

Wooded islands in a sea of prairie

These isolated woodlands are important breeding habitat for northern prairie birds

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THE NATION'S THRUST toward energy independence has resulted in accelerated leasing and development schedules for coal, oil, and natural gas reserves across much of the western United States. Road development through woodlands and total loss of woodland from surface coal-mining are distinct possibilities as energy development continues.

Upland native woodlands (wooded draws) represent unique vegetative communities of the prairie region owing to their patchy distribution and islandlike character (Fig. 1). Noble *et al.* (1980) reported that wooded draws occupied about 3-4% of the northern Great Plains. Stewart (1975) listed 38 breeding bird species characteristic of the western North Dakota Badlands community complex. Among these, about 58% were associated with wooded habitats. Faanes (1982) reported that the third highest mean density of breeding birds on a 83-km² study area in central North Dakota occurred in wooded prairie thickets.

The wooded draw community across much of the northern Great Plains has been altered extensively by land-use practices. In the area west of the Missouri River, energy development has resulted in new impacts on this community. Because of these impacts, descriptive classification systems will be useful in developing multiple-use plans for this community. There is also a need to determine avian use of the wooded draw community and to relate this to the importance of wooded ecosystems as wildlife habitat.

During the 1982 breeding season, I studied the use of wooded draws by breeding birds in a five-county region of western North Dakota. The objectives of



Fig. 1. A typical stringer draw on a 12% slope in Mercer County, North Dakota. Typical vegetation included Green Ash and American Elm. Photos by C.A. Faanes.

this research were to: 1) determine avian use and diversity in wooded draws, 2) to relate the diversity of the avian community to the structure and complexity of wooded vegetation, and 3) to determine the influence of location and size of wooded draws on their value as habitat for birds. This report discusses the first objective.

STUDY AREA

THE STUDY AREA (Fig. 2) lies in the Missouri Plateau physiographic region of Bluemle (1977), in Williams, McKenzie, McLean, Mercer, and Oliver counties. The Missouri Plateau is a roll-

ing-to-hilly plain with gentle slopes and local relief ranging 90-150 meters. The surface geology consists of glacial till made up of mixtures of sand and gravel that vary primarily in relation to topography.

Much of the study area is underlain with coal reserves. These five counties contain about 5.5 billion tons of strippable coal, or about 34.4% of the total strippable reserves in North Dakota (Bluemle 1977). Major oil and natural gas reserves exist in McKenzie, Dunn, and Williams counties.

The climate is continental, with hot dry summers and cold winters. Mean annual precipitation and temperature vary

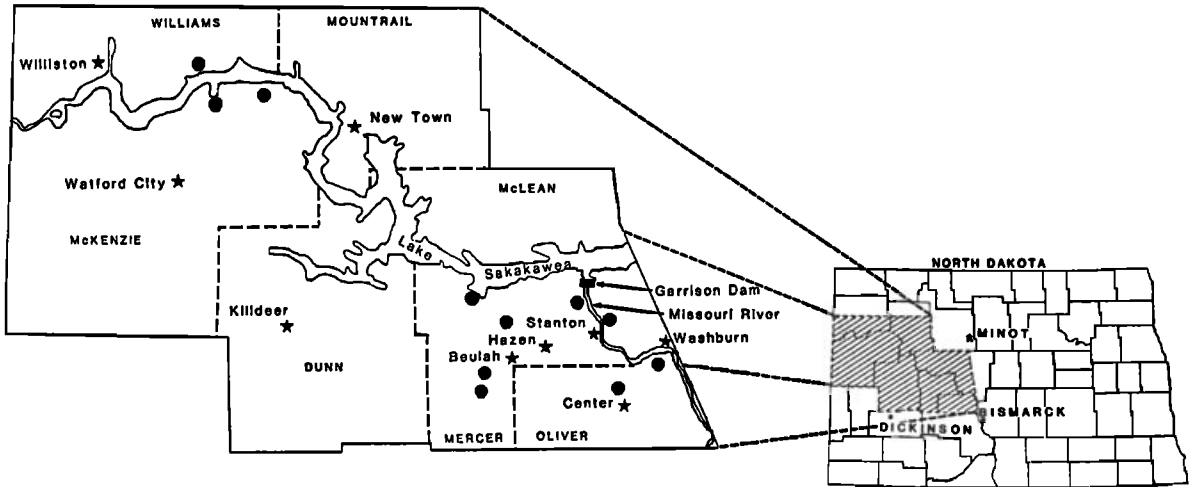


Fig. 2. Geographic location of wooded draw study sites in western North Dakota. Each dot represents the location of 13 census plots.

little across the study area, but show gradual changes along an east-west gradient (Table 1).

