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Native Woodlands and Birds of South Dakota: Past and Present

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Abstract

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Eighty-four percent of the upland bird species in present-day bird counts along the Missouri River were included in bird species lists 150 years ago. Eighty-three percent of upland bird species in the Slim Buttes area also occurred 80 to 120 years ago. Historical photographs show native woodlands were part of the presettlement landscape. Expansion of the ranges of blue jays, common grackles, and eastern phoebes in western South Dakota can be attributed to tree plantings, cultivation, and urbanization rather than expanded native woodlands.

Keywords: Great Plains birds, historic bird lists, native prairie woodlands

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Cover photo : Native woodland habitat of South Dakota.

Native Woodlands and Birds of South Dakota: Past and Present

Mark A. Rumble, Carolyn Hull Sieg, Daniel W. Uresk, Jody Javersak

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Acknowledgments

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Introduction

Native prairie woodlands naturally occur with drainage ways and water courses on the Great Plains. They make up about 1 percent of the land area in the northern Great Plains (Bjugstad and Girard 1984). Most bird species that occur in western South Dakota require these woodlands (Hodorff et al. 1988, Sieg 1991) as breeding (Rodenhouse et al. 1995) or migratory habitat (Moore et al. 1995). Thus, native woodlands on the prairie are priority habitats for managers to sustain bird populations (Carter and Barker 1992, Roth and Petersen 1997).

However, it has been hypothesized that expanding woodland vegetation and the associated avifauna jeopardize the biological integrity of the Great Plains (Knopf 1986). For example, expanded riparian forest along the Platte River system (Johnson 1994) may have provided corridors of avian range expansion to the extent that 90 percent of the present–day birds may not have occurred in 1900 (Knopf 1986). If the vegetation and bird community changes reported along the Platte River system occurred elsewhere in the Great Plains, land managers need to consider this in the context of biodiversity conservation.

This paper evaluates the hypothesis that bird species not endemic to the Great Plains have expanded their ranges into native woodlands in western and central South Dakota since settlement by nonnative humans. We compare species lists and geographic affinities of birds recorded 80 to 150 years ago with present–day bird species from central and western South Dakota. We then evaluate early photographs and published literature for evidence of native woodlands in the landscape of western South Dakota before settlement.

Methods

The present–day birds in native woodlands along the Missouri River and its tributaries were determined from published (Rumble and Gobeille 1995, in press) and unpublished data (Rocky Mountain Research Station, Rapid City, SD) collected during the breeding season in 1990, 1991, and 1992 between Fort Thompson and Mobridge, South Dakota (figure 1). The data presented are total observations from 1,995 point counts (Reynolds et al. 1980).

Birds listed as occurring along the Missouri River before settlement of the region (circa 150 years ago) were obtained from bird lists published by Hayden (1862) and Culbertson (1952). Hayden made several trips to the north-

