

# Uncommon Breeding Birds in North Dakota: Population Estimates and Frequencies of Occurrence

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Breeding bird populations were surveyed on 128 randomly selected quarter-sections throughout North Dakota in 1967, 1992, and 1993. Population estimates and frequencies of occurrence are reported for 92 uncommon breeding bird species with statewide frequencies of less than 10%.

Key Words: frequency of occurrence, population estimate, uncommon breeding birds, North Dakota.

Population estimates for birds over large geographic areas in North America are decidedly rare and usually limited to game species (e.g., waterfowl: U.S. Fish and Wildlife Service 1997), certain taxonomic groups (e.g., seabirds: Ainley et al. 1994), or species of conservation concern (e.g., Piping Plover [*Charadrius melodus*]: Haig and Plissner 1993; Baird's Sparrow [*Ammodramus bairdii*]: Skeel et al. 1995\*). Notable exceptions are population estimates derived from surveys of breeding birds in Illinois (Forbes 1913; Forbes and Gross 1922, 1923; Graber and Graber 1963), North Dakota (Stewart and Kantrud 1972; Igl and Johnson 1997), and the Platte River Valley in Nebraska (Faanes 1991\*; Faanes and Lingle 1995\*). The North American Breeding Bird Survey, a primary source of data on populations for many species of North American breeding birds, by design, provides indices to population change rather than estimates of continental or regional breeding bird populations (Robbins et al. 1986).

In 1967, Stewart and Kantrud (1972) conducted an extensive survey of breeding bird populations throughout North Dakota to obtain baseline estimates of statewide breeding bird abundance and frequency of occurrence. They recorded 131 species of breeding birds on 130 randomly selected quarter-sections. In 1992 and 1993, Igl and Johnson (1997) repeated the Stewart-Kantrud survey using the same sample units and methods to examine changes in breeding bird populations in North Dakota between 1967 and 1992–1993. Igl and Johnson (1997) observed 144 breeding bird species in 1992 and 153 in 1993.

In both studies (Stewart and Kantrud 1972; Igl and Johnson 1997), statewide population estimates were published for only the more common breeding bird species in North Dakota. Population estimates for the uncommon species (defined here as those with frequencies of occurrence of less than 10%) were never published, although this information has occasional-

ly been requested or sought (Robbins et al. 1986: 128; Page and Gill 1994; Houston et al. 1998). In this paper, we present frequencies of occurrence and statewide population estimates for the uncommon species in 1967, 1992, and 1993.

## Study Area and Methods

The study area and methods were described in detail by Stewart and Kantrud (1972) and Igl and Johnson (1997) and are only summarized here. In 1967, Stewart and Kantrud (1972) surveyed breeding birds on 130 randomly selected quarter-sections (about 64.7 ha each) throughout North Dakota. To facilitate a direct comparison, the same sample units and methods used by Stewart and Kantrud (1972) in 1967 were used by Igl and Johnson (1997) in 1992 and 1993. Igl and Johnson (1997), however, visited only 128 of the 130 quarter-sections originally surveyed by Stewart and Kantrud (1972) in 1967; landowners denied access to the other two quarter-sections. Comparisons among years are based on the 128 quarter-sections that were surveyed in all three years.

Breeding bird surveys were conducted between late April and mid-July each year by two observers on foot (Stewart and Kantrud 1972). Each observer surveyed breeding birds on a rectangular half of a quarter-section by following a standardized survey route. The rectangular halves were usually surveyed simultaneously and an interval of about 400 m was maintained between observers. Species were identified by sight or sound. We avoided censusing during precipitation and strong winds (> 24 km/h). We conducted surveys of birds in open habitats between 0.5 h after sunrise and 0.5 h before sunset. Quarter-sections containing extensive woodland habitats were usually surveyed on relatively calm (< 8 km/h), sunny days between 0.5 h after sunrise and 10:00 CDT. Counts of breeding birds were based primarily on the numbers of indicated breeding pairs during peak breeding periods.



TABLE 1. Statewide frequencies of occurrence (with 95% confidence interval) and statewide breeding population estimates (1000s of pairs, with 95% confidence intervals) of uncommon species of birds (i.e., species with frequencies less than 10%) in North Dakota in 1967, 1992, and 1993.

