital record)			
Common Grackle	13	14	34	410		44	-2.4**
<u>Great-tailed Grackle</u>			6	14	20		
Brown-headed Cowbird	15	8	27	406		44	+0.1
Orchard Oriole	12	17	24	355		42	-1.2
Northern Oriole	18	12	25				

	Ducey 1988 (County Records) ^a			Molhoff 2000 ^b	Rarity Index ^c	BBS 1966-1998 ^d
Baltimore Oriole (previously part or Northern Oriole)				339		37 +0.9
Bullock's Oriole (previously part or Northern Oriole)				48		5 +26.8
<u>Cassin's Finch</u>		1			1	
House Finch	1	2	4	37		11 +26.0**
Red Crossbill		3	3	16		
Pine Siskin	4	11	9	23		
American Goldfinch	13	16	18	358		39 +1.2
House Sparrow	5	5	31	381		43 -1.9

^a Ducey's records refer to numbers of counties with one or more nestings for the indicated period.

^b Molhoff's records include all possible, probable, and confirmed records.

^c Rarity Index is the sum of Ducey's county records plus Molhoff's records for species with < 20 records.

^d BBS 1966-1998 (Sauer et al. 1998)

n = number of Breeding Bird Survey routes

* = significant at 0.10, ** = significant at 0.05

Table 13. Monitoring status and Population Trend Uncertainty (PTU) scores for Nebraska birds among woodland, wetland, scrub, urban, grassland, and cliff habitat

Species	Habitat ^a	Monitored	PTU ^c
		Nebraska BBS ^b	Score
Pied-billed Grebe	WE	X	7
Eared Grebe	WE		8
Western Grebe	WE		8
Clark's Grebe	WE		8
Double-c. Cormorant	WE	X	3
American Bittern	WE	X	7
Least Bittern	WE		8
Great Blue Heron	WE	X	2
Snowy Egret	WE		8
Cattle Egret	WE		8
Green Heron	WE	X	6
Black-c. Night-heron	WE	X	7
Yellow-c. Night-heron	WE		8
White-faced Ibis	WE		8
Turkey Vulture	CL	X	2
Canada Goose	WE	X	6
Trumpeter Swan	WE		8
Wood Duck	WE	X	6
Gadwall	WE	X	6
American Wigeon	WE		8
Mallard	WE	X	1
Blue-winged Teal	WE	X	4
Cinnamon Teal	WE		8
Northern Shoveler	WE	X	7
Northern Pintail	WE	X	3
Green-winged Teal	WE	X	7
Canvasback	WE		8
Redhead	WE	X	7
Ring-necked Duck	WE		8
Lesser Scaup	WE		8
Hooded Merganser	WE		8
Ruddy Duck	WE	X	7
Mississippi Kite	WE		8
Bald Eagle	WE		8
Northern Harrier	GR	X	2
Sharp-shinned Hawk	WL		8
Cooper's Hawk	WL		8
Red-shouldered Hawk	WL		8
Broad-winged Hawk	WL		8
Swainson's Hawk	GR	X	5
Red-tailed Hawk	WL	X	1
Ferruginous Hawk	GR	X	7
Golden Eagle	CL	X	7
American Kestrel	WL	X	2
Merlin	WL		8
Prairie Falcon	GR		8
Peregrine Falcon	CL		8
Gray Partridge	GR		8

Ring-necked Pheasant	SS	X	1
Greater Prairie-chicken	GR		6
Sharp-tailed Grouse	GR	X	6
Wild Turkey	WL	X	6
Northern Bobwhite	SS	X	2
King Rail	WE		8
Virginia Rail	WE		8
Sora	WE	X	7
Common Moorhen	WE		8
American Coot	WE	X	6
Sandhill Crane	WE		8
Piping Plover	WE		8
Killdeer	WE	X	1
Mountain Plover	GR		8
Black-necked Stilt	WE		8
American Avocet	WE	X	7
Willet	WE	X	7
Spotted Sandpiper	WE	X	7
Upland Sandpiper	GR	X	1
Long-billed Curlew	GR	X	4
Common Snipe	WE	X	3
American Woodcock	WE		8
Wilson's Phalarope	WE	X	7
Forster's Tern	WE	X	7
Least Tern	WE		8
Black Tern	WE	X	3
Rock Dove	U	X	2
(Eurasian Collared-dove)	U		8
Mourning Dove	U	X	1
Black-billed Cuckoo	WL	X	5
Yellow-billed Cuckoo	WL	X	5
Common Barn Owl	GR		8
Eastern Screech-owl	WL		8
Great Horned Owl	WL	X	4
Burrowing Owl	GR	X	6
Barred Owl	WL		8
Long-eared Owl	WL		8
Short-eared Owl	GR		8
Common Nighthawk	GR	X	2
Common Poorwill	SS		8
Chuck-will's-widow	WL		8
Whip-poor-will	WL		8
Chimney Swift	U	X	5
White-throated Swift	CL		8
Ruby-th. Hummingbird	WL		8
Belted Kingfisher	WE	X	3
Lewis' Woodpecker	WL		8
Red-headed Woodpecker	WL	X	5
Red-bellied Woodpecker	WL	X	6
Downy Woodpecker	WL	X	5
Hairy Woodpecker	WL	X	6
Northern Flicker	WL	X	1
Pileated Woodpecker	WL		8
Western Wood-peewee	WL	X	7

Eastern Wood-peewee	WL	X	6
Willow Flycatcher	SS	X	6
Least Flycatcher	WL		8
Cordilleran Flycatcher	WL		
Eastern Phoebe	WL	X	5
Say's Phoebe	Cliff	X	6
Great Cr. Flycatcher	WL	X	5
Cassin's Kingbird	WL		8
Western Kingbird	WL	X	1
Eastern Kingbird	WL	X	5
Scissor-tailed Flycatcher	SS		8
Loggerhead Shrike	GR	X	5
White-eyed Vireo	WL		8
Bell's Vireo	SS	X	5
Plumbeous Vireo	WL		8
Yellow-throated Vireo	WL		8
Warbling Vireo	WL	X	2
Red-eyed Vireo	WL	X	3
Blue Jay	U	X	5
Pinyon Jay	WL		8
Chihuahuan Raven	GE		8
Clark's Nutcracker	WL		8
Black-billed Magpie	GE	X	2
American Crow	GE	X	4
Horned Lark	GR	X	5
Purple Martin	U	X	6
Tree Swallow	WL	X	7
Violet-green Swallow	WL		8
Northern R-w. Swallow	CL	X	4
Bank Swallow	CL	X	4
Barn Swallow	GE	X	4
Cliff Swallow	CL	X	5
Black-capped Chickadee	WL	X	2
Tufted Titmouse	WL	X	7
Red-breasted Nuthatch	WL		8
White-breasted Nuthatch	WL	X	2
Pygmy Nuthatch	WL		8
Brown Creeper	WL		8
Rock Wren	SS	X	7
Carolina Wren	SS	X	7
House Wren	SS	X	4
Sedge Wren	WE	X	7
Marsh Wren	WE	X	7
Blue-gray Gnatcatcher	WL		8
Eastern Bluebird	WL	X	2
Mountain Bluebird	WL		8
Townsend's Solitaire	WL		8
Swainson's Thrush	WL		8
Wood Thrush	WL		8
American Robin	U	X	1
Gray Catbird	SS	X	2
Northern Mockingbird	WL	X	5
Sage Thrasher	SS		8
Brown Thrasher	SS	X	1

European Starling	GE	X	1
Cedar Waxwing	WL	X	3
Northern Parula	WL		8
Yellow Warbler	SS	X	1
Yellow-rumped Warbler	WL		8
Chestnut-sided Warbler	SS		8
Yellow-throated Warbler	WL		8
Cerulean Warbler	WL		8
Black-and-white Warbler	WL		8
American Redstart	WL		8
Prothonotary Warbler	WL		8
Ovenbird	WL		8
Louisiana Waterthrush	WL		8
Kentucky Warbler	WL		8
Common Yellowthroat	SS	X	1
Yellow-breasted Chat	SS	X	7
Summer Tanager	WL		8
Scarlet Tanager	WL		8
Western Tanager	WL		8
Eastern Towhee	SS	X	6
Spotted Towhee	SS	X	6
Cassin's Sparrow	GR		8
Chipping Sparrow	U	X	4
Brewer's Sparrow	SS	X	7
Field Sparrow	SS	X	2
Vesper Sparrow	GR	X	2
Lark Sparrow	SS	X	5
Lark Bunting	SS	X	4
Grasshopper Sparrow	GR	X	5
Henslow's Sparrow	GR		8
Song Sparrow	SS	X	6
Swamp Sparrow	WE		8
Dark-eyed Junco	WL		8
McCown's Longspur	GR		8
Chestnut-c. Longspur	GR	X	7
Northern Cardinal	SS	X	2
Rose-breasted Grosbeak	WL	X	2
Black-headed Grosbeak	WL	X	7
Blue Grosbeak	SS	X	5
Lazuli Bunting	SS		8
Indigo Bunting	SS	X	5
Dickcissel	GR	X	5
Bobolink	GR	X	4
Red-winged Blackbird	WE	X	1
Eastern Meadowlark	GR	X	2
Western Meadowlark	GR	X	1
Yellow-headed Blackbird	WE	X	5
Brewer's Blackbird	GR	X	7
Common Grackle	WL	X	1
Great-tailed Grackle	WE		8
Brown-headed Cowbird	GE	X	1
Orchard Oriole	SS	X	4
Baltimore Oriole	WL	X	1
Bullock's Oriole	WL	X	7

House Finch	U	X	3	129
Red Crossbill	WL		8	
Pine Siskin	WL		8	
American Goldfinch	SS	X	1	
House Sparrow	U	X	4	

^a WL=Woodland, WE=Wetland, SS=Scrub-successional, U=Urban, GR=Grassland,

^b CL=Cliff, GE=Generalist.

^c Sauer et al. 1999

^d Criteria for PTU scores are in Appendix 3

1,2=well monitored, 3,4=marginal, 5,6,7=incomplete, 8=not monitored.

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Appendix 1. Details of Trend Estimation for the Breeding Bird Survey^a

"Population trends were estimated for 3 time periods: the entire survey interval (1966 - 1996), an early period (1966 - 1979), and a recent period (1980 - 1996). For all periods, we provide the estimated population trend (in %/year), a measure of its statistical significance (either a P value, or stars: *: $P < 0.10$, **: $P < 0.05$, ***: $P < 0.01$), and the number of routes on which trends were estimated. For the entire survey interval results, we also present the 95 % confidence interval of the trend estimate, and the weighted regional abundance of the species (average birds/route).

These results are presented for regions with at least 14 samples. Regions include States and Provinces, physiographic strata (indexed by number, e.g. S05 is the Mississippi Alluvial Valley), BBS regions (Eastern, Central, and Western), Fish and Wildlife Service Administrative Regions (Regions 1-6, RE1-RE6), The United States, Canada, and the Entire survey region (1CO).

The Route-regression method:

Trends are estimated using the route-regression method. In this analysis, we estimate population trends and annual indices using the methods described by Geissler and Sauer (1990). In this analysis, trend (or a consistent change in counts of birds on a route) is the quantity that is estimated, and annual indices of abundance are used to assess higher levels of pattern in the data in the context of the trend.

Regional trends are estimated as a weighted average of trends on individual routes. Route trends are estimated using the estimating equations estimator described by Link and Sauer (1994), in which a multiplicative trend is estimated. As in earlier analyses, observer effects are incorporated in the model to prevent bias associated with increases in observer quality over time (Sauer et al. 1994). See Link and Sauer (1994) for a detailed discussion of the advantages of the estimating equations estimator over the linear regression-based estimates used in earlier analyses.

Regional trends are found as weighted averages of route trends. Regardless of variability in the counts on the route, missing counts (from years when the route was not surveyed) and observer changes (that modify the quality of the data) both tend to make route data less reliable. Consequently, it is necessary to weight the route trends by a measure of the consistency of counting on the route. We do this by weighting the route trends with the inverse of the part of the variance of the slope estimate associated with these factors (which is the appropriate element of the $(X'X)^{-1}$ matrix). This variance weight is proportional to number of years run and number of observer changes, but because it does not contain the MSE of the count data it provides no information on variation in counts. We also weight route trend estimates by mean route counts (Geissler and Sauer 1990) and by areas of the physiographic strata within states. Combination of entire strata is not conducted because of geographic variation in sampling intensity within the strata. Bootstrapping is used to estimate variances of trends. See Geissler and Sauer (1990) for details of the route-regression trend estimation procedure."

Data Selection Criteria:

"We caution all users of BBS trend and annual index results that there exist species, regions, and time periods for which trends should not be estimated. In this analysis, we only used data from observers that we felt provided consistent results. Although

any standards tend to be arbitrary, we feel that the results may not be reliable when the number of samples in the analysis is less than 14. A positive bias in the trend may occur with small samples and low counts, and the variances are imprecise. Of course, if the trend is unreliable the indices must also be unreliable, as they are conditional on the trends. We also note that, although we do our best to assure the quality of the results, no data analysis is ever error free. Users of these data are therefore cautioned to carefully inspect the results for consistency. If errors are found, please inform us.

Finally, these trend results were produced by NBS researchers and managers. While the data are clearly public domain, results of analyses must be considered a research product of the analyst. Any publications based on our analyses should acknowledge that they are collaborative efforts. And, if the paper is based primarily on the results of unpublished NBS trend analysis, we suggest that you involve us with the writing and review of the manuscript."