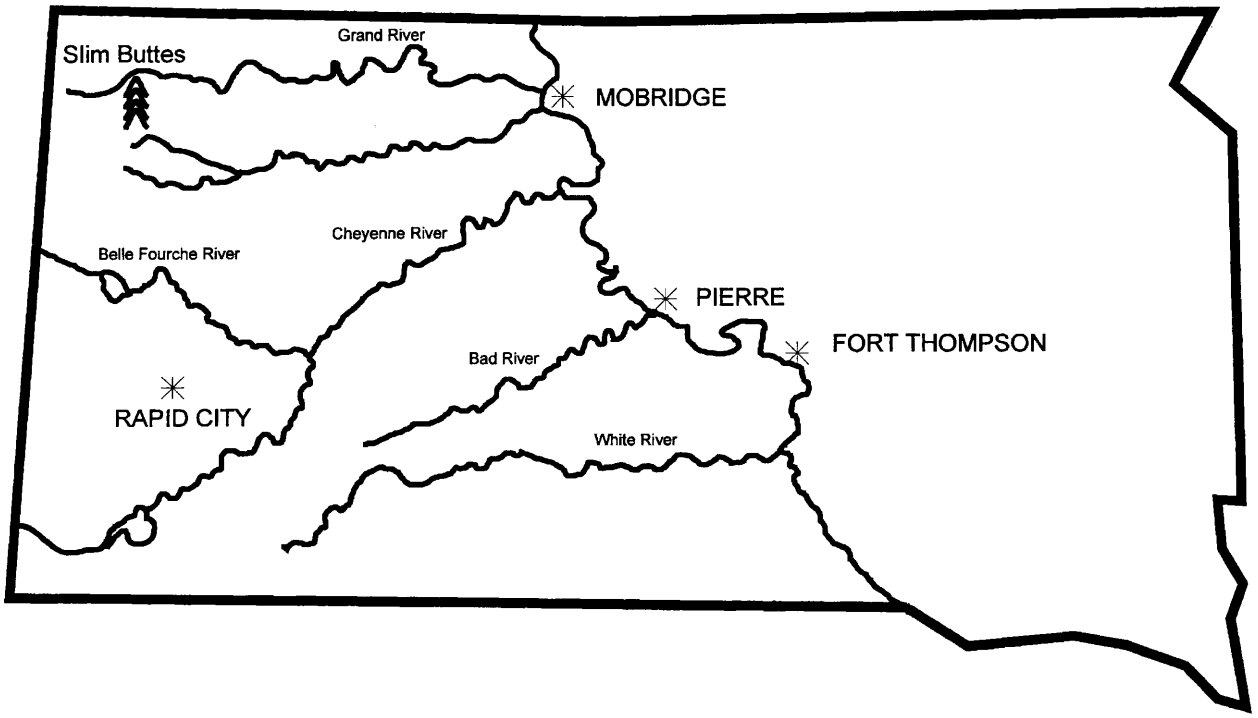

Figure 1. Map of South Dakota showing the locations of the study areas along the Missouri River between Fort Thompson and Mobridge, and in the Slim Buttes in the northwestern corner of the state.

ern Great Plains between 1853 and 1860. In 1862 he published a list of birds he observed on those trips. Culbertson explored the Missouri River in 1850 and included in his account a list of birds observed by Edward Harris who accompanied James Audubon to the upper Missouri River in 1843.

Present–day birds in woodlands of northwestern South Dakota were determined from counts in green ash/chokecherry *(Fraxinus pennsylvanica/Prunus virginiana)* woodlands in the Slim Buttes from May to October of 1983 and 1984 (Hodorff and Sieg 1986). The data presented are total birds observed on 394 transect counts.

Presettlement birds in northwestern South Dakota were obtained from Visher's (1914) report that included (1) bird observations included in Ludlow's report from General Custer's expedition as it passed through Harding County in July and August of 1874; (2) observations of S. Catron, a resident of the Little Missouri since 1883; (3) observations of A. A. Saunders, U.S. Forest Service; and (4) Visher's observations between 1910 and 1912.

To facilitate understanding of the origin of any new bird species, we classified the geographic affinities of birds following Johnsgard (1979): **pandemic** — distribution not clearly associated with specific major vegetation types; **endemic** — largely limited to grasslands or marshes of the Great Plains; **eastern** — breeding distribution generally associated with deciduous forest areas of the east or southeast; **northern** — breeding distribution generally associated with boreal forests of the north or northeast; **southern** — breeding distribution generally associated with deserts or scrublands of the south or southwest; and **western** — breeding distribution generally associated with montane forests of the west or northwest. Four bird species were not included in Johnsgard's classification: blackpoll warbler (scientific names are in table 1), rusty blackbird, Wilson's warbler, and Lincoln's sparrow. We assigned geographic affinities for these species from range maps in National Geographic Society (1987). **Introduced** birds resulted from intentional or accidental transplants. Waterfowl and wetland obligate birds with no direct relationship with native woodland vegetation were excluded.

Given the differences in sampling methods of present–day counts, comparisons of relative abundance should not be made between the Missouri River and Slim Buttes areas. Historical bird lists document the occurrence of species but not abundance. Comparisons of bird species in historic lists with present–day bird lists are made separately for the Missouri River and Slim Buttes areas.

Birds that require woodland vegetation were noted from Ehrlich et al. (1988). Common and scientific names of birds in historical accounts were cross–referenced using Chapman and Reed (1903), Pearson (1917), and American Ornithologists' Union (1983). Photographs of early woodlands were obtained from the South Dakota Geological Survey, University of South Dakota, Vermillion.