Species	Frequency of occurrence (CI)			Population estimate (CI)		
	1967	1992	1993	1967	1992	1993
Pied-billed Grebe ( <i>Podilymbus podiceps</i> )	5.5 (2.1-10.0)	2.3 (0.4-5.5)	3.1 (0.8-6.5)	24 (4-44)	9 (0-17)	15 (0-29)
Horned Grebe ( <i>Podiceps auritus</i> )	1.6 (0.1-4.6)	0.8 (0.0-4.1)	0	4 (0-9)	2 (0-6)	0
Red-necked Grebe ( <i>Podiceps grisegena</i> )	0	0.8 (0.0-4.1)	0.8 (0.0-4.1)	0	2 (0-6)	2 (0-5)
Eared Grebe ( <i>Podiceps nigricollis</i> )	2.3 (0.4-5.5)	0.8 (0.0-4.1)	2.3 (0.4-5.5)	90 (0-188)	108 (0-294)	49 (0-119)
Western Grebe ( <i>Aechmophorus occidentalis</i> )	0	1.6 (0.1-4.6)	0.8 (0.0-4.1)	0	4 (0-10)	2 (0-6)
American White Pelican ( <i>Pelecanus erythrorhynchos</i> )	0	0	0.8 (0.0-4.1)	0	0	4 (0-12)
Double-crested Cormorant ( <i>Phalacrocorax auritus</i> )	0	0.8 (0.0-4.1)	2.3 (0.4-5.5)	0	2 (0-6)	22 (0-50)
American Bittern ( <i>Botaurus lentiginosus</i> )	6.3 (2.7-10.8)	0.8 (0.0-4.1)	4.7 (1.6-9.0)	19 (6-32)	4 (0-12)	17 (3-31)
Great Blue Heron ( <i>Ardea herodias</i> )	1.6 (0.1-4.6)	0.8 (0.0-4.1)	2.3 (0.4-5.5)	4 (0-9)	2 (0-6)	7 (0-13)
Black-crowned Night-Heron ( <i>Nycticorax nycticorax</i> )	6.3 (2.7-10.8)	2.3 (0.4-5.5)	3.1 (0.8-6.5)	37 (0-70)	11 (0-22)	11 (0-21)
Turkey Vulture ( <i>Cathartes aura</i> )	1.6 (0.1-4.6)	0	0.8 (0.0-4.1)	4 (0-9)	0	2 (0-6)
Canada Goose ( <i>Branta canadensis</i> )	0	1.6 (0.1-4.6)	4.7 (1.6-9.0)	0	24 (0-63)	62 (0-133)
Wood Duck ( <i>Aix sponsa</i> )	0.8 (0.0-4.1)	1.6 (0.1-4.6)	3.9 (1.1-8.1)	2 (0-6)	4 (0-10)	25 (0-47)
Cinnamon Teal ( <i>Anas cyanoptera</i> )	0	0.8 (0.0-4.1)	0	0	2 (0-6)	0
Canvasback ( <i>Aythya valisineria</i> )	1.6 (0.1-4.6)	3.1 (0.8-6.5)	1.6 (0.1-4.6)	22 (0-57)	9 (1-17)	10 (0-24)
Redhead ( <i>Aythya americana</i> )	5.5 (2.1-10.0)	4.7 (1.6-9.0)	7.0 (3.2-11.9)	59 (0-115)	42 (0-85)	91 (0-174)
Ring-necked Duck ( <i>Aythya collaris</i> )	0.8 (0.0-4.1)	0	0.8 (0.0-4.1)	4 (0-11)	0	2 (0-6)
Lesser Scaup ( <i>Aythya affinis</i> )	2.3 (0.4-5.5)	0.8 (0.0-4.1)	0.8 (0.0-4.1)	6 (0-13)	9 (0-24)	9 (0-24)