^aThis appendix is cited from: Sauer, J. R., J. E. Hines, I. Thomas, J. Fallon, and G. Gough. 1999. The North American Breeding Bird Survey, Results and Analysis 1966 - 1998. Version 98.1, USGS Patuxent Wildlife Research Center, Laurel, MD

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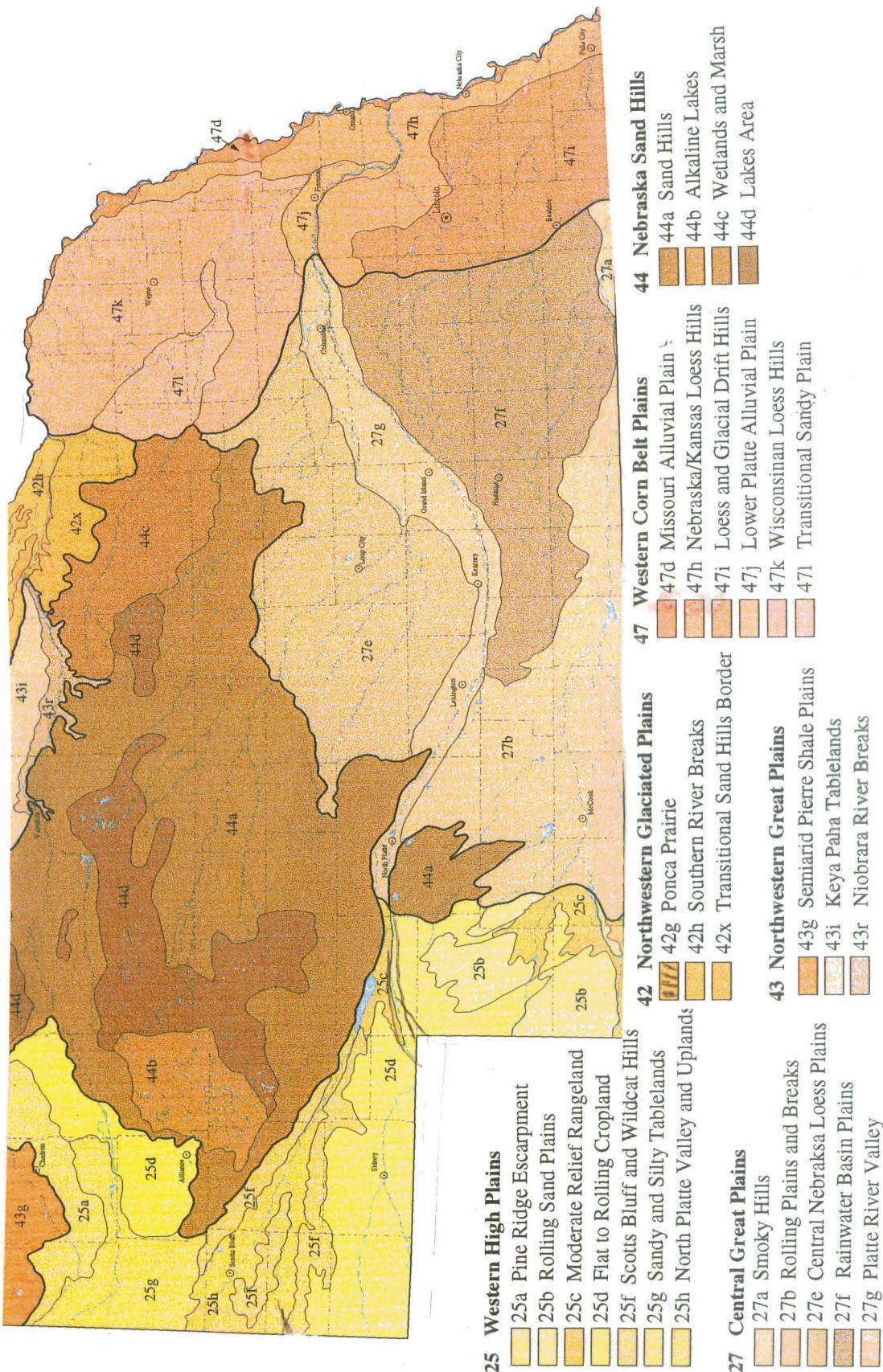
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Appendix 2. Six ecoregions in Nebraska (Omernick 1995)



Appendix 3. PIF Criteria ^a

1a. Total score (based upon the Partners in Flight Prioritization Process) in the physiographic area is 28 or greater and it occurs in the region in manageable numbers.

1b. Total score (based upon the Partners in Flight Prioritization Process) in the physiographic area is 22-27 and it occurs in the region in manageable numbers.

2a. Total PIF score is 19-21, with the sum of Area Importance and Population Trend equal to or greater than eight. Thus, species with moderate total scores and moderate relative densities in the planning unit are included only if their population trends are declining significantly. Species with high relative densities in the area are included if the population trend is unknown or declining.

2b. Total PIF score is 19-21, and the percentage of the population breeding in the physiographic area is greater than 9%. Conditions in physiographic areas that have relatively large proportions of individuals of a given species have a greater ability to influence the species' global population than do areas with smaller numbers of individuals.

3a. PIF "Watch List" species have an AI = >3. (Watch List species are those with the highest PIF prioritization scores based upon the species' ranks across their entire range. Some Watch List species may already have met criterion 1 or 2.

3b. A species is federally listed as Threatened or Endangered.

^a (from Fitzgerald and Pashley 1998)

Appendix 4. Population trend (PT) and population trend uncertainty (PTU) criteria for scoring Breeding Bird Survey data. To determine a PT score, first evaluate PTU by checking sample size (n) and statistical significance (P) and choose a trend depending on whether the species is increasing, decreasing, or stable. PTU scores are not used in the overall priority score but are important in judging the quality of the trend data.

PT Score	Trend	PTU Score	BBS Trend Quality	
			n	P
5=Significant Decrease	Decreasing at or above an average of 1.0% per year	1=	≥ 34 and or $14-33$ and	≤ 0.10 ≤ 0.10
		2=		
4=Possible Decrease	Decreasing at or above an average of 1.0% per year	3=	$6-13$ and or ≥ 14 and	≤ 0.10 $0.11-0.35$
		4=		
3=Trend Unknown	Change at or above an average of 1.0% per year	5=	≥ 14 and	>0.35
3=Insufficient Data	Any trend	6=	$6-13$ and	>0.10
		7=	$1-5$ and	any P value
3>No Data	No data	8=	NA	NA
2=Stable or No Trend	Trend between -1.0% and +1.0% per year	1=	≥ 34 and or $14-33$ and	any P value any P value
		2=		

2=Possible Increase	Increasing at or above an average of 1.0% per year	3=	6-13 or ≥ 14	and	≤ 0.10
		4=			0.11-0.35
1=Significant Increase	Increasing at or above an average of 1.0% per year	1=	≥ 34	and	≤ 0.10
		2=	14-33	and	≤ 0.10

Appendix 5. Inventory of current monitoring efforts of non-game birds in Nebraska by private and public agencies

Agency	Contact	Baseline Information or Mission	Non-game bird Monitoring
Audubon Nebraska	http://www.audubon.org Dave Sands 402 797 2301	Spring migration 'species count' published on NE birds. Annual birdathon	Christmas Bird Count
N.O.U.	http://rip.physics.unk.edu/nou/	Annual species count by county, published on Ne birds Produce the <u>Nebraska Bird Review</u>	Breeding Bird Survey
NE birds	NeBirds@rip.physics.unk.edu	Online discussion of Nebraska birds, archived on N. O. U. website	
Hawk Watch	Mark Orsag 402-826 4162	Count raptors, vultures, and migrant birds at Hitchcock Nature Area. Data from 1992 to present.	
Bluebirds Across Nebraska	http://www.bbne.org/	Increase population of bluebirds through promotion of bluebird awareness and bluebird breeding boxes	Monitor bluebird productivity
U.S. Forest Service Nebraska National Forest Chadron, NE	Gregory Schenbeck www.fs.fed.us 308-432-0399	An interactive database for Neotropical migratory bird/habitat relationships. Conservation priorities and bird ranking developed from Partners in Flight database for Nebraska National Forest and Oglala National Grasslands. Research on burrowing owl/prairie dog town interactions.	No monitoring

U.S Fish and Wildlife Service
Refuge Information <http://www.fws.gov>
 1-800-344-WILD

Require monitoring of Threatened and Endangered (T&E) species

The Nature Conservancy <http://tnc.org>

Nature Conservancy parcels are monitored at the site level
depending on site-specific needs.

Management
prescription
monitoring

Tern and Plover Conservation
Partnership
Nebraska Game and Parks Comm.
Jeff Marcus
402-472-8878

Protect Endangered least terns and piping plovers that nest at
sand/gravel mines, while reducing conflicts with mining

Monitor least tern
and piping plover

Heritage Program
Nebraska Game and Parks Comm.
@ngpc.state.ne.us

Inventory rare species, 1986-present, as identified by Heritage
rare species database. Monitor Threatened and Endangerred species

Monitor least tern,
piping plover,
whooping crane,
bald eagle

Appendix 6. Species accounts for Nebraska's 44 priority species

This appendix contains species accounts for 44 priority species identified for Nebraska. These accounts give a brief description of range, habitat, and trend data.

Species account information came from several sources including the United States Geological Survey, Patuxent Wildlife Research Center, the Northern Prairie Research Center, and The Nature Conservancy.

American White Pelican *Pelecanus erythrorhynchos*

	Western High Plains	Central Great Plains	Northwestern Glaciated Plains	Northwestern Great Plains	Nebraska Sandhills	Western Corn Belt
Percent Occurrence ^a					X	
GRASSLAND						
WETLAND						
SCRUB						
WOODLAND						
URBAN						

^a Percent Occurrence in Nebraska (Molhoff 2000)

Species Account: American White Pelicans breed in island colonies in western North America from northern Alberta to western Ontario and northeastern California to Utah, Nebraska, and Colorado. They prefer large bodies of water such as the lakes or reservoirs formed from dams. In Nebraska the non-breeders summer in the Sandhills and several large reservoirs. White Pelicans forage up to 30 miles from breeding sites in marshes, lakes, and rivers. They eat fish, crayfish and salamanders. The Pelican winters south on waters of the Gulf coast to Nicaragua (Potter 1998).

Factors, that effect their breeding success, are cold temperatures, hailstorms, and varying water levels in reservoirs (Potter 1998). The American White Pelican was reduced in the western United States from 23 colonies to 5 and was on the National Audubon Society's Blue List from 1972-82. This list provides early warning or population reductions (Ehrlich et al. 1988).

The survey-wide 1966-1999 trend for the American White Pelican is +1.2. The Central BBS trend for the same period is 4.0, however it is not statistically significant. The Nebraska trend also shows an increase (Sauer et al. 1999).

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Trumpeter Swan *Cygnus buccinator*

	Western High Plains	Central Great Plains	Northwestern Glaciated Plains	Northwestern Great Plains	Nebraska Sandhills	Western Corn Belt
Percent Occurrence ^a					100%	
GRASSLAND						
WETLAND						
SCRUB						
WOODLAND						
URBAN						

^a Percent Occurrence in Nebraska (Molhoff 2000)

Species Account: The Trumpeter Swan breeds north in Alaska and Canada. The population that breeds in the northern latitudes winters on the west coast, including Southeastern Alaska, where there is a considerable wintering population. There is another population whose year-round range is in the upper Midwest (Johnsgard 1998).

This species originally nested in Nebraska, but was extirpated and absent until the late 1960s. The swan was reintroduced to Lacreek national Wildlife Refuge in South Dakota and since 1963 has bred there and in adjacent parts of South Dakota as well as in Nebraska (Johnsgard 1998).

In 1995, the Nebraska population was about 150 birds. Nesting has been observed in the wetlands of the Sandhills, where they prefer island locations over shoreline sites. Nests are built in emergent vegetation in shallow water (Johnsgard 1979).

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Willet *Catoptrophorus semipalmatus*

	Western High Plains	Central Great Plains	Northwestern Glaciated Plains	Northwestern Great Plains	Nebraska Sandhills	Western Corn Belt
Percent Occurrence ^a	3%				97%	
GRASSLAND						
WETLAND						
SCRUB						
WOODLAND						
URBAN						

^a Percent Occurrence in Nebraska (Molhoff 2000)

Species Account: Willets breed from central Alberta and Montana through southern Manitoba, North Dakota, western Minnesota, and South Dakota, south to southcentral Oregon and central California, and east to northern Nevada, Idaho, northern Utah, Wyoming, northern Colorado, and western Nebraska (National Geographic Society 1987, Dechant et al. 1999). In winter, the Willet can be found along the Gulf coast and as far south as South America (to Galapagos Islands, central Chile, Uruguay, and southern Brazil).

Willets require large expanses of short, sparse upland grasslands for nesting and foraging and wetland complexes for foraging. (Weber 1978; Kantrud and Stewart 1984; Ryan and Renken 1987 1990; Kantrud and Higgins 1992). Willets use wetlands of various salinities, size and permanence. Suitable wetlands range in salinity from fresh to saline, and vary widely in size and permanence (Kantrud and Stewart 1984).

During 1996-1998, Willet populations have generally declined in the Central and Western BBS region. The trend results are a mosaic of increases and decreases, with a significant decline in Nebraska for the 1966-1998 interval (-4.2). Survey wide indices show a slight decline (-.83) in the 1966-1998 trend period (Sauer et al. 1999). Willets are ground nesters and highly susceptible to predation and human disturbance.

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Northern harrier *Circus cyaneus*

	Western High Plains	Central Great Plains	Northwestern Glaciated Plains	Northwestern Great Plains	Nebraska Sandhills	Western Corn Belt
Percent Occurrence ^a	26%	29%	2%	3%	28%	12%

GRASSLAND**WETLAND****SCRUB****WOODLAND****URBAN**

^a Percent Occurrence in Nebraska (Molhoff 2000)

Species Account: Breeding Northern Harriers generally inhabit marshlands, wet meadows, and other damp grassland habitats across the northern United States and Canada, but are also found in upland fields (Bildstein 1988). Harriers are recorded in relatively small numbers along BBS routes throughout their range. They appear to be most numerous in the northern Great Plains from the Dakotas and Montana into southern Canada (Sauer et al. 1995).

Populations of Northern Harriers have generally declined in the northeastern and midwestern United States throughout the twentieth century, primarily as a result of habitat destruction, both in grasslands and wetlands, and the more intensive agricultural use of remaining grasslands (Serrentino and England 1989, Sweet 1991). Trends in the western United States are poorly known, but harrier populations are believed to be stable or slowly declining in most states (Martin 1989). Similar trends are apparent on the BBS, where the most consistent declines occur on the Great Plains from Oklahoma to southern Canada (Sauer et al. 1995).

During 1966-1994, harrier populations have declined in the Central BBS Region and across the United States. Declines within states/provinces and physiographic strata are concentrated on the Great Plains. In Nebraska the 1966-1994 trend shows a decrease of -4.1 % per year, the 1980-1999 trend is -19% per year (Sauer et al. 1999). Breeding populations are known to exhibit considerable annual fluctuations in response to the abundance of prey (Bildstein 1988). These annual fluctuations are not apparent in the survey-wide indices, because few harriers are recorded on most BBS routes (Sauer et al. 1995).

Wintering Northern Harriers are widely distributed across the U.S. and southern Canada. On CBCs, they are most numerous along the southern Great Plains from Kansas into Texas and throughout the Great Basin region. Their population trends are mixed, with significant declines slightly outnumbering increases. Declining populations are most evident in central North America, while increases are scattered throughout its range (Sauer et al. 1995).

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Sweet, M.J. 1991. Kites and Northern Harrier. Pp. 32-41 in B.G Pendleton and D.L. Krahe, eds. Proceedings of the midwest raptor management symposium and workshop. Natl. Wildl. Fed. Scien. Tech. Ser. No. 15.

Swainson's Hawk *Buteo swainsoni*

	Western High Plains	Central Great Plains	Northwestern Glaciated Plains	Northwestern Great Plains	Nebraska Sandhills	Western Corn Belt
Percent Occurrence ^a	24%	34%	2%	1%	37%	2%

GRASSLAND**WETLAND****WOODLAND****SCRUB****URBAN**

^a Percent Occurrence in Nebraska (Molhoff 2000)

Species Account: Swainson's Hawks are found from central Alberta east to southern Manitoba and western Minnesota, south through Texas and west to southern California (Dechant et al. 1999). Swainson's Hawks winter to South America.

Swainson's Hawks prefer open grassland areas with scattered trees or with small clumps of trees or shrubs (Bent 1961). They use shortgrass, mixed-grass, tallgrass, and sandhill prairies, riparian areas, shelterbelts and black-tailed prairie dog colonies. In Nebraska, Johnsgard (1980) found Swainson's Hawks in the western high plains and sandhills grasslands with scattered trees. Faanes and Lingle (1995) observed that in Nebraska these hawks nested in upland prairie in single trees or shelterbelts next to grassland (Dechant et al. 1999).

There is a survey wide decline (-0.5) during the 1966-1999 trend period. For the Central BBS there is a -0.6 percent trend per year. For Nebraska, the trend is -0.5 % per year (Sauer et al. 1999). In Argentina, agricultural use of organophosphate insecticides has resulted in deaths of large numbers of wintering birds due to the effects on their food source, the grasshopper. Although some insecticides which are detrimental have been banned, other organophosphate insecticides remain in use in South America (Beidleman draft 1999).

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Ferruginous Hawk *Buteo regalis*

	Western High Plains	Central Great Plains	Northwestern Glaciated Plains	Northwestern Great Plains	Nebraska Sandhills	Western Corn Belt
Percent Occurrence ^a	60%	10%		10%	20%	

GRASSLAND**WETLAND****SCRUB****WOODLAND****URBAN**

^a Percent Occurrence in Nebraska (Molhoff 2000)

Species Account: The Ferruginous Hawk is an uncommon and locally distributed occupant of grasslands, sagebrush, and desert scrub habitats in the Great Plains and Great Basin regions. On the Great Plains, breeding pairs are normally associated with native grasslands (Gilmer and Stewart 1983).