Results

Missouri River Birds

We observed 105 upland bird species while counting birds in native woodlands near the Missouri River (table 1). Forty–three species were pandemic, 12 were northern, 10 were western, 29 were eastern, 1 was southern, 5 were endemic, and 5 were introduced to the Great Plains. Eighty–four percent (n = 88) of present–day upland bird species in native woodlands near the Missouri River were also recorded by expeditions in the region in the 1850s (Hayden 1862, Culbertson 1952). Sharp–shinned hawks and white–breasted nuthatches were pandemic birds in present–day bird counts that did not occur in bird lists 150 years ago. Brown creeper, hermit thrush, and Wilson's warbler were northern birds not recorded 150 years ago and all were uncommon in our counts. Eight eastern bird species not recorded in the mid 1800s included eastern phoebe, blue jay, Bell's vireo, prothonotary warbler, black–throated green warbler, indigo bunting, common grackle, and scarlet tanager. Of these, the eastern phoebe, prothonotary warbler, black–throated green warbler, and scarlet tanager are migrants that seldom nest in South Dakota (South Dakota Ornithologists' Union 1991). All of these birds were uncommon in present–day counts (fewer than 10 observations). However, since we occasionally observed them in late June, they may have nested in the area. Blue jays and common grackles were abundant in our counts. The five introduced bird species in present–day counts included ring–necked pheasants, wild turkeys, rock doves, European starlings, and house sparrows. Ring–necked pheasants and wild turkeys were common, but European starlings and house sparrows were uncommon. We did not observe any western or endemic upland birds that were not also observed by early explorers to the region.

Slim Buttes Birds

Hodorff and Sieg (1986) observed 81 upland bird species in native green ash woodlands of the Slim Buttes. Twenty–nine species were pandemic, 15 were northern, 16 were western, 17 were eastern, 2 were endemic, and 2 were introduced to the Great Plains (table 1).

Eighty–three percent (n = 67) of present–day bird species in the Slim Buttes were included in Visher's (1914) inventory. We observed 14 species that were not included in Visher's (1914) list. The long–eared owl was the only pandemic bird recorded in present–day bird counts not

Table 1. Number of observations and geographic affinities of birds occurring in prairie woodlands of central and western South Dakota, compared with presence/absence in historical surveys.

Geographic affinity[1] Common name[2]	Scientific name	Missouri River 1990s[3]	Missouri River 1850s[4]	Slim Buttes 1986[5]	Slim Buttes 1912[6]
Pandemic					
Great blue heron †	*Ardea herodias*	32	X		
Turkey vulture	*Carartes aura*	28	X		
Northern harrier	*Circus cyaneus*	6	X	18	X
Sharp-shinned hawk †	*Accipter striatus*	2		8	X
Cooper's hawk †	*Accipter cooperii*	1	X	1	X
Red-tailed hawk †	*Buteo jamaicensis*	20	X	2	X
Killdeer	*Charadrius vociferus*	111	X	4	X
Mourning dove †	*Zenaida macroura*	2222	X	64	X
Yellow-billed cuckoo †	*Coccyzus americanus*	20	X		
Great horned owl †	*Bubo virginianus*	6	X	23	X
Long-eared owl †	*Asio otus*	7	X	44	
Short-eared owl	*Asio flammeus*	16	X		
Common nighthawk	*Chordeiles minor*	146	X	9	X
Belted kingfisher	*Ceryle alcyon*	2	X	2	X
Downy woodpecker †	*Picoides pubescens*	53	X	2	X
Hairy woodpecker †	*Picoides villosus*	36	X	13	X
Northern flicker †	*Colaptes auratus*	346	X	49	X
Purple martin †	*Progne subis*	2	X		
Bank swallow	*Riparia riparia*	6	X		
Northern rough-winged swallow	*Stelgidopteryx serripennis*	24	X		
Cliff swallow	*Hirundo pyrrohota*	507	X		
Barn swallow	*Hirundo rustica*	66	X		
American crow †	*Covus brachyrhynchos*	30	X	4	X
Black-capped chickadee †	*Poeciles atricapillus*	179	X	747	X
White-breasted nuthatch †	*Sitta carolinensis*	38			
House wren †	*Troglodytes aedon*	881	X	82	X
American robin †	*Turdus migratorius*	197	X	563	X
Cedar waxwing †	*Bombycilla cedrorum*	95	X	42	X
Loggerhead shrike †	*Lanius ludovicianus*	69	X	13	X
Warbling vireo †	*Vireo gilvus*	99	X		
Yellow warbler †	*Dendroica petechia*	393	X	24	X
Common yellowthroat †	*Geothlypis trichas*	130	X	21	X
Yellow-breasted chat †	*Icteria virens*	28	X	5	X
Rufous-sided towhee †	*Pipilo erythophthalmus*	608	X	1207	X
Chipping sparrow †	*Spizella passerina*	66	X	245	X
Vesper sparrow	*Pooecetes gramineus*	76	X	24	X
Savannah sparrow	*Passerculus sandwichensis*	6	X		
Grasshopper sparrow	*Ammodramus savannarum*	131	X		
Song sparrow †	*Melospiza melodia*	46	X	5	X
Red-winged blackbird	*Agelaius phoeniceus*	176	X		
Brown-headed cowbird †	*Molothrus ater*	1719	X	73	X
Northern oriole †	*Icterus galbula*	302	X	3	X
American goldfinch †	*Carduelis tristis*	354	X	248	X
Northern					
Northern goshawk †	*Accipter gentilis*			1	X
Merlin †	*Falco columbarius*	2	X	1	X
Sharp-tailed grouse	*Tympanuchus phasianellus*	10	X	171	X
Tree swallow †	*Tachycineta bicolor*	47	X		
Brown creeper †	*Certhia americana*	1		3	
Veery †	*Catharus fuscescens*	5	X		
Swainson's thrush †	*Catharus ustulatus*	5	X	35	X
Hermit thrush †	*Catharus guttatus*	1			