Bufflehead ( <i>Bucephala albeola</i> )	0	0	0.8 (0.0-4.1)	0	0	2 (0-6)
Hooded Merganser ( <i>Lophodytes cucullatus</i> )	0	0	1.6 (0.1-4.6)	0	0	4 (0-9)
Ruddy Duck ( <i>Oxyura jamaicensis</i> )	3.9 (1.1-8.1)	0.8 (0.0-4.1)	4.7 (1.6-9.0)	80 (0-160)	126 (0-342)	50 (0-9)
Sharp-shinned Hawk ( <i>Accipiter striatus</i> )	0	0.8 (0.0-4.1)	0	0	2 (0-5)	0
Cooper's Hawk ( <i>Accipiter cooperii</i> )	2.3 (0.4-5.5)	1.6 (0.1-4.6)	6.3 (2.7-10.8)	6 (0-13)	4 (0-9)	17 (6-29)
Broad-winged Hawk ( <i>Buteo platypterus</i> )	0	0.8 (0.0-4.1)	0.8 (0.0-4.1)	0	2 (0-6)	2 (0-5)
Ferruginous Hawk ( <i>Buteo regalis</i> )	3.1 (0.8-6.5)	3.1 (0.8-6.5)	6.3 (2.7-10.8)	9 (1-17)	9 (1-17)	18 (6-29)
Golden Eagle ( <i>Aquila chrysaetos</i> )	0	1.6 (0.1-4.6)	2.3 (0.4-5.5)	0	4 (0-8)	7 (0-13)
American Kestrel ( <i>Falco sparverius</i> )	0	2.3 (0.4-5.5)	2.3 (0.4-5.5)	11 (2-20)	21 (5-37)	24 (7-41)
Prairie Falcon ( <i>Falco mexicanus</i> )	0	2.3 (0.4-5.5)	2.3 (0.4-5.5)	0	6 (0-12)	6 (0-12)
Wild Turkey ( <i>Meleagris gallopavo</i> )	0	0	2.3 (0.4-5.5)	0	0	7 (0-13)
Yellow Rail ( <i>Coturnicops noveboracensis</i> )	0	0.8 (0.0-4.1)	0	0	2 (0-6)	0
Virginia Rail ( <i>Rallus limicola</i> )	2.3 (0.4-5.5)	2.3 (0.4-5.5)	1.6 (0.1-4.6)	7 (0-13)	11 (0-23)	4 (0-9)
Piping Plover ( <i>Charadrius melodus</i> )	1.6 (0.1-4.6)	0.8 (0.0-4.1)	0.8 (0.0-4.1)	11 (0-27)	4 (0-12)	2 (0-6)
American Avocet ( <i>Recurvirostra americana</i> )	3.9 (1.1-8.1)	2.3 (0.4-5.5)	4.7 (1.6-9.0)	31 (3-59)	13 (0-26)	29 (0-57)
Spotted Sandpiper ( <i>Actitis macularia</i> )	7.8 (3.9-12.6)	6.3 (2.7-10.8)	4.7 (1.6-9.0)	26 (9-42)	26 (5-47)	19 (3-36)
Common Snipe ( <i>Gallinago gallinago</i> )	0	1.6 (0.1-4.6)	5.5 (2.1-10.0)	0	4 (0-10)	15 (4-26)
Franklin's Gull ( <i>Larus pipixcan</i> )	5.5 (2.1-10.0)	2.3 (0.4-5.5)	2.3 (0.4-5.5)	48 (8-88)	171 (0-360)	125 (0-325)
Ring-billed Gull ( <i>Larus delawarensis</i> )	0.8 (0.0-4.1)	3.1 (0.8-6.5)	5.5 (2.1-10.0)	2 (0-6)	106 (0-211)	24 (2-46)