HABITATS

THE REGION OF North Dakota lying generally west of the Missouri River shows biogeographic affinities with western habitats more than any other section of North Dakota. Grasslands here have been described as xeric mixed-grass prairie (Whitman 1962). Dominant plants of this prairie type include Western Wheatgrass (*Agropyron smithii*), Needle-and-thread (*Stipa comata*), Blue Grama (*Bouteloua gracilis*), Little Bluestem (*Andropogon scoparius*), Needleleaf Sedge (*Carex stenophylla*), and Threadleaf Sedge (*Carex filifolia*) (Stewart 1975). Livestock grazing (Fig. 3) is a common land use in this region and the intensity of grazing ranges from none to very heavy. Dryland farming is the predominant land use across much of western North Dakota. Within my study area, the principal agricultural land-uses are grazing, wheat farming, and haying.

Vegetation of the wooded draws varies considerably, and appeared to be related to the slope, aspect, and location of individual draws. The predominant tree species in most draws were Green Ash (*Fraxinus pennsylvanica*) and American Elm (*Ulmus americana*). General observations suggested that Boxelder (*Acer negundo*) was most prevalent on generally flat slopes, such as along river floodplains. As slope increased, the frequency of Boxelder decreased.

The general vegetation pattern at the upper ends of most wooded draws con-

Table 1. Differences in climatic variables along an east to west gradient in western North Dakota.¹ Temperatures are in centigrade, precipitation in mm.

LOCATION	\bar{x} annual temp.	\bar{x} January temp.	\bar{x} July temp.	\bar{x} annual precip.
Williston, Williams Co.	+4.9	-13.6	+21.2	363
Center, Oliver Co.	+4.7	-13.1	+20.6	452

¹Source: U.S. Dept. of Commerce (1981). Climatological data — North Dakota. Vol. 90 No. 13 Nat'l Climatic Center, Asheville, NC.

sisted of many small trees, high shrub densities, low canopy cover, and high ground cover. The lower ends were characterized by few large trees, few shrubs, high canopy cover, and lower ground cover. Grazing intensity appeared to have a pronounced effect on the understory vegetation to the draws (Fig. 4).

METHODS

Census Plot Selection

Thirty plots were selected for Breeding Bird Censuses during the initial year of the study. Site selection involved choosing three draws in each of 11 areas (Fig. 2). This selection included draws set at different aspects and with varying slope and grazing intensities. Although attempts were made to select draws exhibiting a wide array of tree species, the geographic location of the study site appeared to preclude much variation in species composition.

Avian Census Methods

Breeding bird populations were censused June 2-June 30, 1982, by using a modified Emlen line transect (Emlen

1971, 1977). Each of the 30 draws finally selected for censusing was visited three times during the count period. Count times were usually from local sunrise to 1100. During each count, data were re-



Fig. 3. Livestock grazing causes serious reductions in plant community diversity and the structural types of vegetation available for wildlife and virtually eliminates all natural reproduction of the vegetation.



Fig. 4. High structural complexity of the understory vegetation is maintained under light grazing by livestock.

recorded on the location of each male bird of a species encountered (except that only female Brown-headed Cowbirds were counted).

Each census plot was 50 × 400 m, covering an area of two ha. In all plots but one, this size was maintained. The centerline and edges of each plot were marked with colored plastic surveyor's tape.

In addition to census plots, periodic investigations of habitats adjacent to the wooded draws were also made. These data were used to supplement observations made in each area, and to provide further information on the numbers and kinds of birds using these habitats.

Vegetation Analysis

The method used for this investigation was a modification of the James and Shuart (1970) circular plot method, as described by Noon (1981). Vegetation within each draw was sampled in five 0.04-ha circular plots, which provided an analysis of vegetation on 0.2 ha of each bird census plot. These plots were at 0, 50, 150, 200, and 350 m, along each bird census transect.