Cont'd.

Table 1. Cont'd.

Geographic affinity[1] Common name[2]	Scientific name	Missouri River 1990s[3]	Missouri River 1850s[4]	Slim Buttes 1986[5]	Slim Buttes 1912[6]
Northern (Cont'd.)					
Blue-headed vireo †	*Vireo solitarius*		X	3	
Yellow-rumped warbler †	*Dendroica coronata*	3	X	63	X
Blackpoll warbler[7] †	*Dendroica striata*	2	X	1	
Wilson's warbler[7] †	*Wilsonia pussila*	10		44	X
American tree sparrow †	*Spizella arborea*	3	X	22	X
Lincoln's sparrow[7]	*Melospiza lincolnii*			204	X
White-throated sparrow †	*Zonotrichia albicollis*		X	15	
Dark-eyed junco †	*Junco hyemalis*		X	36	X
Rusty blackbird[7] †	*Euphagus carolinus*	10	X		
Pine siskin †	*Carduelis pinus*		X	9	X
Evening grosbeak †	*Coccothraustes vespertinus*			1	
Western					
Swainson's hawk †	*Buteo swainsoni*	6	X	2	X
Prairie falcon	*Falco mexicanus*	6	X	1	X
Western wood-peewee †	*Contopus sordidulus*		X	1	X
Say's phoebe †	*Sayornis saya*	6	X		
Western kingbird †	*Tyrannus verticalis*	232	X		
Black-billed magpie †	*Pica pica*	118	X	78	X
Red-breasted nuthatch †	*Sitta canadensis*		X	45	X
Rock wren	*Salpinctes obsoletus*		X	17	X
Mountain bluebird †	*Sialia currocoides*		X	258	X
Townsend's solitaire †	*Myadestes townsendi*		X	1	
Orange-crowned warbler †	*Vermivora celata*		X	42	
MacGillivray's warbler †	*Oporornis tolmiei*			2	
Black-headed grosbeak †	*Pheucticus melanocephalus*	575	X	3	X
Lazuli bunting †	*Passerina amoena*	2	X	65	X
Lark sparrow †	*Chondestes grammacus*	341	X	196	X
White-crowned sparrow	*Zonotrichia leucophrys*		X	39	X
Western meadowlark	*Sturnella neglecta*	2316	X	138	X
Brewer's blackbird †	*Euphagus cyanocephalus*	9	X	11	X
Eastern					
American kestrel †	*Falco spaverius*	18	X	8	X
Northern bobwhite †	*Colinus virginianus*	1	X		
Black-billed cuckoo †	*Coccyzus erythropthalmus*	78	X	22	X
Red-headed woodpecker †	*Melanerpes erythrocephalus*	74	X	1	X
Red-bellied woodpecker †	*Melanerpes carolinus*	4	X		
Eastern wood-peewee †	*Contopus virens*	15	X		
Least flycatcher †	*Empidonax minimus*	61	X	252[8]	X
Eastern phoebe †	*Sayornis phoebe*	9		2	
Great crested flycatcher †	*Myiarchus crinitus*	49	X		
Eastern kingbird †	*Tyrannus tyrannus*	1220	X	5	X
Blue jay †	*Cyanocitta cristata*	421		9	
Eastern bluebird †	*Sialia sialia*	22	X	14	X
Wood thrush †	*Hyocichla mustenina*	15	X		
Northern mockingbird †	*Minus polyglottus*	3	X		