Continued



TABLE 1. Continued

Species	Frequency of occurrence (CI)			Population estimate (CI)		
	1967	1992	1993	1967	1992	1993
California Gull ( <i>Larus californicus</i> )	0	0	1.6 (0.1-4.6)	0	0	4 (0-10)
Common Tern ( <i>Sterna hirundo</i> )	0.8 (0.0-4.1)	1.6 (0.1-4.6)	1.6 (0.1-4.6)	13 (0-36)	13 (0-33)	7 (0-15)
Forster's Tern ( <i>Sterna forsteri</i> )	1.6 (0.1-4.6)	1.6 (0.1-4.6)	1.6 (0.1-4.6)	6 (0-15)	13 (0-33)	9 (0-21)
Rock Dove ( <i>Columba livia</i> )	0	4.7 (1.6-9.0)	5.5 (2.1-10.0)	0	50 (0-113)	26 (5-48)
Great Horned Owl ( <i>Bubo virginianus</i> )	1.6 (0.1-4.6)	3.1 (0.8-6.5)	7.0 (3.2-11.9)	4 (0-9)	9 (1-16)	19 (7-31)
Burrowing Owl ( <i>Athene cunicularia</i> )	1.6 (0.1-4.6)	2.3 (0.4-5.5)	1.6 (0.1-4.6)	7 (0-15)	7 (0-13)	5 (0-10)
Long-eared Owl ( <i>Asio otus</i> )	0	0.8 (0.0-4.1)	0.8 (0.0-4.1)	0	2 (0-5)	2 (0-6)
Short-eared Owl ( <i>Asio flammeus</i> )	0	0.8 (0.0-4.1)	0.8 (0.0-4.1)	0	2 (0-6)	2 (0-6)
Chimney Swift ( <i>Chaetura pelagica</i> )	0.8 (0.0-4.1)	0	2.3 (0.4-5.5)	2 (0-6)	0	6 (0-13)
Ruby-throated Hummingbird ( <i>Archilochus colubris</i> )	0	3.1 (0.8-6.5)	0	0	9 (1-16)	0
Belted Kingfisher ( <i>Ceryle alcyon</i> )	0	0.8 (0.0-4.1)	0.8 (0.0-4.1)	0	2 (0-6)	2 (0-6)
Red-headed Woodpecker ( <i>Melanerpes erythrocephalus</i> )	1.6 (0.1-4.6)	4.7 (1.6-9.0)	3.9 (1.1-8.1)	4 (0-9)	20 (4-35)	15 (0-28)
Yellow-bellied Sapsucker ( <i>Sphyrapicus varius</i> )	0	0	1.6 (0.1-4.6)	0	0	4 (0-9)
Hairy Woodpecker ( <i>Picoides villosus</i> )	1.6 (0.1-4.6)	7.0 (3.2-11.9)	7.8 (3.9-12.6)	4 (0-9)	26 (9-43)	23 (9-38)
Red-shafted Flicker ( <i>Colaptes auratus cafer</i> )	5.5 (2.1-10.0)	3.9 (1.1-8.1)	3.1 (0.8-6.5)	25 (5-44)	10 (2-19)	9 (1-17)
Pileated Woodpecker ( <i>Dryocopus pileatus</i> )	0	0	0.8 (0.0-4.1)	0	0	2 (0-6)
Eastern Wood-Pewee ( <i>Contopus virens</i> )	1.6 (0.1-4.6)	3.1 (0.8-6.5)	2.3 (0.4-5.5)	4 (0-9)	21 (0-40)	14 (0-29)
Alder Flycatcher ( <i>Empidonax alnorum</i> )	0	0	0.8 (0.0-4.1)	0	0	2 (0-6)
Eastern Phoebe ( <i>Sayornis phoebe</i> )	0.8 (0.0-4.1)	1.6 (0.1-4.6)	2.3 (0.4-5.5)	4 (0-11)	4 (0-9)	6 (0-11)