Ferruginous Hawk populations have undergone noticeable declines in recent decades. These declines are most evident in the Prairie Provinces of Canada (Houston and Bechard 1984, Schmutz 1984) and in the western United States (Harlow and Bloom 1989). Conversion of native grasslands to agricultural land, reduced prey availability, and persecution have been implicated in these declines (Harlow and Bloom 1989).

As is true for many raptors, Ferruginous Hawks tend to be poorly represented along BBS routes. They are recorded in small numbers throughout their range. They are also generally recorded in small numbers on CBCs (Sauer et al. 1995)

While this species may have experienced some declines in recent decades, the BBS trend data for Ferruginous Hawks tend to be fairly positive. The survey-wide indices show an increasing tendency, especially after 1980. Increasing populations prevail throughout most of their range. The 1966-1979 trend estimates are generally produced from very small samples, and these trends are non-significant. After 1980, significant increases are indicated for Colorado and Montana, and the High Plains (S36) and Great Plains Roughlands (S39) strata that include portions of these two states. The increases in these two states are responsible for similar trends in the Central BBS Region, United States, and the survey-wide population (Sauer et al . 1995). In Nebraska, 1980-1998 trend results show a serious decline (-29.1), however this must be viewed with caution because of small sample size. The Nebraska 1966-1998 trend is also negative (-13.7) but should be viewed with caution (Sauer et. al. 1999).

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Bald Eagle *Haliaeetus leucocephalus*

	Western High Plains	Central Great Plains	Northwestern Glaciated Plains	Northwestern Great Plains	Nebraska Sandhills	Western Corn Belt
Percent Occurrence ^a	50%	50%				
GRASSLAND						
WETLAND						
SCRUB						
WOODLAND						
URBAN						

^a Percent Occurrence in Nebraska (Molhoff 2000)

Species Account: The Bald Eagle, our national symbol, has a broad range and can be found throughout North America - from Alaska to Newfoundland, and from Florida to southern California. Bald Eagles build a nest, usually in older and larger trees. They return year after year to the same nest. Due to increases, Nebraska now has a very small population of actively breeding birds. In winter, Bald Eagles can be seen most often along river systems, where they look for fish or crippled waterfowl (Winternitz 1998).

The decline of the Bald Eagle began with European settlement. Bounty shooting dramatically reduced the population. DDT, a pesticide that was sprayed in the late 1950s to control the beetles that control Dutch Elm disease, also contributed. The Federal government designated it an Endangered Species and the conservation activities from that action have returned the Bald Eagle from extinction. DDT was banned in the United States in 1972, though it is still used south of the United States. In 1995, the bird was de-listed from Endangered to Threatened United (Winternitz 1998).

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Greater prairie-chicken *Tympanuchus cupido*

	Western High Plains	Central Great Plains	Northwestern Glaciated Plains	Northwestern Great Plains	Nebraska Sandhills	Western Corn Belt
Percent Occurrence ^a	8%	13%	2%	4%	69%	4%

GRASSLAND**WETLAND****SCRUB****WOODLAND****URBAN**

^a Percent Occurrence in Nebraska (Molhoff 2000)

Species Account: The Prairie Chicken is closely associated with the native prairies of eastern and central North America. They are found in mixed-grass and tallgrass prairies, but will accept agricultural land. Native prairies have largely disappeared, causing a dramatic reduction in this species' abundance and range during historic times (Christisen 1969, Hamerstrom and Hamerstrom 1961). Loss of native grasslands remains the most critical factor influencing population declines.

The isolated eastern race became extinct in 1932. Elsewhere east of the Mississippi River, populations fluctuated during the twentieth century but are currently reduced to a small remnant flock in south-central Illinois (McPeek 1994). The race in Texas has also been reduced to very small numbers. The only sizable populations remain on the Great Plains, where the species has almost completely disappeared from Canada and dramatically declined elsewhere along the northern edge of its range (Sauer et al. 1995).

As is true for other grouse, Greater Prairie-Chickens are poorly surveyed by the BBS (Sauer et al. 1994). Since this species is found along a very small number of routes, the scattered records may not be representative of the actual population trends. Survey-wide indices exhibit a general decline throughout the survey. These declines are most apparent in Kansas and western Missouri (Sauer et al. 1995).

BBS data for Nebraska show a substantial increase in 1966-1979 (+24.5) and a significant increase (+16.6) for 1966-1998 (Sauer et al. 1999). The sample size is small and should be viewed with caution.

Insecticide may limit the insect prey, which is critical to the survival of the young. The introduced ring-necked pheasant competes directly with prairie-chickens, and sometimes parasitizes their nests. Existing pheasant populations should be removed from leks.

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Northern Bobwhite *Colinus virginianus*

	Western High Plains	Central Great Plains	Northwestern Glaciated Plains	Northwestern Great Plains	Nebraska Sandhills	Western Corn Belt
Percent Occurrence ^a	8%	50%	5%		10%	27%

GRASSLAND

WETLAND

SCRUB

WOODLAND

URBAN

^a Percent Occurrence in Nebraska (Molhoff 2000)

Species Account: Northern Bobwhites range from Massachusetts to the southeastern U.S., west to South Dakota and eastern New Mexico. Tall dense shrubs or brushy cover is the preferred habitat, particularly where grasses, cropland and brush come together. In Nebraska they are most common in the Central Great Plains, particularly along drainages. Bobwhite quail have small territories, often staying within one-quarter mile of where they are hatched (Yaeger 1998). After a harsh winter, quail populations are greatly reduced.

Survey-wide trends for 1966-1999 exhibit a statistically significant 2.8% decline continentally, similar to the Central BBS trend of a 2% decline. Nebraska trend for the same period is a decline of 1% (Sauer et al. 1999).

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Piping Plover *Charadrius melodus*

Western High Plains	Central Great Plains	Northwestern Glaciated Plains	Northwestern Great Plains	Nebraska Sandhills	Western Corn Belt
Percent Occurrence ^a	37%	17%		10%	37%

GRASSLAND

WETLAND

SCRUB

WOODLAND

URBAN

^a Percent Occurrence in Nebraska (Molhoff 2000)

Species Account: The Piping Plover breeds in the northern Great Plains region from southern Alberta, northern Saskatchewan, southern Manitoba, and southwestern Ontario, south to eastern Montana, the Dakotas, southeastern Colorado, Iowa, Minnesota, and Nebraska; breeding birds are widely distributed in small populations. Complete winter distribution is not known. Birds have been reported wintering from North Carolina south to Florida, the Gulf coast states, Mexico, and the Caribbean. Approximately 35 percent of the total breeding population winters along the gulf coast from Florida to Texas and represents 56 percent of the Great Lakes/Great Plains population. Also in small numbers in the Bahamas and Greater Antilles, and probably eastern Mexico (Andrews and Righter 1992, Haig 1992 in The Nature Conservancy 2000).

Plovers nest on broad, sandy beaches, especially where scattered grass tufts are present, but water levels changes from year to year force movement between sites (Nelson 1998).

In the mid-1800's piping plovers were harvested for food and brought to the verge of extinction. Piping plovers were protected from hunting by legislation in 1913, but populations have not increased to former levels (Hull 1981 in The Nature Conservancy 2000). The Piping Plover is Threatened species in accordance with the Engangered Species Act at the federal and state (Nebraska) level. They are affected by many things – disturbance to nest sites, water policies, predation on chicks. Without human intervention, the Piping Plover would have great difficulty (Nelson 1998).

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Mountain plover *Charadrius montanus*

	Western High Plains	Central Great Plains	Northwestern Glaciated Plains	Northwestern Great Plains	Nebraska Sandhills	Western Corn Belt
Percent Occurrence ^a	X			X		
GRASSLAND						
WETLAND						
SCRUB						
WOODLAND						
URBAN						

^a Percent Occurrence in Nebraska (Molhoff 2000)

Species account: The Mountain Plover was formerly a widespread summer resident of short-grass prairies on the western Great Plains, occupying a range extending from Montana to New Mexico and Texas (Graul and Webster 1976). During the past century, the conversion of native prairies to croplands has significantly reduced the availability of suitable habitats for this species, producing a significant decline in the continental population. The plover evolved with grazing ungulates and prairie dogs and benefits from bare ground. Nearly half of the remaining breeding population is found in Weld County, Colorado and Phillips County, Montana, with a very local distribution elsewhere in its range (Andrews and Righter 1992 in Sauer et al. 1995).

This species has fairly specific habitat requirements, preferring level areas with very short grass and scattered cactus (Graul 1975). Intensive grazing is beneficial for Mountain Plovers, and they also regularly occupy prairie dog towns (Knowles et al. 1982). They are somewhat colonial during the breeding season, and may shift their breeding areas from year to year (Sauer et al. 1995).

Breeding Mountain Plovers are relatively inconspicuous and easily overlooked. They tend to be poorly sampled by roadside surveys such as the BBS where they are recorded in very small numbers. For example, though they occur in Nebraska, they are not represented on the BBS survey data for the state.

The 1966-1999 trends indicate a decline in the Central BBS Region (-1.4). The survey-wide indices are variable but with a declining tendency. The assumption can be made that a regional decrease in prairie dog towns may be influencing this species (Sauer et al. 1999). This species is on the national Watch List, indicating high conservation need throughout the range. A petition to list under the Endangered Species Act has been filed.

The status of wintering Mountain Plover populations is poorly understood. In the U.S., most are found in California with small numbers in Arizona and Texas. An unknown proportion of the continental population winters in northern Mexico (Sauer et al. 1995).

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Upland sandpiper *Bartramia longicauda*

	Western High Plains	Central Great Plains	Northwestern Glaciated Plains	Northwestern Great Plains	Nebraska Sandhills	Western Corn Belt
Percent Occurrence ^a	10%	28%	5%	2%	44%	11%

GRASSLAND**WETLAND****SCRUB****WOODLAND****URBAN**

^a Percent Occurrence in Nebraska (Molhoff 2000)

Species Account: Upland Sandpipers prefer grassland habitats on their North American breeding grounds and South American winter range as well as during migration. On the BBS, this shorebird is most numerous on the central Great Plains from northern Oklahoma to North Dakota, and locally in Montana. It is generally recorded in small numbers elsewhere in its breeding range (Sauer et al. 1995).

The Upland Sandpiper is common in Nebraska. Approximately 44% of the breeding observations for this species were in the Nebraska sandhills. In general, Upland Sandpipers use areas with low to moderate forb cover, low woody cover, moderate grass cover, moderate to high litter cover, and little bare ground (Buss and Hawkins 1939, Rotenberry and Wiens 1980). Upland Sandpipers use a variety of habitats within grasslands including native and tame grasslands, wet meadows, hayland and pastures (Deschant et al. 1999). King and Savidge (1995) found Upland Sandpipers in native prairie and in CRP planted to native grasses in Nebraska.

Over the entire survey period, breeding populations have significantly increased in 3 states/provinces, 4 strata, the Central BBS Region, United States, and Canada. Other regional trends are generally non-significant increases. During 1966-1979, significant increases and declines are nearly equally distributed in states/provinces and strata, while regional trends include increases in the Central BBS Region, United States, and survey-wide (Sauer et al. 1995).

The survey-wide indices show evidence of a slight increasing tendency, especially after the late 1970s. Population trends in the Central BBS Region show a similar pattern (+1.0), while those in the Eastern BBS Region are essentially stable. Populations in Nebraska have generally increased (+2.8) throughout the 1966-1998 survey period (Sauer et al. 1999).

During the nineteenth century, Upland Sandpipers were abundant summer residents of native grasslands throughout the Great Plains. The population plummeted because of market hunting between the late 1800s and 1916 when many breeding populations were nearly extirpated. Increases in the Great Plains during the BBS survey period could reflect a continued recovery from the effects of market hunting. In the eastern portion of the breeding range, especially from Ohio through the northeastern states, Upland Sandpipers have noticeably declined since the 1940s (Peterjohn and Rice 1991). Causes of declines are loss of breeding and wintering habitat by conversion to agricultural lands and removal of taller vegetation by over-grazing (Sauer et al. 1995).

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Long-billed curlew *Numenius americanus*

	Western High Plains	Central Great Plains	Northwestern Glaciated Plains	Northwestern Great Plains	Nebraska Sandhills	Western Corn Belt
Percent Occurrence ^a	12%			1%	87%	

GRASSLAND

WETLAND

SCRUB

WOODLAND

URBAN

^a Percent Occurrence in Nebraska (Molhoff 2000)

Species Account: During the late nineteenth and early twentieth centuries, populations of many shorebirds, including Long-billed Curlews, were decimated by uncontrolled hunting. Breeding curlews disappeared from large portions of their range during these decades (Andrews and Righter 1992, Stewart 1975). With protection, the populations of most shorebirds breeding in the arctic recovered. However, Long-billed Curlews nest in the grasslands of central and western North America, where habitat destruction and other factors have not allowed for a sustained population recovery during the twentieth century. In fact, its breeding range has continued to contract in some areas such as the Texas panhandle and South Dakota (Oberholser 1974, SDOU 1978). Breeding populations have gradually declined in Utah and other states (Hayward et al. 1976) (Sauer et al. 1995).

Long-billed Curlews breed in short-grass communities, preferring native prairies but also occupying grazed mixed-grass communities and scrub prairie (Stewart 1975). Despite their large size, this species is not particularly conspicuous during the breeding season except for territorial individuals. Hence, its relative abundance may be under-represented along BBS routes. In general, breeding curlews are most numerous on the western Great Plains from eastern New Mexico and the Texas panhandle north to portions of Montana and Alberta, and in the Great Basin from Utah into eastern Oregon (Sauer et al. 1995).

BBS data suggest that Long-billed Curlew populations are declining throughout the western Great Plains. Declines are evident in the PIF 36 in which includes western Nebraska, and Central BBS Region. Small sample sizes preclude analysis of the 1966-1979 trends. After 1980, the trends are generally in a negative direction including significant declines in the Central BBS Region, U.S., and survey-wide population. The survey-wide annual indices are variable but show a slight declining tendency. Nebraska trends reflect that pattern, with significant declines (-9.0) from 1980-1998 (Sauer et al. 1999).

After the breeding, Long-billed Curlews form flocks and migrate to coastal habitats, mostly from California and Texas into Mexico. While they are most often encountered on tidal flats and other coastal habitats, wintering curlews also occur on inland grassland and agricultural habitats such as those found in the Central Valley of California and in west Texas. Given their tendency to occur as flocks in suitable habitats, their wintering numbers can vary considerably from year to year at many localities and tend to obscure long-term population trends (Sauer et al. 1995).

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Least Tern *Sterna antillarum*

	Western High Plains	Central Great Plains	Northwestern Glaciated Plains	Northwestern Great Plains	Nebraska Sandhills	Western Corn Belt
Percent Occurrence ^a	2%	39%	20%		11%	29%
GRASSLAND						
WETLAND						
SCRUB						
WOODLAND						
URBAN						

^a Percent Occurrence in Nebraska (Molhoff 2000)

Species Account: The Least Tern now breeds only locally in this region, north to Montana and North Dakota, east to southwestern Indiana, central Kentucky, and western Tennessee, west to eastern Colorado. Atlantic-Gulf coast: Maine south to Florida. It winters along Pacific coast from southern Mexico to Peru and eastern coasts of Mexico, Central America, and South America to Brazil and northern Argentina (AOU 1998).