RESULTS AND DISCUSSION

FORTY-SEVEN BIRD SPECIES in the 30 wooded draws censused for breeding birds were recorded. An additional 23 species were found occupying adjacent draws, or habitats in proximity to wooded draws. These figures indicate that at least 23% of the known nesting avifauna of North Dakota was found in the wooded draws censused, and nearly 34% of the total was found occupying wooded draws or adjacent habitats (Faanes and Stewart 1982). The mean number of bird species recorded per draw was 13.2, with the range 8-18 species. The most frequently occur-

ring species were Rufous-sided Towhee, Brown-headed Cowbird, House Wren, and American Goldfinch (Table 2).

Among families, the Emberizidae accounted for 42.6% of all species recorded in wooded draws, and 42.2% of all bird species recorded in all habitats studied in 1982 (Table 3). Within the Emberizidae, 8 species were grosbeaks, 7 were warblers, and 5 were blackbirds. The Tyrannidae were second most numerous, making up 12.8% of the wooded draw bird species and 8.4% of all species recorded.

Each of the 30 census plots were within 11 subareas. For this analysis, I grouped the plots into 10 subareas, leaving out the lone plot in the Garrison Dam Quadrangle. These data suggest that the Cussicks Spring area of Williams County and the Zap area of Mercer County supported the highest mean breeding densities (Table 4).

Among all subareas, the lowest mean breeding-bird density and two of the three lowest mean species-richness values were from wooded draws either adja-

Table 2. Percent frequency of occurrence of breeding birds in wooded draw census plots, 1982.

SPECIES	No. plots recorded	% of plots
Brown-headed Cowbird (<i>Molothrus ater</i>)	27	90
Rufous-sided Towhee (<i>Pipilo erythrophthalmus</i>)	27	90
House Wren (<i>Troglodytes aedon</i>)	26	87
Am. Goldfinch (<i>Spinus tristis</i>)	24	80
Mourning Dove (<i>Zenaidura macroura</i>)	23	77
Am. Robin (<i>Turdus migratorius</i>)	17	57
Yellow Warbler (<i>Dendroica petechia</i>)	17	57
Field Sparrow (<i>Spizella pusilla</i>)	16	53
E. Kingbird (<i>Tyrannus tyrannus</i>)	15	50
Red-eyed Vireo (<i>Vireo olivaceus</i>)	15	50
Blue Jay (<i>Cyanocitta cristata</i>)	13	43
Black-and-white Warbler (<i>Mniotilta varia</i>)	13	40
Black-headed Grosbeak (<i>Pheucticus melanocephalus</i>)	12	40
Lazuli Bunting (<i>Passerina amoena</i>)	11	37
Vesper Sparrow (<i>Pooecetes gramineus</i>)	11	37
Black-capped Chickadee (<i>Parus atricapillus</i>)	10	33
Brown Thrasher (<i>Toxostoma rufum</i>)	10	33
Ovenbird (<i>Seiurus aurocapillus</i>)	10	33
Yellow-breasted Chat (<i>Icteria virens</i>)	8	27
Am. Redstart (<i>Setophaga ruticilla</i>)	8	27
W. Kingbird (<i>Tyrannus verticalis</i>)	7	23
Least Flycatcher (<i>Empidonax minimus</i>)	7	23
N. Flicker (<i>Colaptes auratus</i>)	6	20
Com. Yellowthroat (<i>Geothlypis trichas</i>)	6	20
Cedar Waxwing (<i>Bombycilla cedrorum</i>)	5	17
Gray Catbird (<i>Dumetella carolinensis</i>)	5	17
Black-billed Cuckoo (<i>Coccyzus erythrophthalmus</i>)	4	13
Red-winged Blackbird (<i>Agelaius phoeniceus</i>)	4	13
Clay-colored Sparrow (<i>Spizella pallida</i>)	4	13
N. Oriole (<i>Icterus galbula</i>)	3	10
Lark Sparrow (<i>Chondestes grammacus</i>)	3	10
Wild Turkey (<i>Meleagris gallopavo</i>)	2	7
Willow Flycatcher (<i>Empidonax traillii</i>)	2	7
E. Wood-Pewee (<i>Contopus virens</i>)	2	7
Am. Crow (<i>Corvus brachyrhynchos</i>)	2	7
Mountain Bluebird (<i>Sialia currucoides</i>)	2	7
Orchard Oriole (<i>Icterus spurius</i>)	2	7
Com. Grackle (<i>Quiscalus quiscula</i>)	2	7
Chipping Sparrow (<i>Spizella passerina</i>)	2	7
Turkey Vulture (<i>Cathartes aura</i>)	1	3
Sharp-shinned Hawk (<i>Accipiter striatus</i>)	1	3
Red-tailed Hawk (<i>Buteo jamaicensis</i>)	1	3
Ring-necked Pheasant (<i>Phasianus colchicus</i>)	1	3
Long-eared Owl (<i>Asio otus</i>)	1	3
Great Horned Owl (<i>Bubo virginianus</i>)	1	3
Great Crested Flycatcher (<i>Myiarchus crinitus</i>)	1	3
Veery (<i>Catharus fuscescens</i>)	1	3
Black-billed Magpie (<i>Pica pica</i>)	1	3
MacGillivray's Warbler (<i>Oporornis tolmiei</i>)	1	3