Great Crested Flycatcher ( <i>Myiarchus crinitus</i> )	0.8 (0.0-4.1)	2.3 (0.4-5.5)	3.1 (0.8-6.5)	6 (0-16)	17 (0-34)	26 (3-50)
Yellow-throated Vireo ( <i>Vireo flavifrons</i> )	0	0	0.8 (0.0-4.1)	0	0	4 (0-11)
Red-eyed Vireo ( <i>Vireo olivaceus</i> )	3.9 (1.1-8.1)	3.1 (0.8-6.5)	6.3 (2.7-10.8)	27 (0-52)	42 (0-81)	86 (16-157)
Black-billed Magpie ( <i>Pica pica</i> )	4.7 (1.6-9.0)	6.3 (2.7-10.8)	7.0 (3.2-11.9)	40 (6-75)	32 (7-57)	33 (10-56)
Purple Martin ( <i>Progne subis</i> )	1.6 (0.1-4.6)	0.8 (0.0-4.1)	0	4 (0-9)	2 (0-6)	0
Tree Swallow ( <i>Tachycineta bicolor</i> )	2.3 (0.4-5.5)	3.9 (1.1-8.1)	6.3 (2.7-10.8)	6 (0-13)	11 (2-19)	26 (8-44)
Northern Rough-winged Swallow ( <i>Stelgidopteryx serripennis</i> )	2.3 (0.4-5.5)	0.8 (0.0-4.1)	1.6 (0.1-4.6)	15 (0-32)	2 (0-6)	7 (0-16)
White-breasted Nuthatch ( <i>Sitta carolinensis</i> )	0.8 (0.0-4.1)	3.9 (1.1-8.1)	5.5 (2.1-10.0)	6 (0-16)	15 (2-28)	19 (4-34)
Rock Wren ( <i>Salpinctes obsoletus</i> )	3.1 (0.8-6.5)	4.7 (1.6-9.0)	4.7 (1.6-9.0)	20 (2-37)	46 (12-80)	58 (14-101)
Sedge Wren ( <i>Cistothorus platensis</i> )	3.1 (0.8-6.5)	4.7 (1.6-9.0)	6.3 (2.7-10.8)	22 (0-49)	43 (5-81)	80 (0-187)
Eastern Bluebird ( <i>Sialia sialis</i> )	0	3.1 (0.8-6.5)	3.1 (0.8-6.5)	0	8 (1-16)	11 (0-20)
Mountain Bluebird ( <i>Sialia currucoides</i> )	3.1 (0.8-6.5)	4.7 (1.6-9.0)	4.7 (1.6-9.0)	16 (1-30)	30 (5-54)	43 (7-79)
Veery ( <i>Catharus fuscescens</i> )	1.6 (0.1-4.6)	2.3 (0.4-5.5)	0.8 (0.0-4.1)	22 (0-57)	11 (0-22)	6 (0-16)
European Starling ( <i>Sturnus vulgaris</i> )	9.4 (4.9-14.8)	8.6 (4.2-14.1)	9.4 (4.9-14.8)	26 (12-40)	102 (0-202)	89 (0-164)
Sprague's Pipit ( <i>Anthus spragueii</i> )	3.9 (1.1-8.1)	5.5 (2.1-10.0)	6.3 (2.7-10.8)	15 (2-28)	29 (5-52)	42 (8-75)
Chestnut-sided Warbler ( <i>Dendroica pensylvanica</i> )	0	0	1.6 (0.1-4.6)	0	0	4 (0-9)
Black-and-white Warbler ( <i>Mniotilta varia</i> )	1.6 (0.1-4.6)	3.1 (0.8-6.5)	4.7 (1.6-9.0)	6 (0-13)	14 (0-27)	45 (0-86)
American Redstart ( <i>Setophaga ruticilla</i> )	5.5 (2.1-10.0)	3.9 (1.1-8.1)	3.9 (1.1-8.1)	26 (0-51)	21 (4-39)	41 (0-76)
Ovenbird ( <i>Seiurus aurocapillus</i> )	1.6 (0.1-4.6)	3.9 (1.1-8.1)	3.9 (1.1-8.1)	12 (0-25)	40 (0-77)	61 (0-131)