Typical riverine nesting habitat contains unvegetated or sparsely vegetated sand and gravel bars with a wide unobstructed river channel (Sidle and Harrison 1990). Interior populations nest mainly on riverine sandbars or salt flats that become exposed during periods of low water (Hardy 1957). Nests are usually located at higher elevations and away from the water. Water levels determine the size of sand bars and the extent of nesting areas (USFWS 1990). Dams above colonies generally lower habitat quality by eliminating the spring floods that are necessary for alluvium deposition and the scouring of vegetation.

See also Ziewitz et al. (1992) for information on nesting habitat in the Platte River in Nebraska.

This species is listed as Endangered at the Federal and state (Nebraska) level. Due to its small numbers and limited range, it is not adequately sampled by the BBS.

Populations were decreased greatly by formerly extensive plume hunting. Decline of interior nesting populations has been coincident with human modification of river flow (e.g., reduction of spring floods by dams) and bank stabilization and channelization, resulting in reduced availability of bare island/sandbar nesting habitat; loss of aquatic habitat diversity and resulting changes in fish species composition and abundance also may have contributed to the reduced tern population (Figg 1993). Ziewitz et al. (1992) recommended the creation of sandbars to provide suitable nesting substrate in the Platte River in Nebraska.

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Burrowing Owl *Speotyto cunicularia*

	Western High Plains	Central Great Plains	Northwestern Glaciated Plains	Northwestern Great Plains	Nebraska Sandhills	Western Corn Belt
Percent Occurrence ^a	44%	20%		1%	34%	

GRASSLAND**WETLAND****SCRUB****WOODLAND****URBAN**

^a Percent Occurrence in Nebraska (Molhoff 2000)

Species Account: Western Burrowing Owls breed from southern Alberta to southwestern Saskatchewan, south through east central Washington, central Oregon, and southern California, and east to North Dakota, west central Nebraska, and Texas. Populations in the northern part of this range are migratory and winter south to El Salvador (Bent 1961).

Burrowing Owls prefer open areas within deserts, grasslands, and shrubsteppe. They use well-drained, level to gently sloping areas characterized by sparse vegetation and bare ground such as moderately or heavily grazed pasture (Bent 1961). Burrowing Owls on the Great Plains are not known to dig their own burrows, and usually rely on burrowing mammals to excavate nest sites and often use black-tailed prairie dog or Richardson's ground squirrel colonies at their nest sites (Bent 1961). In the Platte River Valley of Nebraska, Burrowing Owl nests were found only in upland prairie, and often were associated with black-tailed prairie dog colonies (Faanes and Lingle 1995). Of 92 Burrowing Owl nests in western Nebraska, 85% occurred in black-tailed prairie dog colonies, and 15% in American badger excavations (Desmond 1991, Desmond and Savidge 1998). In Nebraska, the Sandhills and western section of the state provide important habitat for the species.

Populations of Burrowing Owls have declined throughout the twentieth century as a result of elimination of burrowing rodents often exterminated by control programs (Desmond and Savidge 1996, 1998). Population trends of the Burrowing Owl from 1966 to 1996 show a significant decline in the Central BBS Region (-3.8), a stable trend in the Western BBS Region, and declines in many other regions including Wyoming, Colorado, New Mexico, South Dakota, and Texas (Sauer et al. 1995). The Nebraska trend for Burrowing Owls for the 1966-1998 period is stable with a slight increase of the 1980-1998 trend (Sauer et al. 1999).

In particular, preservation of black-tailed prairie dogs and Richardson's ground squirrels may be essential to the conservation of Burrowing Owls. Populations of black-tailed prairie dogs are in danger of local extirpation, and their colonies have become so isolated through fragmentation that re-population through natural dispersal and colonization is unlikely (Benedict et al. 1996). Fragmentation and isolation of habitat patches are potentially important factors in the decline of black-tailed prairie dog populations, but are largely unstudied. Declines of Burrowing Owl populations north and east of the Missouri River in North Dakota may be related to declines in Richardson's ground squirrel populations (Murphy et al. 1998). South and west of the Missouri River, Burrowing Owl population declines may be related to reductions in populations of black-tailed prairie dogs. In western Nebraska, a 63% decline in Burrowing Owl numbers over a 7-yr period in 17 black-tailed prairie dog colonies was associated with declines in black-tailed prairie dog densities due to prairie dog control activities (Desmond and Savidge 1998).

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Long-eared Owl *Asio otus*

	Western High Plains	Central Great Plains	Northwestern Glaciated Plains	Northwestern Great Plains	Nebraska Sandhills	Western Corn Belt
Percent Occurrence ^a		14%			29%	57%
GRASSLAND						
WETLAND						
SCRUB						
WOODLAND						
URBAN						

^a Percent Occurrence in Nebraska (Molhoff 2000).

Species Account: The Long-eared Owl inhabits middle latitudes of the Northern Hemisphere. There is broad overlap between winter and summer ranges (Boyle 1998). Long-eared Owls operate between forests and open country. They sometimes use dense forests, but more often mixed shrublands, prairie, and rural areas where shelterbelts and riparian areas provide roost sites. During the breeding season, they are closely associated with woodlands, forest edges or patches, or similar wooded habitats (Johnsgard 1988). The long-eared owl prefers forests, either coniferous or mixed. They also inhabit dense thickets of small trees near open habitats, riparian woodlands and woodlots, often near water. It nests in an abandoned hawk or corvid nest. It feeds on small mammals, primarily rodents, occasionally taking small birds. In winter, it often roosts communally in dense conifers (Dobkin 1994).

Long-eared Owls are often absent from BBS surveys. They are highly nomadic and numbers fluctuate with rodent populations. Continent-wide, these owls have declined in California and some midwestern states, probably because of habitat loss. Declines in Colorado have been correlated with an increase in the Great Horned Owl. However, land use changes, including the removal of shelterbelts and more efficient farming may correlate with population declines (Boyle 1998).

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Short-eared owl *Asio flammeus*

	Western High Plains	Central Great Plains	Northwestern Glaciated Plains	Northwestern Great Plains	Nebraska Sandhills	Western Corn Belt
Percent Occurrence ^a	60%				20%	20%

GRASSLAND**WETLAND****SCRUB****WOODLAND****URBAN**

^a Percent Occurrence in Nebraska (Molhoff 2000)

Species Account: A resident of grasslands, prairies and wetlands, this species gathers together in areas where vole populations are high. Hence, the numbers of breeding and wintering owls may fluctuate markedly from year to year, depending upon the availability of their rodent prey (Clark 1975). While these population fluctuations may partially obscure long-term trends, in general Short-eared Owl populations have declined in North America since 1900. These declines are very evident in the northeastern states, where this species has become one of the rarest and most threatened species (Melvin et al. 1989). However, similar trends have been reported from Ontario (Cadman et al. 1987) to North Dakota (Stewart 1975) and Colorado (Andrews and Righter 1992) (Sauer et al. 1995).

Along BBS routes, Short-eared Owls are generally reported in small numbers. The trends during 1966-1999 for the Central BBS show a declining trend (-3.0) (Sauer et al. 1999). That decrease is more apparent from 1980-1999 (-6.0). No trend data exists for the Short-eared Owl in Nebraska.

Short-eared Owls are generally recorded in small numbers throughout their range on CBCs. Trend estimates based on these data are generally in a negative direction, and all significant trends are declines. These declining populations occur in all portions of the winter range (Sauer et al. 1995).

As is true for most grassland birds, habitat loss is believed to be the primary factor responsible for the declines of Short-eared Owls (Marti and Marks 1987, Melvin et al. 1989). Overgrazing is also detrimental to the Short-Eared Owl.

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Chimney Swift *Chaetura pelagica*

	Western High Plains	Central Great Plains	Northwestern Glaciated Plains	Northwestern Great Plains	Nebraska Sandhills	Western Corn Belt
Percent Occurrence ^a	7%	47%	2%		15%	29%

GRASSLAND

WETLAND

SCRUB

WOODLAND

URBAN

^a Percent Occurrence in Nebraska (Molhoff 2000).

Species Account: Chimney swifts nest from New Brunswick west to Alberta and south to Texas and Florida. Their wintering grounds, unknown until recently, lie in the Amazon Basin or Brazil and Peru, south to northern Chile. The Chimney Swift is a woodland bird which has adapted well to human dwellings, nesting in chimneys. John James Audubon found them nesting in hollow trees but by 1870 they made a transition to chimneys and buildings. Since about 1920 few observers have identified them as tree nesting species. It feeds exclusively on flying insects (Kingery 1998).

Population numbers of swifts are small. Overall, populations survey-wide from 1966-1999 are showing a decline. The BBS shows a continental decline of 1% per year, a drop of about 25% in 31 years. Similarly, trend results for the Central BBS region show declines (-1.0). Nebraska trend results are -0.7 decline per year. All surveys measure significant declines (Sauer et al. 1999).

The ability to find suitable nesting and roosting sites in the form of chimneys appears to be responsible for expansion westward and similar population declines. The swift breeds in small colonies but gather in enormous post breeding flocks that roost together before the onset of migration (Dobkin 1994).

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Red-headed Woodpecker *Melanerpes erythrocephalus*

	Western High Plains	Central Great Plains	Northwestern Glaciated Plains	Northwestern Great Plains	Nebraska Sandhills	Western Corn Belt
Percent Occurrence ^a	13%	40%	3%	1%	21%	22%

GRASSLAND

WETLAND

SCRUB

WOODLAND

URBAN

^a Percent Occurrence in Nebraska (Molhoff 2000)

Species Account: The Red-headed Woodpecker breeds from southern Alberta and southern Saskatchewan South to central Texas, Gulf Coast, and Florida, west to central Montana, eastern Wyoming, eastern Colorado and Nebraska and central New Mexico (AOU 1998).

The Red-headed Woodpecker is associated with mature open woodlands, especially oak, riverbottoms, open areas with scattered trees and snags (standing dead trees). This species winters regularly through the southern two-thirds of the breeding range, rarely to the northern limits of the breeding range (AOU 1998).

The Red-headed Woodpecker is a cavity nester. It nests in holes excavated 2-25 meters above ground, requiring older standing dead trees. Individuals typically nest in the same tree or cavity in successive years (Ingold 1991).

Breeding Bird Survey data indicate the most serious declines in the Ozark-Ouachita Plateau, Ohio Hills, Northern Spruce Hardwoods, Great Lakes Plain, and the Southeast in general. It is the fastest declining cavity-nesting bird in Florida (Smith et al., in press). In the Central BBS there is a declining population (-2.5) for 1966-1999 and a more drastic decline (-4.8) for 1980-1999. The Nebraska trend for 1980-1998 is -4.1 and for 1966-1999 -0.4 (Sauer et al. 1999).

The most significant threat to this species is loss of nesting habitat due to the reduction in the number of dead trees and snags (Raphael and White 1984) and the change to "cleaner" agricultural practices (e.g., removal of hedgerows, odd corners on fields, larger monoculture fields) (Smith et al., in press). Habitat areas in isolated woodlots and trees surrounded by cropland may also increase exposures to pesticides, but this has not been documented. Loss of mature bottomland hardwood forest continues to pose threats to breeding and wintering habitat (Kilham 1958 in The Nature Conservancy 2000).

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Eastern Phoebe *Sayornis Phoebe*

	Western High Plains	Central Great Plains	Northwestern Glaciated Plains	Northwestern Great Plains	Nebraska Sandhills	Western Corn Belt
Percent Occurrence ^a	5%	56%	3%	1%	11%	24%

GRASSLAND

WETLAND

SCRUB

WOODLAND

URBAN

^a Percent Occurrence in Nebraska (Molhoff 2000)

Species Account: The Eastern and Say's Phoebe ranges overlap along a narrow north-south band extending from western Nebraska and the Dakotas to Alberta and the Northwest Territories.

They inhabit grasslands, but require trees or other woody vegetation for perching and hiding from predators (Jones 1998). The Eastern Phoebe prefers open riparian woodlands or woodlands near streams and lakes. It often uses human structures such as bridges or abandoned buildings to build nests. It is an aerial insectivore, capturing insects in flight from an exposed perch and returning to the same perch (Dobkin 1994). Eastern Phoebes are very susceptible to nest predation and nest parasitism. Studies have shown nest failures attributed to predators such as raccoons, snakes, and mice. Cowbirds are also a culprit. A common cowbird host on the wintering grounds is thought to be responsible for recent declines (Dobkin 1994, Jones 1998).

Over the entire range (+1.0) and in the Central BBS (+2.0), the Eastern Phoebe has been steady (+1.0) during the 1966-1999 trend. However for Nebraska, there has been a decline of -5.6 per year (Sauer et al. 1999).

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Western Kingbird *Tyrannus verticalis*

	Western High Plains	Central Great Plains	Northwestern Glaciated Plains	Northwestern Great Plains	Nebraska Sandhills	Western Corn Belt
Percent Occurrence ^a	19%	35%	4%	2%	31%	8%

GRASSLAND

WETLAND

SCRUB

WOODLAND

URBAN

^a Percent Occurrence in Nebraska (Molhoff 2000)

Species Account: Western kingbirds breed throughout western North America. They winter from central Mexico south to Costa Rica. They breed in grasslands, deserts, shrublands, riparian woodlands, and rural shelterbelts. Bergen (1992 in Jones 1998) reported that Western Kingbirds in Nebraska selected large, widely spaced cottonwoods surrounded by grass. They prey on large insects and grasshoppers.

Nest predators include hawks, ravens, jays and raccoons (Beal 1912 in Jones 1998).

The 1966-1999 BBS trend survey-wide is stable. The Central BBS trend is also stable, but the Nebraska trend shows a -2.3% decline (Sauer et al. 1999).

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*Eastern Kingbird *Tyrannus tyrannus**

	Western High Plains	Central Great Plains	Northwestern Glaciated Plains	Northwestern Great Plains	Nebraska Sandhills	Western Corn Belt
Percent Occurrence ^a	14%	34%	3%	1%	29%	19%

GRASSLAND

WETLAND

SCRUB

WOODLAND

URBAN

^a Percent Occurrence in Nebraska (Molhoff 2000)

Species Account: Kingbirds are aerial hawking insectivores of open spaces that occur in most regions of North America. They use a variety of wooded habitats, but particularly woodlands with open water. Despite its common name, the Eastern Kingbird breeds abundantly west of the Mississippi River, and its range extends to the northern aspect of the West coast. In the Great Plains and Far West it may breed sympatrically with 1 or 2 other species of kingbirds (The Nature Conservancy 2000).

The Eastern Kingbird over-winters in Amazonia. While there, it maintains different social and feeding behaviors that are seen during the breeding season. Clutch size varies, but females raise only a single brood per season. This low productivity is likely related to the species' foraging habits and reliance on flying insects for food. (Murphy 1996 in The Nature Conservancy 2000).

During 1966-1999, Eastern Kingbird trend was -0.8 per year. The slight declines were similar in the Central BBS Region and in Nebraska (-0.4) (Sauer et al. 1999).

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Scissor-tailed Flycatcher (*Tyrannus forficatus*)

	Western High Plains	Central Great Plains	Northwestern Glaciated Plains	Northwestern Great Plains	Nebraska Sandhills	Western Corn Belt
Percent Occurrence ^a						100%
GRASSLAND						
WETLAND						
SCRUB						
WOODLAND						
URBAN						

^a Percent Occurrence in Nebraska (Molhoff 2000)

Species Account: The Scissor-tailed Flycatcher breeds from eastern New Mexico, southeastern Colorado, southern Nebraska, central Missouri, central Arkansas, and western Louisiana south to northern Nuevo Leon and southern Texas (AOU 1998). It winters from central and southern Florida, and in Middle America from southern Veracruz and Oaxaca south to central Costa Rica (rarely to western Panama) It is a casual north to California and southern Louisiana (AOU 1998).