Cont'd.

Table 1. Cont'd.

Geographic affinity[1] **Common name[2]**	**Missouri River Scientific name**	**Slim Buttes 1990s[3]**	**1850s[4]**	**1986[5]**	**1912[6]**
Gray catbird †	*Dumetella carolinensis*	51	X	2	X
Eastern (Cont'd.)					
Brown thrasher †	*Toxostoma rufum*	582	X	21	X
Bell's vireo †	*Vireo belli*	76			
Red-eyed vireo †	*Vireo olivaceus*	40	X	5	X
Black-throated green warbler †	*Dendroica virens*	3			
Black-and-white warbler †	*Mniotilta varia*	2	X	1	
Prothonotary warbler †	*Protonotaria citrea*	1			
Ovenbird †	*Seirus aurocapillus*	9	X	11	X
American redstart †	*Setophaga ruticilla*	11	X	3	X
Scarlet tanager †	*Piranga olivacea*	2			
Rose-breasted grosbeak †	*Pheucticus ludovicianus*	7	X		
Indigo bunting †	*Passerina cyanea*	54		32	X
Field sparrow †	*Spizella pusilla*	448	X	1003	X
Common grackle †	*Quiscalus quiscalus*	271		13	X
Orchard oriole †	*Icterus spurius*	250	X		
Endemic					
Upland sandpiper	*Bartramia longicauda*	123	X	1	X
Dickcissel	*Spiza americana*	3	X		
Clay-colored sparrow	*Spizella pallida*		X	62	X
Lark bunting	*Calamospiza melanocorys*	62	X		
McCown's longspur	*Calcarius mccownii*	2	X		
Chestnut-collared longspur	*Calcarius ornatus*	9	X		
Southern					
Blue grosbeak †	*Guiraca caerulea*	23	X		
Introduced					
Gray partridge	*Perdix perdix*			2	
Ring-necked pheasant	*Phasianus colchicu*	279			
Wild turkey[9] †	*Meleagris gallopavo*	62	X	1	
Rock dove	*Columba livia*	1			
European starling †	*Sturnus vulgaris*	6			

[1] *Geographic affinities follow Johnsgard (1979).*

[2] *† indicates birds associated with woodland vegetation.*

[3] *Numbers of each species recorded in native woodlands along the Missouri River from 1990 to 1992.*

[4] *Bird species lists from Hayden (1862) and Culbertson (1952).*

[5] *Numbers of each species recorded in the Slim Buttes, Harding County, SD, from 1983 to 1984 (from Hodorff and Sieg 1986).*

[6] *Bird species list from Visher (1914), based on observations made in that area by Ludlow (1876), S. Catron, and A. A. Saunders, and field surveys from 1910 to 1912.*

[7] *Geographic affinity not in Johnsgard (1979); taken from range maps in National Geographic Society (1987).*

[8] *Number observed in Slim Buttes also includes other* Empidonax *spp.*

[9] *Listed as pandemic by Johnsguard (1979). Birds we observed are introduced subspecies; Culpertson recorded a different subspecies of wild turkeys along Missouri south of our present-day study area.*

recorded before approximately 1912. Five new northern species not included in Visher's list included evening grosbeak, brown creeper, blue–headed vireo, black–polled warbler, and white–throated sparrow. The white–throated sparrow was the most common new northern bird observed but only comprised 15 occurrences. All other northern birds were uncommon. Our list also included three new western species: Townsend's solitaire, orange–crowned warbler, and MacGillivray's warbler of which Townsend's solitaire and MacGillivray's warblers were uncommon. Three new eastern species in the Slim Buttes included the eastern phoebe, blue jay, and black–and–white warbler. All new eastern birds were uncommon. Two introduced species included gray partridge and wild turkey.