Continued



TABLE 1. *Concluded*

Species	Frequency of occurrence (CI)			Population estimate (CI)		
	1967	1992	1993	1967	1992	1993
Northern Waterthrush ( <i>Seiurus noveboracensis</i> )	1.6 (0.1-4.6)	0	0	4 (0-9)	0	0
Mourning Warbler ( <i>Oporornis philadelphia</i> )	0	0.8 (0.0-4.1)	0.8 (0.0-4.1)	0	2 (0-6)	2 (0-6)
Yellow-breasted Chat ( <i>Icteria virens</i> )	1.6 (0.1-4.6)	3.1 (0.8-6.5)	3.9 (1.1-8.1)	12 (0-26)	12 (1-23)	24 (4-43)
Brewer's Sparrow ( <i>Spizella breweri</i> )	0.8 (0.0-4.1)	0.8 (0.0-4.1)	1.6 (0.1-4.6)	4 (0-11)	2 (0-5)	6 (0-14)
Field Sparrow ( <i>Spizella pusilla</i> )	7.0 (3.2-11.9)	6.3 (2.7-10.8)	6.3 (2.7-10.8)	99 (41-156)	130 (29-231)	159 (47-270)
Le Conte's Sparrow ( <i>Ammodramus leconteii</i> )	3.9 (1.1-8.1)	0.8 (0.0-4.1)	4.7 (1.6-9.0)	12 (2-22)	4 (0-12)	29 (0-58)
Nelson's Sharp-tailed Sparrow ( <i>Ammodramus nelsoni</i> )	2.3 (0.4-5.5)	2.3 (0.4-5.5)	7.0 (3.2-11.9)	7 (0-13)	7 (0-13)	27 (9-46)
McCown's Longspur ( <i>Calcarius mccownii</i> )	3.1 (0.8-6.5)	0.8 (0.0-4.1)	0.8 (0.0-4.1)	50 (0-99)	4 (0-12)	2 (0-6)
Rose-breasted Grosbeak ( <i>Pheucticus ludovicianus</i> )	1.6 (0.1-4.6)	2.3 (0.4-5.5)	3.1 (0.8-6.5)	4 (0-9)	6 (0-12)	10 (1-20)
Black-headed Grosbeak ( <i>Pheucticus melanocephalus</i> )	1.6 (0.1-4.6)	3.1 (0.8-6.5)	2.3 (0.4-5.5)	11 (0-26)	11 (1-21)	7 (0-13)
Blue Grosbeak ( <i>Guiraca caerulea</i> )	0.8 (0.0-4.1)	0.8 (0.0-4.1)	0	2 (0-6)	2 (0-6)	0
Lazuli Bunting ( <i>Passerina amoena</i> )	3.1 (0.8-6.5)	2.3 (0.4-5.5)	3.9 (1.1-8.1)	17 (0-33)	24 (0-52)	36 (0-70)
Indigo Bunting ( <i>Passerina cyanea</i> )	1.6 (0.1-4.6)	1.6 (0.1-4.6)	1.6 (0.1-4.6)	4 (0-9)	4 (0-9)	6 (0-14)
Dickcissel ( <i>Spiza americana</i> )	6.3 (2.7-10.8)	6.3 (2.7-10.8)	2.3 (0.4-5.5)	139 (26-252)	74 (7-14)	31 (0-75)
Spotted Towhee ( <i>Pipilo maculatus</i> )	9.4 (4.9-14.8)	9.4 (4.9-14.8)	8.6 (4.2-14.1)	189 (64-314)	167 (58-275)	253 (84-423)
Eastern Meadowlark ( <i>Sturnella magna</i> )	0	0	0.8 (0.0-4.1)	0	0	2 (0-6)
Bullock's Oriole ( <i>Icterus bullockii</i> )	0	0	1.6 (0.1-4.6)	0	0	4 (0-9)
Pine Siskin ( <i>Carduelis pinus</i> )	0	0	2.3 (0.4-5.5)	0	0	30 (0-75)

We estimated population means and totals, and their standard deviations, using standard methods for stratified random samples with proportional allocation (Cochran 1977). We calculated Bayesian confidence intervals (95% confidence limits, Box and Tiao 1973) in lieu of the usual confidence intervals. Bayesian intervals exploit the prior knowledge that the means of bird densities and frequencies of occurrence of birds are non-negative.

Vernacular and scientific names follow the American Ornithologists' Union (1998). The Red-shafted (*Colaptes auratus cafer*) and Yellow-shafted (*C. a. auratus*) subspecies of the Northern Flicker were recorded separately to reflect their treatment as separate species in 1967.

We classified each species into one of three groups according to its migration strategy: permanent resident (present in North Dakota year-round), short-distance migrant (winters primarily north of the U.S./Mexico border), and long-distance migrant (winters primarily south of the U.S./Mexico border; see Igl and Johnson 1997). In addition, we categorized each species into a general breeding habitat (Igl and Johnson 1997). Habitat classes were: wetland (including wet meadow), grassland, open habitat with scattered trees, woodland, open or semi-open deciduous woodland, shrubland, residential areas and human-made structures, and other habitat (mostly unvegetated habitats including clay buttes, cliffs, banks, rock outcrops, etc.). Chi-square tests of independence were conducted to test if the species status (i.e., common or uncommon) was independent of its migratory-strategy class or its breeding-habitat class.