This flycatcher inhabits open country (savannas, grasslands, croplands, pastures, gardens, parks, golf courses, and urban areas) with scattered trees and shrubs for perching and nesting. Nests are often in isolated trees or shrubs, but also in tree or shrub copses or sometimes in riparian forests (Fitch 1950, Nolte and Fulbright 1996, Regosin 1994).

Although range-wide Christmas Bird Counts (CBC) suggests a significant decline, North American Breeding Bird Survey does not. The difference between these two monitoring programs may be due to the smaller CBC sample size or an expanding range. Weather-related mortality of eggs and young during the nesting season appears to significantly influence population size (The Nature Conservancy 2000).

North American Breeding Bird Survey data indicate a stable breeding population during the 30-year period, 1966-1996, with some areas showing a significant population and other areas (e.g., east Texas prairies) exhibiting a significant population decline (Sauer et al. 1997). The Central BBS shows a stable trend (+0.1) during the 1966-1999 period (Sauer et al 1999). This species is not shown on the Nebraska BBS survey where it is a rare breeder in the southern edge of the state. The Scissor-tailed Flycatcher has expanded eastward with the conversion of woodland to open habitats such as croplands, pastures, cemeteries, golf courses, and subdivisions (Baumgartner and Baumgartner 1992, Gruber et al. 1974)

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Brown Thrasher *Toxostoma rufum*

	Western High Plains	Central Great Plains	Northwestern Glaciated Plains	Northwestern Great Plains	Nebraska Sandhills	Western Corn Belt
Percent Occurrence ^a	14%	44%	4%	1%	18%	19%

GRASSLAND

WETLAND

SCRUB

WOODLAND

URBAN

^a Percent Occurrence in Nebraska (Molhoff 2000)

Species Account: Brown Thrashers breed throughout the eastern United States and southern Canada west to Alberta and eastern Texas. During winter they migrate to the southeastern states. The Thrasher prefers dense shrubs and thickets in riparian corridors, draws, shelterbelts, woodlots and rural areas. In Colorado, typical habitat consisted of trees and shrubs around houses and cultivated woodlots (Dillon 1998).

Brown Thrashers display a continuing decline on BBS routes of 1.2% per year. Nebraska trends are similar for the 1966-1999 trend period, showing a slight (-0.4) decline (Sauer et al 1999).

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Loggerhead Shrike *Lanius ludovicianus*

	Western High Plains	Central Great Plains	Northwestern Glaciated Plains	Northwestern Great Plains	Nebraska Sandhills	Western Corn Belt
Percent Occurrence ^a	20%	28%	2%	2%	37%	11%

GRASSLAND**WETLAND****SCRUB****WOODLAND****URBAN**

^a Percent Occurrence in Nebraska (Molhoff 2000)

Species Account: Loggerhead Shrikes breed from central Washington, the prairie provinces of Canada, and the northeastern United States. Loggerhead Shrikes prefer open habitat with scattered shrubs or trees, particularly thick or thorny shrubs. Thorny shrubs or trees also serve as impaling stations. In the upper Midwest, abundance of open habitat, foraging areas, and elevated perch sites were considered the most important factors in habitat suitability (Brooks and Temple 1990a). Loggerhead Shrikes are opportunistic predators, feeding on a wide variety of small prey including insects and other arthropods, mammals, birds, reptiles, amphibians, and occasionally carrion (Yosef 1996).

Loss of shrub habitat, use of insecticides, and cattle grazing disturbance have all contributed to its decline. This species has a high conservation need throughout its range. Continental BBS trends suggest a decline of 3.5% per year, with 63% of the routes reporting declines. The rate will lead to two-thirds loss of the population in three decades (Kingery 1998 in Beidleman draft 1999). In the Central BBS region, the Shrike shows a -2.9 percent decline per year for the 1966-1999 trend. The Nebraska trend is less, with a -0.1 percent per year decline (Sauer et al. 1999).

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	Western High Plains	Central Great Plains	Northwestern Glaciated Plains	Northwestern Great Plains	Nebraska Sandhills	Western Corn Belt
Percent Occurrence ^a	6%	45%	4%	1%	23%	22%

GRASSLAND

WETLAND

SCRUB

WOODLAND

URBAN

^a Percent Occurrence in Nebraska (Molhoff 2000)

Species Account: The Bell's Vireo breeds from southern California, southern Nevada, southwestern Utah, Arizona, southern New Mexico to northeastern Colorado, Nebraska, South Dakota, western North Dakota, southeastern Minnesota, southern Wisconsin, northeastern Illinois, northwestern Indiana, and southwestern Michigan south to northern Baja California, southern Texas, north-central Louisiana, Arkansas, and southwestern Tennessee, southwestern Kentucky, southern Indiana, and western Ohio (Brown 1993, AOU 1998). It winters primarily in southern Baja California and southern Sonora, the gulf coast, south to Honduras and Nicaragua (Brown 1993, AOU 1998).

The Bell's Vireo breeds in dense brush, willow thickets, mesquite, streamside thickets, and scrub oak, in arid regions often near water, also adjoining uplands (AOU 1998). This species has seriously declined in several portions of range, particularly in arid southwest where it is endangered. It is at risk to loss and fragmentation of riparian and scrub habitats, and susceptible to brood parasitism by brown-headed cowbirds. These factors threaten remaining breeding populations. Breeding habitat restoration and cowbird control has led to recovery in some areas (Nature Conservancy 2000).

Breeding Bird Survey data from 1966-1995 indicate significant survey wide declines averaging 3.2 percent per year, with steepest regional declines in the BBS Central region (-4.8%). The highest declines occur in Oklahoma (-8.3 percent average per year), and in Nebraska (-7.7 for 1980-1995) (Sauer et al. 1999).

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	Western High Plains	Central Great Plains	Northwestern Glaciated Plains	Northwestern Great Plains	Nebraska Sandhills	Western Corn Belt	
Percent Occurrence ^a							100%
GRASSLAND							
WETLAND							
SCRUB							
WOODLAND							
URBAN							

^a Percent Occurrence in Nebraska (Molhoff 2000)

Species Account: The Cerulean Warbler breeds from southeastern Nebraska across southern Great Lakes region to southern Ontario, southwestern Quebec, and western New England, south to northern Texas, central Georgia and Alabama, western North Carolina, and Maryland. It winters in a narrow elevational zone on the eastern slopes of the Andes from Colombia and Venezuela through Ecuador to Peru (AOU 1983).

Breeding habitat is a structurally mature hardwood forest in a mesic or wetter situation, with a closed canopy. This species uses older deciduous forests on both the breeding grounds in North America and the non-breeding range in the Andes. Habitat is frequently described as mature deciduous forest, particularly in floodplains or other mesic conditions (Robbins et al. 1992 in Tennessee and Maryland; Kahl et al. 1985 in Missouri).

Rangewide declines are most severe in the center of their range, where the highest numbers of individuals are recorded. The Central BBS Region shows a -11.7 percent decline for 1966-1999 and -34.4 percent decline for the 1966-1979 period. Survey wide trends for 1966-1999 also show a decline (-4.0). This is a cause for concern. Range-wide loss of both breeding and wintering habitat may be the cause. The traits of the species as a single brooded, forest nesting neotropical migrant are believed to be the features that put the species at risk for population decline resulting from habitat destruction (The Nature Conservancy 2000).

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Prothonotary Warbler *Protonotaria citrea*

	Western High Plains	Central Great Plains	Northwestern Glaciated Plains	Northwestern Great Plains Plains	Nebraska Sandhills	Western Corn Belt
Percent Occurrence*					14%	86%
GRASSLAND						
WETLAND						
SCRUB						
WOODLAND						
URBAN						

* Percent Occurrence in Nebraska (Molhoff 2000)

Species Account: The Prothonotary Warbler breeds in the southeastern U.S., south to Texas, the Gulf Coast, and central Florida, west to Oklahoma and Kansas (AOU 1983). Habitat for this species includes wooded wetlands, bottomland hardwood forests, and cypress swamps. Bottomland forests and extensive willow thickets near lakes or ponds are also suitable. This warbler likes dense underbrush along streambanks (Bushman and Therres 1988). It is a cavity nester, using the woodpecker holes in dead or dying trees. Essential habitat requirements are water, shade, and older trees that provide the nesting holes. This is the only eastern warbler that nests in tree cavities (The Nature Conservancy 2000).

Little is known of winter habitat on the Caribbean slope of Central America, Colombia, and northern Venezuela. Most studies indicate a steady decline in populations of this Neotropical migrant since the 1970s. The major threat is loss, degradation, and fragmentation of habitat as many wetlands are either permanently drained or flooded. Some mortality occurs through cowbird parasitism and competition with other species for nest sites (The Nature Conservancy 2000).

BBS data survey - wide from 1966-1999 show a -1.3% per year decline for the species. The central BBS region shows a -2.2% decline (Sauer et al. 1999). The primary threat in most areas is loss of suitable habitat (Leberman 1992). Loss of old growth forest associated with riparian habitats is detrimental because older trees are more likely to have nesting cavities. Widespread drainage of required wetland habitat is a significant threat. Mortality factors are nest destruction by house wrens (Walkinshaw 1941), brood parasitism, and parasitism by brown-headed cowbirds (Walkinshaw 1941).

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Dickcissel *Spiza americana*

	Western High Plains	Central Great Plains	Northwestern Glaciated Plains	Northwestern Great Plains	Nebraska Sandhills	Western Corn Belt
Percent Occurrence ^a	9%	47%	4%	0.5%	15	25%

GRASSLAND**WETLAND****SCRUB****WOODLAND****URBAN**

^a Percent Occurrence in Nebraska (Molhoff 2000)

Species Account: Dickcissel is a grassland bird whose distribution has been irregular. The Dickcissel is thought to have originally occupied the tall grass and mixed prairies of the eastern and central Great Plains. Historical changes in its breeding range have been correlated with changes in agricultural land use practices (Hurley and Franks 1976). Deforestation allowed this species to spread eastward during the nineteenth century (Peterjohn and Rice 1991)(Sauer et al 1995).

Even though most native tall and mixed grass prairies have been destroyed, breeding Dickcissels remain most numerous on the eastern and central Great Plains from Iowa and southern South Dakota south to Missouri and Texas. Their abundance declines rapidly towards the eastern and western edges of this range. Most Dickcissels winter in northern South America and sporadically in Central America (Sauer et al. 1995).

While Dickcissels tend to be scarce and locally distributed at the peripheries of their range, periodic influxes from elsewhere in their range can cause these populations to exhibit considerable annual fluctuations in abundance. These influxes near the periphery of the range are inversely correlated with habitat suitability in the southern portion of their normal breeding range (Fretwell 1986).

Dickcissel populations have generally declined since the mid-1960s. Populations in the Central BBS regions, U.S., and survey-wide have declined. During the 1966-1979 interval, all significant trends in states/provinces, strata, and regions with adequate sample sizes are declines. Nebraska exhibited a -3.3 % decline for the time period (Sauer et al. 1995, 1999).

After 1980, declines were limited to specific regions and survey-wide populations increased. In Nebraska populations stabilized (-0.8). The geographic patterns to the long-term trends are not uniform. Declines are most prevalent in the northern portion of the range, particularly from Ohio west to Minnesota, Iowa, and Missouri, and also from Nebraska north into North Dakota (Sauer et al. 1995,1999).

A number of factors have contributed to the trends in Dickcissel populations. This species is well adapted to residing in agricultural landscapes, inhabiting hayfields, pastures, weedy fallow fields, and the weedy margins of ditches and roadsides. However, the conversion of these habitats into cultivated fields and the more frequent mowing of hayfields contributed to the declines in some areas (Fretwell 1986). Brood parasitism by Brown-headed Cowbirds has been shown to negatively impact recruitment of Dickcissels, as could increased nest predation in certain habitats (Zimmerman 1983, 1984). Fretwell (1977) indicated that food availability on the winter range influences the numbers of Dickcissels returning the following spring, and may favor the survival of males over the survival of females. Changing land use practices as well as persecution may also be having an effect on Dickcissels during the winter months in northern South America (Sauer et al. 1995).

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Cassin's sparrow *Aimophila cassini*

	Western High Plains	Central Great Plains	Northwestern Glaciated Plains	Northwestern Great Plains	Nebraska Sandhills	Western Corn Belt
Percent Occurrence ^a	100%					
GRASSLAND						
WETLAND						
SCRUB						
WOODLAND						
URBAN						

^a Percent Occurrence in Nebraska (Molhoff 2000)

Species Account: During the breeding season, Cassin's Sparrows inhabit short-grass prairies mixed with scattered shrubs. They avoid pure grassland and pure shrubland habitats. They use the taller posts as lookout posts and singing perches. Their populations are known to experience considerable annual fluctuations in abundance, primarily in response to changes in precipitation. In Colorado, Cassin's Sparrows are least numerous during wet years when the grassy vegetation becomes too tall. Wintering Cassin's Sparrows also use grasslands with scattered brush in the southwestern U.S. and adjacent Mexico (Sauer et al.1995).

The BBS trend estimates for this species should be viewed with caution, since years of unusual abundance or scarcity could markedly influence these estimates and the secretive habits of these birds make detection difficult. BBS data indicate a long-term major decline in the U.S. Declines occur in the Central BBS Region and survey-wide. The survey-wide indices exhibit a definite peak during 1974, followed by a decline through 1981 and then fairly stable numbers despite annual fluctuations in abundance. Indices for the Central BBS Region and Texas are similar to the survey-wide indices (Sauer et al. 1995).

The BBS trends are influenced by the unusual abundance of Cassin's Sparrows during 1974, followed by a gradual decline to stable levels. Such short-term fluctuations are not unexpected for this species, but should not be confused with any long-term patterns in their population trends. However, due to the long-term trends, this species should be viewed high among the species needing attention (Sauer et al. 1995).

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American Tree Sparrow *Spizella arborea*

	Western High Plains	Central Great Plains	Northwestern Glaciated Plains	Northwestern Great Plains	Nebraska Sandhills	Western Corn Belt
Percent Occurrence ^a	X	X	X	X	X	X

GRASSLAND

WETLAND

SCRUB

WOODLAND

URBAN

^a Percent Occurrence in Nebraska (Molhoff 2000)

Species Account: The American Tree Sparrow breeds in the far north or North America. It winters in the interior or the United States, including Nebraska. This sparrow prefers weedy and scrubby fields, woodland edges and areas that provide an abundance of weed seeds in winter. It is common throughout its range and breeds in open willow, alder, dwarf scrub along streams and bogs on the edge or the tundra. It also breeds in open areas with scrub conifers (Byers et al. 1995).

The American Tree Sparrow is a common migrant in Nebraska and winter visitor statewide. It is widespread throughout the entire Plains Region during winter and migration. It can be found in small flocks among thickets, and brushy roadsides (Johnsgard 1998).

This species is on the priority list because of declines in the Central Mixed Grass Prairie region, documented during the Christmas Bird Count.

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Brewer's Sparrow *Spizella breweri*

	Western High Plains	Central Great Plains	Northwestern Glaciated Plains	Northwestern Great Plains	Nebraska Sandhills	Western Corn Belt
Percent Occurrence ^a	67%				33%	
GRASSLAND						
WETLAND						
SCRUB						
WOODLAND						
URBAN						

^a Percent Occurrence in Nebraska (Molhoff 2000)

Species Account: The Brewer's Sparrow breeds from southeast Alberta, southwestern Saskatchewan, Montana, and southwestern North Dakota, south to southern California, southern Nevada, central Arizona, northwestern New Mexico, central Colorado, southwestern Kansas, northwestern Nebraska, and southwestern South Dakota (AOU 1983, Rotenberry et al. 1999). It winters to southern California, southern Nevada, central Arizona, southern New Mexico, and west Texas, south to southern Baja California, Sonora, and in highlands from Chihuahua, Coahuila, and Nuevo Leon south to northern Jalisco and Guanajuato (AOU 1983, Rotenberry et al. 1999).