cent to the Missouri River or along the floodplain of the Knife River. Wooded draws along the Knife River generally supported high ground-cover values, low shrub density, and fewer individual large trees. Because these draws were located along the floodplain of a moderately large stream, the low shrub layer is subject to increased frequency and duration of floods which may hinder the colonization of this layer by low-ground-layer breeding bird species. Examination of the species lists for these three draws revealed that among the 16 bird species recorded, only three (19%) are typical of ground or shrub layer vegetation.

Among the 34 breeding bird species that reached maximum numbers in individual draws or subareas, 18 or 53% occupied the three western subareas (Table 4). Three of the eastern subareas (Ft. Clark, Stanton, Medicine Butte) supported four species (12%) among them that reached maximum numbers, and of these the Stanton subarea was the only one not to support maximum numbers of at least one bird species.

SUMMARY

FORTY-SEVEN BIRD SPECIES were recorded on 30 wooded draw census plots in five western North Dakota counties. An additional 23 species were recorded in habitats adjacent to wooded draws. The most frequently occurring species were Rufous-sided Towhee, Brown-headed Cowbird, House Wren, and American Goldfinch. Wooded draws in the McKenzie-Williams County area seemingly supported higher mean breeding densities than did draws in the eastern half of the area.

ACKNOWLEDGMENTS

THIS RESEARCH WAS conducted under Interagency Agreement MT 950-1A2-15 between the U.S. Bureau of Land Management and U.S. Fish and Wildlife Service. Marv Hoffer and Roger Collins served as project officers for the respective agencies. Charles Shaiffer and Bruce Hanson provided assistance with data gathering and Douglas Johnson read several drafts of the manuscript.

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Table 3. Proportional distribution of bird families in wooded draws and adjacent habitats.

Family	No. species in		% total	
	Draws	Adjacent habitats	Draws	All habitats
Cathartidae	1	0	2.1	1.4
Accipitridae	2	3	4.2	7.0
Phasianidae	2	1	4.2	4.2
Charadriidae	0	1	0	1.4
Scolopacidae	0	1	0	1.4
Columbidae	1	0	2.1	1.4
Cuculidae	1	0	2.1	1.4
Strigidae	2	0	4.2	2.8
Caprimulgidae	0	1	0	1.4
Picidae	0	1	0	1.4
Tyrannidae	6	0	12.8	8.4
Alaudidae	0	1	0	1.4
Hirundinidae	0	2	0	2.8
Corvidae	2	1	4.2	4.2
Paridae	1	0	2.1	1.4
Troglodytidae	1	1	2.1	1.4
Musicapidae	3	0	6.3	4.2
Mimidae	2	1	4.2	4.2
Motacillidae	0	1	0	1.4
Bombycillidae	1	0	1.1	1.4
Laniidae	0	1	0	1.4
Vireonidae	1	0	2.1	1.4
Emberizidae	20	7	42.6	42.2
Fringillidae	1	1	2.1	2.8
TOTALS	47	24		

Table 4. Distribution of breeding bird densities and species richness among wooded draw subunits, 1982.

Numerical rank	Plot nos.	\bar{x} density (prs/ha)	\bar{x} species	No. species reaching max. numbers	Subarea
1	31-33	1373	14.7	9	Cussicks Spring
2	19-21	1341	13.0	4	Zap
3	28-30	1196	13.0	4	Charleson
4	7-9	1116	15.7	6	Center
5	25-27	1116	13.7	5	Tobacco Garden
6	14-15	1069	14.0	1	Beaver Creek
7	16-18	914	13.7	1	Beulah N.W
8	4-6	721	13.0	3	Ft. Clark
9	1-3	637	12.0	0	Stanton
10	22-24	583	10.0	1	Medicine Butte

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