Woodland Vegetation 80–150 Years Ago

Historic evidence indicates that native woodlands were part of the presettlement prairie landscape. General Land Office Surveys document extensive woodlands along the Missouri River and its tributaries in the 1870s and 1880s (Johnson 1992). Early 20th century photographs show extensive cottonwood forests along the Missouri River (figures 2A, 2B). Well–developed, mature cottonwood riparian forests also occurred in northwestern South Dakota and along most of the larger streams (figure 2C). In central (figure 2D) and western South Dakota, mature green ash forests occurred along drainage ways by 1900 (figures 2E, 2F) and Visher (1914:23) noted that "the canyons in the forest reserves [Slim Buttes area] are more or less filled with deciduous trees." Mature trees in these photographs indicate these woodlands were established well before settlement influenced the landscape. When these photographs were taken, human population densities were less than two per square mile in northwestern South Dakota (Visher 1914).

Extensive native woodlands were part of the presettlement prairie landscape elsewhere in the northern Great Plains (Kaul 1990, Hart and Hart 1997). Comparing the Bad River to the White River in western South Dakota in 1855, G. K. Warren (1856) reported: "The same difficulty is experienced ... if you attempt to follow along its valley. The valley is one–half to one mile wide, well grassed and wooded. ... Cottonwood exists in considerable quantities, mixed with willow, and in some places ash and oak. Wild plum trees are abundant."

In western North Dakota J. J. Audubon in 1843 reported: "We found this walk one of the worst, the very worst, upon which we ever trod: full of wild rose bushes, tangled and matted with vines, burs and thorns of all sorts, and encumbered by thousands of pieces of drift wood, some decayed, some sunk in the earth, while others were entangled with innumerable roots exposed by flood or rains."

Discussion

Understanding presettlement conditions and comparing them with current conditions helps to identify processes that shaped ecosystems (Samson and Knopf 1993) and place conservation of biological diversity in proper context (Austin and Margules 1986, Ratcliffe 1986). Because birds differ in their environmental requirements, their populations serve as indicators of environmental conditions (Cody 1985, Martin and Finch 1995). The presence of birds species associated with riparian woodlands is indicative of the composition and structure of those woodlands (Mosconi and Hutto 1982).

Woodland birds are not newcomers to the prairie landscape of central and western South Dakota. Most (84 percent and 83 percent, respectively) of the present–day upland birds along the Missouri River and in the Slim Buttes of South Dakota were recorded in journals of early explorers to the region. In southeastern South Dakota, E. Harris wrote in a letter dated May 24, 1843, "We were assured that we should see no small birds, and we have seen millions of them, including almost every species we find in the eastern states" (McDermott 1951). This reference occurred during the season when songbirds have established breeding territories in the region. Past research has demonstrated that these birds would not have occurred without suitable habitat.

New eastern birds such as blue jays, common grackles, Bell's vireos, and indigo buntings that were abundant in the present–day bird community along the Missouri River would not likely have been missed if they were present in similar abundances 150 years ago. However, other new eastern birds such as Eastern phoebes, prothonotary warblers, black–throated green warblers, and Wilson's warblers are rare migrants or accidental breeders in South Dakota (South Dakota Ornithologists' Union 1991). Blue jays were present during the breeding season in the Slim Buttes, but black–and–white warblers and eastern phoebes were present only during migration (Hodorff 1985). Most new species with pandemic, northern, or western distributions in central and western South Dakota were uncommon in present–day bird counts and were often noted by a single observation. Along the Missouri River, new records of western birds in prairie woodlands were less frequent than new records of eastern birds. All of the new northern and western birds observed in the Slim Buttes were migrants, and the pandemic long–eared owl is secretive (Hodorff 1985, Paulson and Sieg 1984). Rare occurrences of migratory birds could have been easily missed in early bird inventories.

Although the bird communities in western and central South Dakota woodlands have changed somewhat over the last century, these changes cannot be attributed to the

Figure 2A. Confluence of the Cheyenne and Missouri rivers, 1904 (photo by J. E. Todd).