The Brewer's Sparrow is the dominant avian species associated with sagebrush habitats. It prefers the shrubsteppe, shortgrass prairie with scattered shrubs (Nature Conservancy 2000). This sparrow eats insects and seeds of grasses and forbes.

The cause of widespread decline on breeding grounds is uncertain, but possibly linked to degradation of sagebrush habitats. Range improvement programs remove sagebrush by burning, herbicide application, and mechanical treatment, replacing sagebrush with annual grassland to promote forage for livestock. Grazing can trigger a cascade of ecological changes, the most dramatic where invasion of non-native grasses escalates the fire cycle and converts sagebrush shrublands to annual grasslands. Historical heavy livestock grazing altered much of the sagebrush range, changing plant composition and densities (Rotenberry and Weins 1980).. West (1988, 1996) estimates less than 1 percent of sagebrush steppe habitats remain untouched by livestock (The Nature Conservancy 2000).

Widespread long-term declines and threats to shrub-steppe breeding habitats have placed it on the Partners in Flight WatchList of conservation priority species (Muehter 1998). BBS data for 1966-1996 show significant and strong survey-wide declines averaging -3.7 percent per year. These negative trends appear to be consistent throughout the 30-year survey period (Nature Conservancy 2000). Trend results for Nebraska for the 1966-1999 period represent a sharp decline of -5.8 percent per year (Sauer et al 1999).

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Percent Occurrence ^a	20%	28%	2%	2%	37%	11%

GRASSLAND

WETLAND

SCRUB

WOODLAND

URBAN

^a Percent Occurrence in Nebraska (Molhoff 2000)

Species Account: Loggerhead Shrikes breed from central Washington, the prairie provinces of Canada, and the northeastern United States. Loggerhead Shrikes prefer open habitat with scattered shrubs or trees, particularly thick or thorny shrubs. Thorny shrubs or trees also serve as impaling stations. In the upper Midwest, abundance of open habitat, foraging areas, and elevated perch sites were considered the most important factors in habitat suitability (Brooks and Temple 1990a). Loggerhead Shrikes are opportunistic predators, feeding on a wide variety of small prey including insects and other arthropods, mammals, birds, reptiles, amphibians, and occasionally carrion (Yosef 1996).

Loss of shrub habitat, use of insecticides, and cattle grazing disturbance have all contributed to its decline. This species has a high conservation need throughout its range. Continental BBS trends suggest a decline of 3.5% per year, with 63% of the routes reporting declines. The rate will lead to two-thirds loss of the population in three decades (Kingery 1998 in Beidleman draft 1999). In the Central BBS region, the Shrike shows a -2.9 percent decline per year for the 1966-1999 trend. The Nebraska trend is less, with a -0.1 percent per year decline (Sauer et al. 1999).

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Field Sparrow *Spizella pusilla*

	Western High Plains	Central Great Plains	Northwestern Glaciated Plains	Northwestern Great Plains	Nebraska Sandhills	Western Corn Belt
Percent Occurrence ^a	1%	31%	5%	1%	24%	33%

GRASSLAND**WETLAND****SCRUB****WOODLAND****URBAN**

^a Percent Occurrence in Nebraska (Molhoff 2000)

Species Account: The Field Sparrow breeds from eastern Montana east across the northern U.S. and southern Canada to New England and southern New Brunswick, south to northeastern Colorado, Nebraska, Oklahoma, Texas, Gulf Coast, and southern Georgia; also southern Manitoba (Carey et al. 1994, AOU 1998). It winters in Kansas east to Massachusetts, south to southeastern New Mexico, northern Coahuila, central Nuevo Leon, northern Tamaulipas, Gulf Coast, and southern Florida (Carey et al. 1994, AOU 1998).

Habitat for this species is grasslands with a shrubby component, including overgrown pastures, thorn scrub, deciduous forest edge, and fencerows (AOU 1983). Woody vegetation and dense grass appear to be very important habitat features for the Field Sparrow, including shrub-dominated edge habitat adjacent to grassland or grassland with a shrub component (The Nature Conservancy 2000).

Predation and cowbird parasitism are two significant causes of nest mortality. In Illinois, 112 of 147 nests depredated (Carey et al. 1994). Parasitism by brown-headed cowbirds is common (Crooks and Henderson 1953, Friedmann et al. 1977, Carey et al. 1994 in The Nature Conservancy 2000).

The most significant abundances of this species may have occurred in the late 19th century after clearing of eastern forests. More recently, North American Breeding Bird Survey (BBS) data indicate annual survey-wide decrease -3.3 percent in the period 1966-1996 (Sauer et al. 1997). The Central BBS shows a similar decline (-2.2) from 1966-1999. Non-significant increases are observed only in Minnesota, Nebraska, and North Dakota. The declines are probably due to successional changes in breeding habitat as shrubby old fields grow to forest or are cleared for agriculture and development (The Nature Conservancy 2000).

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Lark bunting *Calamospiza melanocorys*

	Western High Plains	Central Great Plains	Northwestern Glaciated Plains	Northwestern Great Plains	Nebraska Sandhills	Western Corn Belt
Percent Occurrence ^a	38%	11%	1%	5%	44%	

GRASSLAND**WETLAND****SCRUB****WOODLAND****URBAN**

^a Percent Occurrence in Nebraska (Molhoff 2000)

Species Account:

Lark Buntings are conspicuous occupants of short-grass and mixed- grass communities of the Great Plains. In North Dakota, their optimum habitats are sage prairies, although they are found in other mixed-grass communities as well as fallow fields, weedy roadsides, and hayfields (Stewart 1975). In Colorado, they are most numerous in short-grass prairies but also occupy sagebrush habitats in mountain parks (Andrews and Righter 1992).

Like many other grassland birds, habitat destruction has been responsible for declines in Lark Bunting populations since the nineteenth century (Andrews and Righter 1992). However, this species is fairly nomadic during the breeding season, and short- term movements can obscure or accentuate long-term trends. For example, Lark Buntings are normally scarce residents of eastern South Dakota, but large numbers appeared in that portion of the state during 1964. They remained numerous through 1970, but then returned to their previous abundance (SDOU 1978). Similar fluctuations have been reported elsewhere, but are normally of shorter duration. Annual fluctuations in precipitation levels and its influence on habitat conditions are believed to be primarily responsible for these nomadic movements. Along BBS routes, Lark Buntings are normally most numerous on the central and western Great Plains from eastern Colorado and western Kansas north to Montana and North Dakota. Their numbers rapidly diminish towards the peripheries of their range. Despite their nomadic movements, population declines predominate throughout most of their range (Sauer et al. 1995, Dechant et al. 1999).

In the Central BBS Region, declines are most evident during 1970 and 1971 with considerable population fluctuations during the mid- 1980s. In Nebraska, the declines were most evident during the 1966-1979 trend period, tapering to -0.8 during 1980-1998 (Sauer et al. 1999).

During the winter months, Lark Buntings are most prevalent in the southwestern deserts from south Texas to southern Arizona and south into Mexico. They occupy weedy, barren habitats within these desert communities (Phillips et al. 1964). They are also quite nomadic during these months, apparently in response to food availability. Throughout their winter range, Lark Buntings can be locally numerous one year and nearly absent the next. These fluctuations in abundance are responsible for very imprecise trend estimates based on data from CBCs, although these data suggest that their populations are also declining (Sauer et al. 1995).

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Henslow's sparrow *Ammodramus henslowii*

	Western High Plains	Central Great Plains	Northwestern Glaciated Plains	Northwestern Great Plains	Nebraska Sandhills	Western Corn Belt
Percent Occurrence ^a						X
GRASSLAND						
WETLAND						
SCRUB						
WOODLAND						
URBAN						

^a Percent Occurrence in Nebraska (Molhoff 2000)

Species Account: The Henslow's Sparrow inhabits the grasslands of eastern and central North America. With its secretive habits and simple song, this species is easily overlooked. Only vague information is available on its historic status and distribution. Its original breeding range may have consisted of tall grass prairies in the midwest and various grassland habitats along the mid-Atlantic coastal plain (Hyde 1939). Deforestation allowed it to enlarge its breeding range in the Great Lakes region, primarily during the first half of the twentieth century. After 1950, its populations have been declining through most of its range (Andrle and Carroll 1988, Brewer et al. 1991, Cadman et al. 1987). However, reclaimed strip mines provide suitable habitats for this species, and the bulk of its remaining populations occupy these habitats in eastern Ohio and western Pennsylvania (Brauning 1992, Peterjohn and Rice 1991 in Sauer et al. 1995).

Breeding Henslow's Sparrows have always been locally distributed, frequently forming loose "colonies" (Hyde 1939). This local distribution, combined with its inconspicuous behavior, cause this species to be poorly represented along most BBS routes. It is recorded in small numbers throughout its current range. All trend estimates during 1966-1994 are in a negative direction. Similar trends are evident during both the 1966-1979 and 1980-1994 intervals. Declines predominate throughout most of its range (Sauer et al. 1995).

During the breeding season, Henslow's Sparrows have very specific habitat requirements. They are mostly found in fallow fields supporting tall, dense grassy and weedy cover with a high density of standing dead vegetation as well as scattered bushes or very small trees (Zimmerman 1988). In some portions of their range, breeding pairs prefer damp habitats although they are regularly found on dry hilltops in other areas (Andrle and Carroll 1988, Brewer et al. 1991). Habitat loss is thought to be largely responsible for population declines since 1950. Successional changes producing unsuitable habitats, the conversion of native grasslands to cultivated crops, and drainage of wetlands have all contributed to the decline and disappearance of some populations (Andrle and Carroll 1988, Cadman et al. 1987).

Scant information is available on their status away from the breeding grounds. They are observed in small numbers on CBCs, primarily in the southeastern states west to eastern Texas. These limited data also suggest that the populations are generally decreasing, but should be viewed with some caution since this species is under-represented on CBCs throughout its range (Sauer et al. 1999).

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Grasshopper sparrow *Ammodramus savannarum*

	Western High Plains	Central Great Plains	Northwestern Glaciated Plains	Northwestern Great Plains	Nebraska Sandhills	Western Corn Belt
Percent Occurrence ^a	16%	29%	3%	1%	36%	15%

GRASSLAND

WETLAND

SCRUB

WOODLAND

URBAN

^a Percent Occurrence in Nebraska (Molhoff 2000)

Species Account: Grasshopper Sparrows are widespread occupants of grassland habitats across North America. The main population is in the Great Plains, from North Dakota south to northern Texas, and east to Illinois. Grasshopper Sparrows are found in a variety of tall- and mixed-grass habitats including native prairies, hayfields, pastures, and grassy fallow fields. They prefer grasslands of intermediate height and are often associated with clumped vegetation interspersed with patches of bare ground (Bent 1968, Blankespoor 1980). Other habitat requirements include moderately deep litter and sparse coverage of woody vegetation (Smith 1963; Bent 1968; Wiens 1969).

Their breeding distribution has undergone some dramatic changes, including an eastward range expansion during the nineteenth and early twentieth centuries as deforestation increased appropriate habitats (Andrle and, Brewer et al. 1991). In recent decades, this species has experienced population declines throughout most of its breeding range (Sauer et al. 1995).

Along BBS routes, Grasshopper Sparrows remain most numerous on the Great Plains from North Dakota south to Kansas and the Texas panhandle area, and eastward into portions of Missouri and Iowa. Population declines prevail throughout most of this range, although there are some local increases. During 1966-1994, significant declines occur in 18 states/provinces, 16 physiographic strata, all 3 BBS regions, U.S., and survey-wide (Sauer et al. 1995).

The survey-wide indices indicate a fairly consistent decline since the mid-1960s. The temporal patterns in trends are more variable on the Great Plains. In the High Plains Border stratum, encompassing western Nebraska, the indices are variable but fairly stable. Generally in Nebraska, the long term trend for 1966-1999 is -1.1. Declines from 1966-1979 are significantly greater (-4.1), changing to +2.3 from 1980-1998. The Central BBS Region trend is relatively consistent through years (-2.7) (Sauer et al. 1999).

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Harris' Sparrow *Zonotrichia querula*

	Western High Plains	Central Great Plains	Northwestern Glaciated Plains	Northwestern Great Plains	Nebraska Sandhills	Western Corn Belt
Percent Occurrence ^a	X	X	X	X	X	X
GRASSLAND						
WETLAND						
SCRUB						
WOODLAND						
URBAN						

^a Percent Occurrence in Nebraska (Molhoff 2000)

Species Account: The Harris' Sparrow breeds in a highly restricted range in isolated parts of the forest-tundra zone of northern Canada. The species winters primarily from northern Nebraska, South Dakota, and central Iowa south to south-central Texas. The Harris' sparrow is a widespread migrant and winter resident in Nebraska. The highest winter concentrations are south of Nebraska, in Kansas to northern Texas (Norment and Shackleton 1993, AOU 1998).

Winter range habitat includes thickets and brush bordering streams, edges of low woodlands, brush, hedgerows, and willow thickets in ravines (Swenk and Stevens 1929).

Christmas Bird Count data suggest that changes on wintering grounds may be responsible for the population declines. However, there is little information available on winter ecology. Christmas Bird Count data suggest a significant population decline (-2.2 percent per year), 1959-1988 (Sauer et al. 1996). The perceived decline may be due, in part, to an expanding winter range (Nature Conservancy 2000). If the decline is real, it is likely due to factors operating in the wintering habitat (e.g., loss of favored shrubby habitats) given the isolation of the breeding grounds (The Nature Conservancy 2000).

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	Western High Plains	Central Great Plains	Northwestern Glaciated Plains	Northwestern Great Plains	Nebraska Sandhills	Western Corn Belt
Percent Occurrence ^a	100%					
GRASSLAND						
WETLAND						
SCRUB						
WOODLAND						
URBAN						

^a Percent Occurrence in Nebraska (Molhoff 2000)

Species Account: The McCown's Longspur is a characteristic summer resident of short-grass prairie communities on the western Great Plains of North America. In addition to native prairies, they also regularly occur in overgrazed habitats where the vegetation is very short (Andrews and Righter 1992). They prefer more xeric habitats with shorter vegetation than Chestnut-collared Longspurs (Sauer et al. 1995). Its winter range is primarily in the remaining grasslands of the southwestern U.S. from west Texas into Arizona.

As is true for many grassland birds, McCown's Longspur populations have undergone noticeable declines during historic times. Their population declines were most apparent during the first decades of the twentieth century, especially 1905-1930 in North Dakota when these longspurs disappeared from most of their range in the state (Stewart 1975). Similar declines were apparent in the winter range during this period, especially in portions of Arizona and Texas (Phillips et al. 1964, Oberholser 1974). Another sharp decline was apparent in the Texas panhandle after 1940 (Sauer et al. 1995).

The most significant population declines occurred prior to the initiation of the BBS. Since 1966, BBS data suggest McCown's Longspur population trends are generally mixed.. However, these trend estimates are relatively imprecise and should be viewed with caution. Considerable annual fluctuations in abundance and inconsistent coverage of routes contribute to the imprecision of these estimates. The trend map shows a mixed pattern of increases and declines, perhaps with increases predominating. The survey-wide indices are variable, especially prior to 1970, but prove an increasing tendency during the later years. The Central BBS region shows a slight increase in population in the 1966-1999 trend period. The species is not identified in the Nebraska BBS trend data, however the BBS trend map shows a decrease in western Nebraska (Sauer et al. 1995, 1999).