### Results and Discussion

The breeding avifauna of North Dakota is enriched by a diverse assemblage of birds with eastern, western, central, and boreal North American affinities (Stewart 1975). One hundred and sixty-one breeding bird species were observed within the 128 quarter-sections over the three years, including 129 species in 1967, 144 in 1992, and 153 in 1993 (Igl and Johnson 1997). Uncommon species are an important component of the avifaunal diversity of North Dakota; 92 (57%) species were classified as uncommon, with frequencies of occurrence of less than 10% in all years (Table 1; statewide population estimates in Table 1 are in 1000s of pairs). Sixty-one (47% of the total species) uncommon species were observed in 1967, 75 (52%) in 1992, and 84 (55%) in 1993. Fifty-four uncommon species occurred in all three years, 20 in only two years, and 18 in only one year. In addition, the Red-shafted subspecies of the Northern Flicker was considered uncommon each year, although its yellow-shafted counterpart was designated as common (Igl and Johnson 1997). We include the statewide frequency of occurrence and population estimate for the Red-shafted Flicker



TABLE 2. Composition of breeding birds in North Dakota, by migration strategy and habitat, in 1967, 1992, and 1993.

	Number of uncommon species	Number of common species
<b>Migration strategy</b>		
Long-distance migrant	32	30
Short-distance migrant <sup>1</sup>	53	33
Permanent resident	7	6
<b>Breeding habitat</b>		
Grassland	7	17
Open habitat/scattered trees	3	5
Wetland	34	17
Shrubland	7	7
Woodland	13	1
Open woodland/edge <sup>1</sup>	20	17
Residential/human structures	4	4
Other <sup>2</sup>	4	1
Total	92	69

<sup>1</sup>Northern Flicker counted only once in this category.  
<sup>2</sup>Mostly unvegetated habitats including clay buttes, cliffs, banks, etc.

for each of the three years in Table 1, but the Northern Flicker, as a whole, would be considered common.

The estimated statewide populations of breeding birds in North Dakota were 25.5 million breeding pairs in 1967, 24.1 million in 1992, and 27.4 million in 1993 (Igl and Johnson 1997). Statewide population estimates are given in Table 1 for the 92 uncommon species. Uncommon species comprised 5% of the projected statewide breeding bird population in 1967 and 8% in both 1992 and 1993. In decreasing order, the five most abundant (averaged over the three years) uncommon species were Spotted Towhee (*Pipilo maculatus*), Field Sparrow (*Spizella pusilla*), Franklin’s Gull (*Larus pipixcan*), Ruddy Duck (*Oxyura jamaicensis*), and Eared Grebe (*Podiceps nigricollis*) (Table 1).

The numbers of common and uncommon species did not differ significantly within migratory strategies ( $\chi^2 = 1.54$ ,  $P = 0.463$ ,  $df = 2$ ), but differed significantly among breeding habitats ( $\chi^2 = 19.78$ ,  $P = 0.006$ ,  $df = 7$ ; Table 2). In particular, most species associated with woodland habitat were uncommon, a high number of species associated with wetlands and “other” habitats were uncommon, and a high number of grassland species were common. These patterns, in part, reflect the availability and distribution of suitable breeding habitats in North Dakota (see Igl and Johnson 1997). That is, species with broad geographic or habitat distributions within North Dakota were more likely to be common during our survey, whereas species that are rare (e.g., Blue Grosbeak [*Guiraca caerulea*]), very local (e.g., Broad-winged Hawk [*Buteo platypterus*]), or restricted to unique or

uncommon habitats (e.g., Rock Wren [*Salpinctes obsoletus*]) were less likely to be encountered and, thus, were uncommon (Stewart 1975). Colonial-nesting (e.g., Franklin’s Gull, Eared Grebe) and nocturnal (e.g., most owls) species were more likely to be uncommon than common in our survey, which may reflect limitations in survey methodology or that these species cannot be adequately sampled from randomly sampled quarter-sections. Although biases and limitations associated with the bird survey were not quantified, Stewart and Kantrud (1972) suggested that woodland species may not have been adequately sampled by the survey methods. Nonetheless, efforts were made to minimize apparent biases in methodology through adjustments in census techniques (Stewart and Kantrud 1972; Igl and Johnson 1997).

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