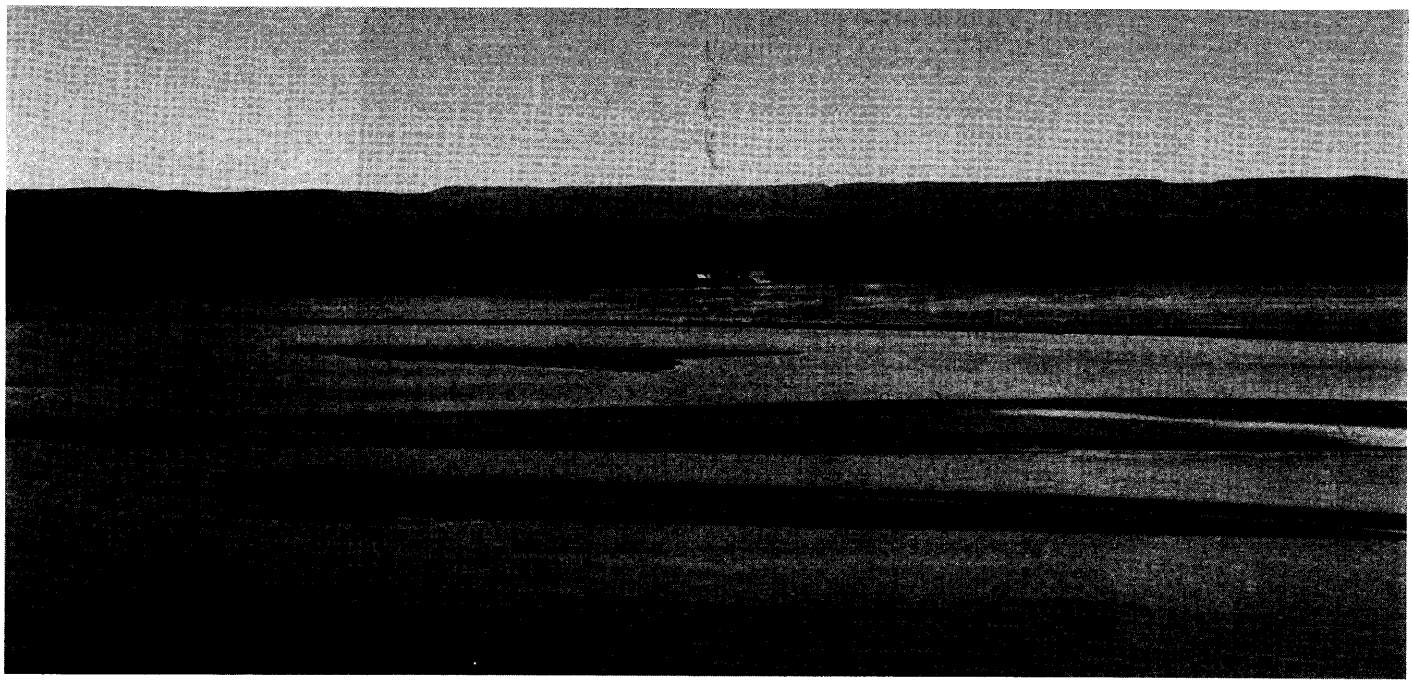

Figure 2B. Confluence of Moreau and Missouri rivers, 1903 (photo by Fred Smith).

Figure 2C. Mature cottonwood riparian woodlands in northwestern South Dakota, 1902 (photo by J. E. Todd). Caption indicates this scene is typical of streams in western South Dakota.

Typical cottonwood groves of the drier semi-humid region. Although this view was taken in 1902 along Rabbit Creek near the Moreau River similar views could be taken along the White River, the Cheyenne or almost any other large stream crossing our plains.

Figure 2D. Mature green ash, elm (*Ulmus americana*), and boxelder (*Acer negundo*) woodland along the Ponca River in south central South Dakota, 1904 (photo by Fred Smith).

Figure 2E. Green ash/ chokecherry woodland in the Slim Buttes, 1909 (photo by Rawley).