Habitat loss was believed to be primarily responsible for the historic declines in McCown's Longspur populations, especially the conversion of short-grass prairies to cultivated fields (Stewart 1975). Measures to control grasshoppers are also detrimental to longspurs. Some populations are still affected by this habitat loss. However, factors on the wintering grounds undoubtedly contributed to these declines, as breeding pairs have even disappeared from suitable native short-grass prairies (Stewart 1975). Their winter ecology is poorly understood, as are the historic factors affecting these longspurs on their winter range (Sauer et al. 1995).

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Chestnut-collared Longspur *Calcarius ornatus*

	Western High Plains	Central Great Plains	Northwestern Glaciated Plains	Northwestern Great Plains	Nebraska Sandhills	Western Corn Belt
Percent Occurrence ^a	63%				37%	

GRASSLAND**WETLAND****SCRUB****WOODLAND****URBAN**

^a Percent Occurrence in Nebraska (Molhoff 2000)

Species Account: The Chestnut-collared Longspur is a characteristic breeding species of native mixed-grass prairies across the northern Great Plains. Along the western margin of its range, it is also found in tall short-grass habitats (Andrews and Righter 1992, Stewart 1975). It prefers taller and more mesic habitats than the McCown's Longspur, which becomes more prevalent in short-grass prairie communities (Sauer et al. 1995).

Along BBS routes, the peak abundance of Chestnut-collared Longspurs is attained from southern Alberta and Saskatchewan into Montana and the Dakotas. Because of small sample sizes and incomplete coverage of BBS routes within portions of this range, the BBS trend estimates for this species should be viewed with caution. The 1966-1994 trends are generally non-significant; the only significant trend is a decline in South Dakota. The 1966-1979 trends are generally in a positive direction. In contrast the 1980-1994 trends are generally in a negative direction, with significant declines in South Dakota and the Great Plains Roughlands BBS stratum (Sauer et al. 1995). The trend in Nebraska is positive, particularly for 1980-1998 (Sauer et al 1999). However, this should be viewed with caution because of small sample size.

During the winter months, Chestnut-collared Longspurs are primarily found in grasslands from the Texas panhandle west to southeastern Arizona. Trends on CBCs are also limited by small sample sizes and should be viewed with caution; most are no significant although an increase is indicated for Texas (Sauer et al. 1995).

This species was formerly abundant in the native mixed-grass prairies, but its numbers have greatly declined since the nineteenth century as these habitats were converted to cultivated fields (Stewart 1975). Overgrazing is also detrimental to these longspurs, and contributed to these historic declines. Reduced wintering numbers have also been apparent in portions of Texas (Oberholser 1974). Loss of habitat to agriculture continues to be a factor in the negative trends for this species (Sauer et al. 1995).

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Bobolink *Dolichonyx oryzivorus*

	Western High Plains	Central Great Plains	Northwestern Glaciated Plains	Northwestern Great Plains	Nebraska Sandhills	Western Corn Belt
Percent Occurrence ^a	5%	33%	4%	1%	41%	17%

GRASSLAND

WETLAND

SCRUB

WOODLAND

URBAN

^a Percent Occurrence in Nebraska (Molhoff 2000)

Species Account: Bobolinks are conspicuous summer residents of hayfields, lightly grazed pastures, tall- and mixed-grass prairies, reclaimed strip mines, and similar habitats dominated by tall grasses. As is true for many other grassland birds, this species underwent a noticeable population increase and range expansion in eastern North America during the nineteenth century when agricultural fields dominated the deforested landscape (Andrle and Carroll 1988, Brewer et al. 1991, Peterjohn and Rice 1991). Bobolink population trends were reversed during the twentieth century, especially after 1940 when changing agricultural practices greatly reduced the amount of suitable grassland habitats for this species). Along BBS routes, breeding Bobolinks are most numerous in a band stretching across the northern U.S. and southern Canada from the Maritime provinces and New England to North Dakota and Manitoba (Sauer et al. 1995).

BBS data indicate that Bobolink populations have generally declined throughout their breeding range. These long-term trend estimates are strongly influenced by the population trends after 1980, when all significant trends are in a negative direction. The survey-wide indices are fairly stable through the late 1970s, followed by a consistent decline. However, a variety of temporal patterns exist in trends. In the midwestern U.S., two temporal patterns prevail. These patterns are fairly stable trends through the mid-1970s, followed by substantial declines. In Nebraska, the declines (-2.1% per year) were documented from 1966-1979, while the 1980-1998 trend is positive (Sauer et al. 1999).

In addition to habitat loss, the factor most frequently cited for declines in Bobolink populations is the more frequent mowing of hayfields (Brauning 1992, Brewer et al. 1991). Many hayfields are being cut in late May and at more frequent intervals throughout the summer, which does not provide late migrants such as Bobolinks an opportunity to successfully raise a brood before they have to start their fall migration. Additionally, the Bobolink is one of very few North American passersines whose entire winter range is south of the equator in South America. Its winter biology is poorly known, and factors on its South American winter range could also be contributing to the recent population declines (Sauer et al. 1999).

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Western meadowlark *Sturnella neglecta*

	Western High Plains	Central Great Plains	Northwestern Glaciated Plains	Northwestern Great Plains	Nebraska Sandhills	Western Corn Belt
Percent Occurrence ^a	19%	32%	3%	1%	27%	18%

GRASSLAND**WETLAND****SCRUB****WOODLAND****URBAN**

^a Percent Occurrence in Nebraska (Molhoff 2000)

Species Account: The western counterpart of the Eastern Meadowlark, the Western Meadowlark is a common resident of grasslands, croplands, weedy fallow fields, roadsides, and mixed grasslands/shrublands of central and western North America. Where the two species are sympatric, they are frequently found together in the same fields but Westerns tend to prefer drier and more open habitats with shorter vegetation while Easterns are found in more mesic microhabitats with denser vegetation (Lanyon 1956).

The status and distribution of Western Meadowlarks has remained fairly constant during historic times. The only significant change occurred during the twentieth century when its breeding range expanded eastward into the Great Lakes region (Lanyon 1956, DeVos 1964). This expansion was most apparent during the 1930s, when breeding populations became established in Michigan, western Ohio, and southwestern Ontario (Brewer et al. 1991, Cadman et al. 1987, Peterjohn and Rice 1991). These populations flourished for several decades, but have noticeably declined during recent years (Sauer et al. 1995).

Western Meadowlarks remain numerous throughout western and central North America from Washington and the prairie provinces south to the southwestern deserts, and east to Iowa and Minnesota. As similar for many grassland birds, their population trends have generally declined since 1966. Over the entire survey period (1966-1994), Western meadowlarks have increased only in the Chihuahuan Desert stratum but declined in 10 states/provinces, 11 physiographic strata, the Eastern and Western BBS regions, U.S., Canada, and survey-wide. Declining trends also prevail during the 1966-1979 and 1980-1994 intervals, although the regional trends tend to be slightly less negative after 1980. Nebraska trends for 1966-1998 have remained relatively constant showing a decline of -0.8 per year (Sauer et al. 1995, 1999).

Western Meadowlark populations frequently exhibit marked annual fluctuations in response to changing precipitation levels (Andrews and Righter 1992, Phillips et al. 1964). These fluctuations are evident in the BBS annual indices, and tend to obscure some temporal patterns in the population trends. The survey-wide indices are somewhat variable but with a declining tendency. The Western Meadowlark population in Iowa is almost cyclical, with peaks at 8-10 year intervals since 1966 (Sauer et al. 1995).

During the winter months, Western Meadowlarks tend to be most numerous from northern California, Colorado, and southern Nebraska south into Mexico. Factors responsible for the recent declines are poorly understood, although loss of suitable habitats may be important in most areas (Sauer et al. 1995).

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Orchard Oriole *Icterus Spurius*

	Western High Plains	Central Great Plains	Northwestern Glaciated Plains	Northwestern Great Plains	Nebraska Sandhills	Western Corn Belt
Percent Occurrence ^a	16%	39%	3%	1%	25%	16%

GRASSLAND
WETLAND
SCRUB
WOODLAND
URBAN

^a Percent Occurrence in Nebraska (Molhoff 2000)

Species Account: The Orchard Oriole is mainly a species of the Great Plains and southeastern United States, ranging from the Canadian border to central Mexico. They are more common in the southern states. The Orchard Oriole winters from central Mexico to northern South America (Kuenning 1998).

The Orchard Oriole prefers riparian woodlands, shelterbelts, and shrubs. In all parts or their range, they avoid heavily wooded areas with dense cover, and select semi-open areas. It consumes insects, fruit, and tree blossoms by gleaning from foliage in trees and shrubs (Dobkin 1994).

The spread of Orchard Orioles has probably occurred gradually during the twentieth century, the expansion facilitated by creation of new habitats (Kuenning 1998)

Across the continent, these birds show BBS decline of 1.8% per year. In the 1966-1999 trend period, this species has been declining continent-wide, with widespread significant declines in the most recent survey years (Dobkin 1994, Sauer et al. 1999). For the Central BBS, this species has declined during the same time period (-2.7). In Nebraska, there is a -2.3% deline per year (Sauer et al. 1999).

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Baltimore Oriole *Icterus galbula*

	Western High Plains	Central Great Plains	Northwestern Glaciated Plains	Northwestern Great Plains	Nebraska Sandhills	Western Corn Belt
Percent Occurrence ^a	7%	44%	4%	0.5%	22%	22%

GRASSLAND

WETLAND

SCRUB

WOODLAND

URBAN

^a Percent Occurrence in Nebraska (Molhoff 2000)

Species Account: The Baltimore Oriole and the Bullock's Oriole split the continent up the Great Plains. The Baltimore on the east and the Bullock's on the west. The ranges of both species reach north into southern Canada and Bullock's breed south into central Mexico (Barrett 1998).

The Baltimore Oriole prefers mature deciduous trees, often cottonwoods. Siberian elms and cottonwoods found on farms and riparian areas are favorites. The close tie between orioles and deciduous habitat led to the combining of Bullock's and Baltimore as Northern Oriole. The grasslands of the Great Plains historically provided a barrier between the two species. As Europeans settled the continent, they planted trees and suppressed fire, creating corridors, which allowed the species to meet (Barrett 1998).

Orioles feed on soft foods, mainly insects and nectar in summer and fruits in winter. Juniper berries are eaten in the proper habitat.

Survey-wide trend results from 1966-1999 show a slight decline (-0.5). The Central BBS trend is (-0.7), while Nebraska appears stable (Sauer et al. 1999).

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Appendix 7. Birds that occur in Nebraska for some part or their life cycle

Common Name Scientific Name

Red-throated Loon, <i>Gavia stellata</i>
Pacific Loon, <i>Gavia pacifica</i>
Common Loon, <i>Gavia immer</i>
Yellow-billed Loon, <i>Gavia adamsii</i>
Pied-billed Grebe, <i>Podilymbus podiceps</i>
Horned Grebe, <i>Podiceps auritus</i>
Red-necked Grebe, <i>Podiceps grisegena</i>
Eared Grebe, <i>Podiceps nigricollis</i>
Western Grebe, <i>Aechmophorus occidentalis</i>
Clark's Grebe, <i>Aechmophorus clarkii</i>
American White Pelican, <i>Pelecanus erythrorhynchos</i>
Brown Pelican, <i>Pelecanus occidentalis</i>
Double-crested Cormorant, <i>Phalacrocorax auritus</i>
Neotropic Cormorant, <i>Phalacrocorax brasiliensis</i>
Anhinga, <i>Anhinga anhinga</i>
American Bittern, <i>Botaurus lentiginosus</i>
Least Bittern, <i>Ixobrychus exilis</i>
Great Blue Heron, <i>Ardea herodias</i>
Great Egret, <i>Ardea alba</i>
Snowy Egret, <i>Egretta thula</i>
Little Blue Heron, <i>Egretta caerulea</i>
Tricolored Heron, <i>Egretta tricolor</i>
Cattle Egret, <i>Bubulcus ibis</i>
Green Heron, <i>Butorides virescens</i>
Black-crowned Night-Heron, <i>Nycticorax nycticorax</i>
Yellow-crowned Night-Heron, <i>Nyctanassa violacea</i>
White-faced Ibis, <i>Plegadis chihi</i>
Roseate Spoonbill, <i>Ajaia ajaja</i>
Wood Stork, <i>Mycteria americana</i>
Black Vulture, <i>Coragyps atratus</i>
Turkey Vulture, <i>Cathartes aura</i>
Black-bellied Whistling-Duck, <i>Dendrocygna autumnalis</i>
Bean Goose, <i>Anser fabalis</i>
Greater White-fronted Goose, <i>Anser albifrons</i>
Emperor Goose, <i>Chen canagica</i>
Snow Goose, <i>Chen caerulescens</i>
Ross's Goose, <i>Chen rossii</i>
Canada Goose, <i>Branta canadensis</i>
Brant, <i>Branta bernicla</i>
Trumpeter Swan, <i>Cygnus buccinator</i>
Wood Duck, <i>Aix sponsa</i>
Gadwall, <i>Anas strepera</i>
Eurasian Wigeon, <i>Anas penelope</i>

- American Wigeon, *Anas americana*
American Black Duck, *Anas rubripes*
Mallard, *Anas platyrhynchos*
Mottled Duck, *Anas fulvigula*
Blue-winged Teal, *Anas discors*
Northern Shoveler, *Anas clypeata*
Northern Pintail, *Anas acuta*
Garganey, *Anas querquedula*
Green-winged Teal, *Anas crecca*
Canvasback, *Aythya valisineria*
Redhead, *Aythya americana*
Ring-necked Duck, *Aythya collaris*
Greater Scaup, *Aythya marila*
Lesser Scaup, *Aythya affinis*
King Eider, *Somateria spectabilis*
Common Eider, *Somateria mollissima*
Harlequin Duck, *Histrionicus histrionicus*
Surf Scoter, *Melanitta perspicillata*
White-winged Scoter, *Melanitta fusca*
Black Scoter, *Melanitta nigra*
Oldsquaw, *Clangula hyemalis*
Bufflehead, *Bucephala albeola*
Common Goldeneye, *Bucephala clangula*
Barrow's Goldeneye, *Bucephala islandica*
Hooded Merganser, *Lophodytes cucullatus*
Common Merganser, *Mergus merganser*
Ruddy Duck, *Oxyura jamaicensis*
Osprey, *Pandion haliaetus*
Swallow-tailed Kite, *Elanoides forficatus*
White-tailed Kite, *Elanus leucurus*
Mississippi Kite, *Ictinia mississippiensis*
Bald Eagle, *Haliaeetus leucocephalus*
Northern Harrier, *Circus cyaneus*
Sharp-shinned Hawk, *Accipiter striatus*
Northern Goshawk, *Accipiter gentilis*
Harris's Hawk, *Parabuteo unicinctus*
Red-shouldered Hawk, *Buteo lineatus*
Broad-winged Hawk, *Buteo platypterus*
Swainson's Hawk, *Buteo swainsoni*
Red-tailed Hawk, *Buteo jamaicensis*
Ferruginous Hawk, *Buteo regalis*
Rough-legged Hawk, *Buteo lagopus*
American Kestrel, *Falco sparverius*
Merlin, *Falco columbarius*
Prairie Falcon, *Falco mexicanus*
Peregrine Falcon, *Falco peregrinus*

- Gyrfalcon, *Falco rusticolus*
 Gray Partridge, *Perdix perdix*
 Ring-necked Pheasant, *Phasianus colchicus*
 Ruffed Grouse, *Bonasa umbellus*
 Sage Grouse, *Centrocercus urophasianus*
 Greater Prairie-Chicken, *Tympanuchus cupido*
 Lesser Prairie-Chicken, *Tympanuchus pallidicinctus*
 Sharp-tailed Grouse, *Tympanuchus phasianellus*
 Wild Turkey, *Meleagris gallopavo*
 Northern Bobwhite, *Colinus virginianus*
 Yellow Rail, *Coturnicops noveboracensis*
 Black Rail, *Laterallus jamaicensis*
 Clapper Rail, *Rallus longirostris*
 King Rail, *Rallus elegans*
 Virginia Rail, *Rallus limicola*
 Sora, *Porzana carolina*
 Purple Gallinule, *Porphyrrula martinica*
 Common Moorhen, *Gallinula chloropus*
 American Coot, *Fulica americana*
 Sandhill Crane, *Grus canadensis*
 Common Crane, *Grus grus*
 Whooping Crane, *Grus americana*
 Black-bellied Plover, *Pluvialis squatarola*
 American Golden-Plover, *Pluvialis dominica*
 Snowy Plover, *Charadrius alexandrinus*
 Semipalmated Plover, *Charadrius semipalmatus*
 Piping Plover, *Charadrius melanotos*
 Killdeer, *Charadrius vociferus*
 Mountain Plover, *Charadrius montanus*
 American Avocet, *Recurvirostra americana*
 Greater Yellowlegs, *Tringa melanoleuca*
 Lesser Yellowlegs, *Tringa flavipes*
 Solitary Sandpiper, *Tringa solitaria*
 Spotted Sandpiper, *Actitis macularia*
 Upland Sandpiper, *Bartramia longicauda*
 Eskimo Curlew, *Numenius borealis*
 Whimbrel, *Numenius phaeopus*
 Long-billed Curlew, *Numenius americanus*
 Hudsonian Godwit, *Limosa haemastica*
 Marbled Godwit, *Limosa fedoa*
 Ruddy Turnstone, *Arenaria interpres*
 Red Knot, *Calidris canutus*
 Sanderling, *Calidris alba*
 Semipalmated Sandpiper, *Calidris pusilla*
 Western Sandpiper, *Calidris mauri*
 Least Sandpiper, *Calidris minutilla*

- White-rumped Sandpiper, *Calidris fuscicollis*
Baird's Sandpiper, *Calidris bairdii*
Pectoral Sandpiper, *Calidris melanotos*
Sharp-tailed Sandpiper, *Calidris acuminata*
Dunlin, *Calidris alpina*
Curlew Sandpiper, *Calidris ferruginea*
Stilt Sandpiper, *Calidris himantopus*
Buff-breasted Sandpiper, *Tryngites subruficollis*
Ruff, *Philomachus pugnax*
Short-billed Dowitcher, *Limnodromus griseus*
Long-billed Dowitcher, *Limnodromus scolopaceus*
Common Snipe, *Gallinago gallinago*
American Woodcock, *Scolopax minor*
Wilson's Phalarope, *Phalaropus tricolor*
Red-necked Phalarope, *Phalaropus lobatus*
Red Phalarope, *Phalaropus fulicaria*
Pomarine Jaeger, *Stercorarius pomarinus*
Parasitic Jaeger, *Stercorarius parasiticus*
Long-tailed Jaeger, *Stercorarius longicaudus*
Laughing Gull, *Larus atricilla*
Franklin's Gull, *Larus pipixcan*
Little Gull, *Larus minutus*
Black-headed Gull, *Larus ridibundus*
Bonaparte's Gull, *Larus philadelphicus*
Mew Gull, *Larus canus*
Ring-billed Gull, *Larus delawarensis*
Herring Gull, *Larus argentatus*
Thayer's Gull, *Larus thayeri*
Iceland Gull, *Larus glaucopterus*
Lesser Black-backed Gull, *Larus fuscus*
Glaucous-winged Gull, *Larus glaucescens*
Glaucous Gull, *Larus hyperboreus*
Great Black-backed Gull, *Larus marinus*
Black-legged Kittiwake, *Rissa tridactyla*
Ross's Gull, *Rhodostethia rosea*
Sabine's Gull, *Xema sabini*
Caspian Tern, *Sterna caspia*
Common Tern, *Sterna hirundo*
Forster's Tern, *Sterna forsteri*
Least Tern, *Sterna antillarum*
Black Tern, *Chlidonias niger*
Ancient Murrelet, *Synthliboramphus antiquus*
Rock Dove, *Columba livia*
Band-tailed Pigeon, *Columba fasciata*
Eurasian Collared-Dove, *Streptopelia decaocto*
White-winged Dove, *Zenaida asiatica*

Mourning Dove, *Zenaida macroura*
 Passenger Pigeon, *Ectopistes migratorius*
 Inca Dove, *Columbina inca*
 Common Ground-Dove, *Columbina passerina*
 Black-billed Cuckoo, *Coccyzus erythrophthalmus*
 Yellow-billed Cuckoo, *Coccyzus americanus*
 Groove-billed Ani, *Crotophaga sulcirostris*
 Barn Owl, *Tyto alba*
 Eastern Screech-Owl, *Otus asio*
 Great Horned Owl, *Bubo virginianus*
 Snowy Owl, *Nyctea scandiaca*
 Northern Hawk Owl, *Surnia ulula*
 Burrowing Owl, *Athene cunicularia*
 Barred Owl, *Strix varia*: Regular
 Great Gray Owl, *Strix nebulosa*
 Long-eared Owl, *Asio otus*
 Short-eared Owl, *Asio flammeus*
 Boreal Owl, *Aegolius funereus*
 Northern Saw-whet Owl, *Aegolius acadicus*
 Common Nighthawk, *Chordeiles minor*
 Common Poorwill, *Phalaenoptilus nuttallii*
 Chuck-will's-widow, *Caprimulgus carolinensis*
 Whip-poor-will, *Caprimulgus vociferus*
 Chimney Swift, *Chaetura pelagica*
 White-throated Swift, *Aeronautes saxatalis*
 Ruby-throated Hummingbird, *Archilochus colubris*
 Calliope Hummingbird, *Stellula calliope*
 Broad-tailed Hummingbird, *Selasphorus platycercus*
 Rufous Hummingbird, *Selasphorus rufus*
 Belted Kingfisher, *Ceryle alcyon*
 Lewis's Woodpecker, *Melanerpes lewis*
 Acorn Woodpecker, *Melanerpes formicivorus*
 Red-bellied Woodpecker, *Melanerpes carolinus*
 Yellow-bellied Sapsucker, *Sphyrapicus varius*
 Red-naped Sapsucker, *Sphyrapicus nuchalis*
 Downy Woodpecker, *Picoides pubescens*
 Hairy Woodpecker, *Picoides villosus*
 Three-toed Woodpecker, *Picoides tridactylus*
 Northern Flicker, *Colaptes auratus*
 Wood-Pewee, *Contopus*
 Eastern Wood-Pewee, *Contopus virens*
 Yellow-bellied Flycatcher, *Empidonax flaviventris*
 Acadian Flycatcher, *Empidonax virescens*
 Alder Flycatcher, *Empidonax alnorum*
 Willow Flycatcher, *Empidonax traillii*
 Least Flycatcher, *Empidonax minimus*

Hammond's Flycatcher, *Empidonax hammondi*
Cordilleran Flycatcher, *Empidonax occidentalis*
Eastern Phoebe, *Sayornis phoebe*
Say's Phoebe, *Sayornis saya*
Vermilion Flycatcher, *Pyrocephalus rubinus*
Ash-throated Flycatcher, *Myiarchus cinerascens*
Great Crested Flycatcher, *Myiarchus crinitus*
Cassin's Kingbird, *Tyrannus vociferans*
Eastern Kingbird, *Tyrannus tyrannus*
Scissor-tailed Flycatcher, *Tyrannus forficatus*
Northern Shrike, *Lanius excubitor*
Loggerhead Shrike, *Lanius ludovicianus*
White-eyed Vireo, *Vireo griseus*
Black-capped Vireo, *Vireo atricapillus*
Blue-headed Vireo, *Vireo solitarius*
Yellow-throated Vireo, *Vireo flavifrons*
Philadelphia Vireo, *Vireo philadelphicus*
Red-eyed Vireo, *Vireo olivaceus*
Gray Jay, *Perisoreus canadensis*
Blue Jay, *Cyanocitta cristata*
Pinyon Jay, *Gymnorhinus cyanocephalus*
Clark's Nutcracker, *Nucifraga columbiana*
American Crow, *Corvus brachyrhynchos*
Common Raven, *Corvus corax*
Horned Lark, *Eremophila alpestris*
Purple Martin, *Progne subis*
Tree Swallow, *Tachycineta bicolor*
Violet-green Swallow, *Tachycineta thalassina*
Bank Swallow, *Riparia riparia*
Barn Swallow, *Hirundo rustica*
Cliff Swallow, *Petrochelidon pyrrhonota*
Cave Swallow, *Petrochelidon fulva*
Black-capped Chickadee, *Poecile atricapillus*
Mountain Chickadee, *Poecile gambeli*
Red-breasted Nuthatch, *Sitta canadensis*
White-breasted Nuthatch, *Sitta carolinensis*
Pygmy Nuthatch, *Sitta pygmaea*
Brown Creeper, *Certhia americana*
Rock Wren, *Salpinctes obsoletus*
Canyon Wren, *Catherpes mexicanus*
Carolina Wren, *Thryothorus ludovicianus*
Bewick's Wren, *Thryomanes bewickii*
House Wren, *Troglodytes aedon*
Winter Wren, *Troglodytes troglodytes*
Marsh Wren, *Cistothorus palustris*
American Dipper, *Cinclus mexicanus*

Golden-crowned Kinglet, *Regulus satrapa*
Ruby-crowned Kinglet, *Regulus calendula*
Blue-gray Gnatcatcher, *Polioptila caerulea*
Eastern Bluebird, *Sialia sialis*
Mountain Bluebird, *Sialia currucoides*
Townsend's Solitaire, *Myadestes townsendi*
Veery, *Catharus fuscescens*
Gray-cheeked Thrush, *Catharus minimus*
Hermit Thrush, *Catharus guttatus*
Wood Thrush, *Hylocichla mustelina*
Gray Catbird, *Dumetella carolinensis*
Northern Mockingbird, *Mimus polyglottos*
Sage Thrasher, *Oreoscoptes montanus*
Brown Thrasher, *Toxostoma rufum*
Curve-billed Thrasher, *Toxostoma curvirostre*
European Starling, *Sturnus vulgaris*
American Pipit, *Anthus rubescens*
Sprague's Pipit, *Anthus spragueii*
Bohemian Waxwing, *Bombycilla garrulus*
Cedar Waxwing, *Bombycilla cedrorum*
Phainopepla, *Phainopepla nitens*
Blue-winged Warbler, *Vermivora pinus*
Nashville Warbler, *Vermivora ruficapilla*
Virginia's Warbler, *Vermivora virginiae*
Northern Parula, *Parula americana*
Yellow Warbler, *Dendroica petechia*
Chestnut-sided Warbler, *Dendroica pensylvanica*
Black-throated Blue Warbler, *Dendroica caerulescens*
Yellow-rumped Warbler, *Dendroica coronata*
Townsend's Warbler, *Dendroica townsendi*
Black-throated Green-Warbler, *Dendroica virens*
Blackburnian Warbler, *Dendroica fusca*
Yellow-throated Warbler, *Dendroica dominica*
Pine Warbler, *Dendroica pinus*
Prairie Warbler, *Dendroica discolor*
Bay-breasted Warbler, *Dendroica castanea*
Blackpoll Warbler, *Dendroica striata*
Cerulean Warbler, *Dendroica cerulea*
Black-and-white Warbler, *Mniotilla varia*
American Redstart, *Setophaga ruticilla*
Prothonotary Warbler, *Protonotaria citrea*
Worm-eating Warbler, *Helmitheros vermivorus*
Swainson's Warbler, *Limnothlypis swainsonii*
Kentucky Warbler, *Oporornis formosus*
Connecticut Warbler, *Oporornis agilis*
Mourning Warbler, *Oporornis philadelphia*

- MacGillivray's Warbler, *Oporornis tolmiei*
Wilson's Warbler, *Wilsonia pusilla*
Canada Warbler, *Wilsonia canadensis*
Yellow-breasted Chat, *Icteria*
Summer Tanager, *Piranga rubra*
Scarlet Tanager, *Piranga olivacea*
Western Tanager, *Piranga ludoviciana*
Green-tailed Towhee, *Pipilo chlorurus*
Eastern Towhee, *Pipilo erythrophthalmus*
American Tree Sparrow, *Spizella arborea*
Chipping Sparrow, *Spizella passerina*
Brewer's Sparrow, *Spizella breweri*
Field Sparrow, *Spizella pusilla*
Vesper Sparrow, *Pooecetes gramineus*
Lark Sparrow, *Chondestes grammacus*
Black-throated Sparrow, *Amphispiza bilineata*
Lark Bunting, *Calamospiza melanocorys*
Savannah Sparrow, *Passerculus sandwichensis*
Baird's Sparrow, *Ammodramus bairdii*
Grasshopper Sparrow, *Ammodramus savannarum*
Henslow's Sparrow, *Ammodramus henslowii*
Le Conte's Sparrow, *Ammodramus leconteii*
Fox Sparrow, *Passerella iliaca*
Song Sparrow, *Melospiza melodia*
Lincoln's Sparrow, *Melospiza lincolni*
White-throated Sparrow, *Zonotrichia albicollis*
Harris's Sparrow, *Zonotrichia querula*
Dark-eyed Junco, *Junco hyemalis*
McCown's Longspur, *Calcarius mccownii*
Lapland Longspur, *Calcarius lapponicus*
Chestnut-collared Longspur, *Calcarius ornatus*
Snow Bunting, *Plectrophenax nivalis*
Northern Cardinal, *Cardinalis cardinalis*
Rose-breasted Grosbeak, *Pheucticus ludovicianus*
Black-headed Grosbeak, *Pheucticus melanocephalus*
Blue Grosbeak, *Guiraca caerulea*
Lazuli Bunting, *Passerina amoena*
Indigo Bunting, *Passerina cyanea*
Painted Bunting, *Passerina ciris*
Dickcissel, *Spiza americana*
Bobolink, *Dolichonyx oryzivorus*
Red-winged Blackbird, *Agelaius phoeniceus*
Eastern Meadowlark, *Sturnella magna*
Western Meadowlark, *Sturnella neglecta*
Yellow-headed Blackbird, *Xanthocephalus xanthocephalus*
Rusty Blackbird, *Euphagus carolinus*

Brewer's Blackbird, *Euphagus cyanocephalus*
Common Grackle, *Quiscalus quiscula*
Brown-headed Cowbird, *Molothrus ater*
Orchard Oriole, *Icterus spurius*
Baltimore Oriole, *Icterus galbula*
Bullock's Oriole, *Icterus bullockii*
Scott's Oriole, *Icterus parisorum*
Gray-crowned Rosy-Finch, *Leucosticte tephrocotis*
Pine Grosbeak, *Pinicola enucleator*
Purple Finch, *Carpodacus purpureus*
Cassin's Finch, *Carpodacus cassini*
House Finch, *Carpodacus mexicanus*
Red Crossbill, *Loxia curvirostra*
White-winged Crossbill, *Loxia leucoptera*
Common Redpoll, *Carduelis flammea*
Hoary Redpoll, *Carduelis hornemanni*
Pine Siskin, *Carduelis pinus*
Lesser Goldfinch, *Carduelis psaltria*
American Goldfinch, *Carduelis tristis*
Evening Grosbeak, *Coccothraustes vespertinus*
House Sparrow, *Passer domesticus*