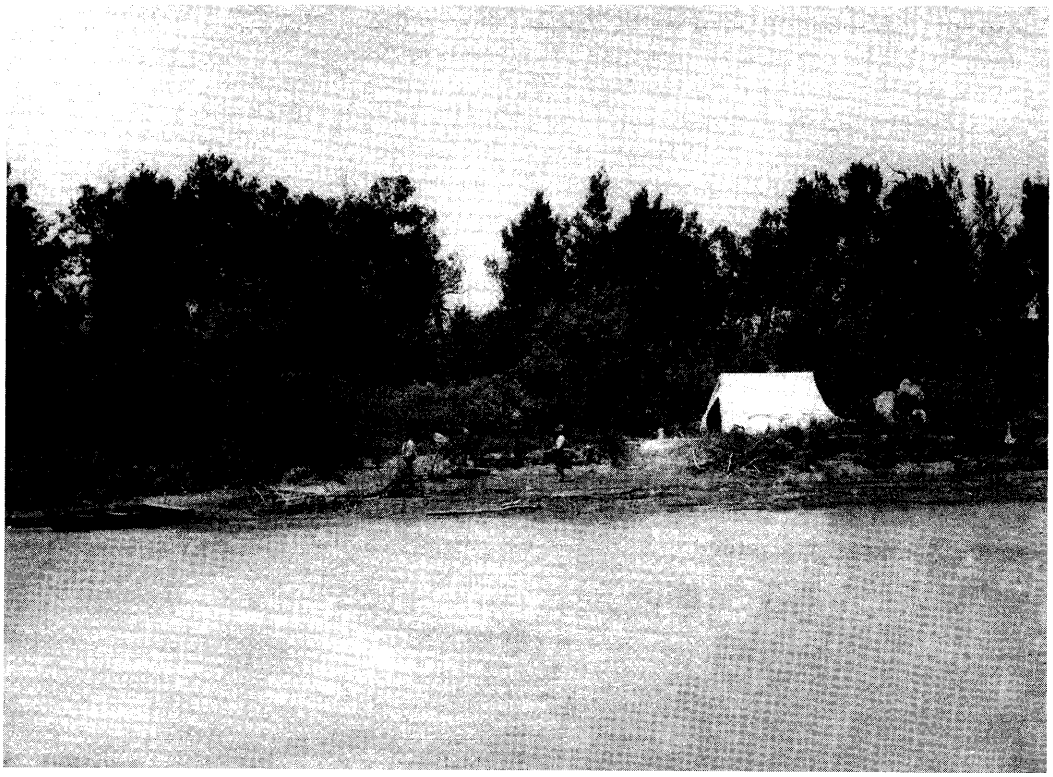

Figure 2F. Riparian woodland showing vegetation structure comprised of mature cottonwood and green ash trees and shrubs (photo by Fred Smith).

expansion of native woodlands. Of greater significance are the other impacts settlement has had on the Great Plains landscape. For example, since 1935, 176.6 million trees have been planted in South Dakota (unpubl. data, Nat. Res. Conserv. Serv., Huron, SD), excluding those planted in cities and towns. These trees provide more than 123,600 ha of habitat for birds, some of which did not occur historically in the plains (Emerich and Vohs 1982, Martin 1980). Urbanization and cultivation encouraged westward expansion of blue jays (Ehrlich et al. 1988). The eastern phoebe benefits from construction of bridges where favorable nest sites occur (South Dakota Ornithologists' Union 1991), and the bird's use of open woodlands has enhanced its westward range expansion. The common grackle is well–adapted to humans and to grain fields for feeding (Ehrlich et al. 1988). Destruction of some species' preferred habitat in the eastern United States may have forced them westward. For example, the prothonotary warbler is associated with swampy lowland and river bottom woodlands subject to flooding; its numbers may be declining due to loss of habitat (Ehrlich et al. 1988).

Conclusions

Because birds have specific habitat requirements, their presence before and during the early 1900s shows that native woodlands were a part of the Great Plains landscape of central and western South Dakota before settlement. Early photographs and journals of explorers to the region provide further evidence that native woodlands were prevalent in the drainage ways and along rivers of western and central South Dakota. Changes in bird species composition in native woodlands of western and central South Dakota cannot be attributed to expansion of these woodlands (e.g., Knopf 1986). Of greater significance are tree planting, cultivation, urbanization, and destruction of native eastern habitats. Native woodlands of the prairie in central and western South Dakota provide critical habitats for a variety of migratory and breeding birds (e.g. Carter and Barker 1992, Rodenhouse et al. 1995, Moore et al. 1995) and other endemic plants and animals. Land managers should be assured that management plans focusing on restoring and sustaining native woodlands of South Dakota are warranted.

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