

Changes in Breeding Blackbird Numbers in North Dakota from 1967 to 1981-82

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ABSTRACT — Red-winged blackbirds (*Agelaius phoeniceus*), yellow-headed blackbirds (*Xanthocephalus xanthocephalus*), and common grackles (*Quiscalus quiscula*) were censused in 1981-82 in North Dakota in the 130 quarter sections (160 acres) censused in 1967 by Stewart and Kantrud (1972). The number of breeding adult male red-winged blackbirds was estimated to be 29.0% lower ($P = 0.002$) in 1981-82 than in 1967; the statewide breeding population was estimated at 1,512,000 in 1981-82. This decrease has been more than compensated for by the number of breeding adult male yellow-headed blackbirds, which have increased 4.7-fold ($P = 0.12$) to an estimated 962,000 statewide in 1981-82. Grackles increased 71.4% ($P = 0.002$) since 1967 to an estimated 573,000 pairs statewide. The 1981-82 estimate of 3.1 million breeding "pairs" of these three species in North Dakota compares with 2.7 million estimated by Stewart and Kantrud (1972) in 1967, or 14.3% ($P > 0.5$) more. Wetland habitats (7.8% of the area sampled) were preferred over upland habitats by breeding red-wings and yellow-heads. Densities of breeding red-wings were 17 times greater in wetlands than uplands and yellow-heads bred exclusively in wetlands. Grackles preferred farmsteads, shelterbelts, and groves, where densities were 16 times greater than in wetlands.

Red-winged blackbirds (*Agelaius phoeniceus*), yellow-headed blackbirds (*Xanthocephalus xanthocephalus*), and common grackles (*Quiscalus quiscula*) are responsible for multi-million dollar losses annually to ripening sunflowers (*Helianthus annuus*) in the Dakotas (Henne et al. 1979, DeHaven 1982). Much of this loss is caused by blackbirds that breed within 100 mi of where the damage occurs (Besser et al. 1984). For this reason, many parties are interested in the status of breeding blackbird populations in North Dakota, the state with the largest amount of prairie wetlands remaining in the contiguous United States (Shaw and Fredine 1971).

In 1967, Stewart and Kantrud (1972) censused 130 randomly selected legal quarter-sections (160 acres, 64.75 ha) in North Dakota (Fig. 1) and estimated the breeding populations of red-winged and yellow-headed blackbirds and common grackles in that state at 2,637,000 "pairs" (2,092,000 red-wings, 204,000 yellow-heads, and 341,000 common grackles). Estimates of red-wings and yellow-heads were considered minimums for these polygynous species, because each territorial male was considered to represent only one pair. To obtain information on the more recent status of breeding populations of these three species, we censused the same sampling units in 1981-82.

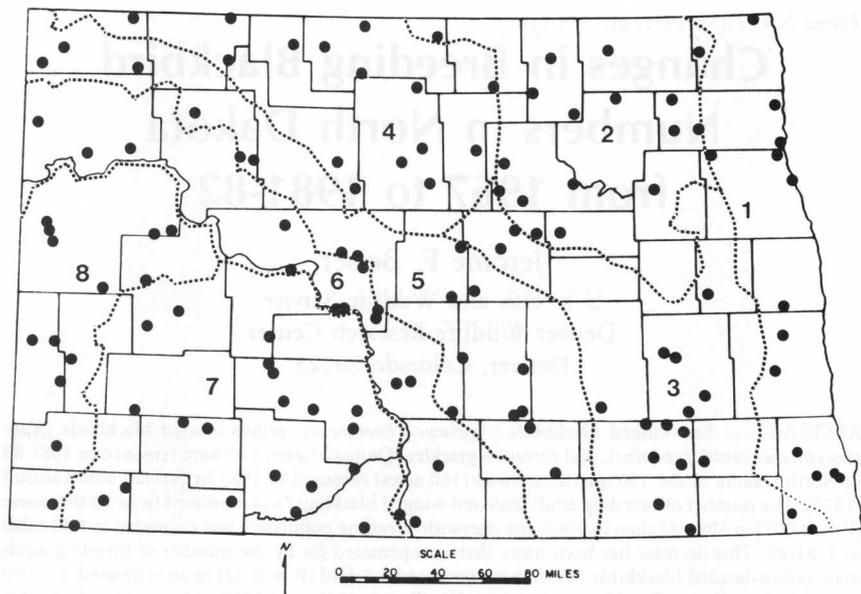


Figure 1. Biotic stratification of North Dakota (dotted lines) and distribution of sample units (solid circles). Strata numbered as follows: (1) Agassiz Lake Plain, (2) Northeastern Drift Plain, (3) Southern Drift Plain, (4) Northwestern Drift Plain, (5) Missouri Coteau, (6) Coteau Slope, (7) Missouri Slope, (8) Little Missouri Slope (From Stewart and Kantrud 1972).

METHODS

In 1981, the 68 quarter-sections sampled by Stewart and Kantrud in the Missouri Coteau and the Southern, Northeastern, and Northwestern Drift Plains physiographic regions of North Dakota were censused between 28 May and 24 June (the 60 most southern blocks from 28 May to 8 June). In 1982, the remaining 62 blocks in the Agassiz Lake Plain, and Coteau, Missouri, and Little Missouri Slopes regions were censused between 29 May and 9 June. The 1981-82 census dates included the times found best for censusing territorial male red-winged blackbirds in North Dakota (Besser and Brady 1984); 50 of the 130 sample units in 1967 were also censused within these dates, but 50 were censused earlier (average nine days) and 30 were censused later (average seven days). As the census covered two breeding seasons, to minimize small year-to-year variations in breeding blackbird numbers ($8.3\% \pm \text{SE } 3.7$) for red-winged blackbirds in the Dakotas from 1964-68 and 1979-81 (Besser et al. 1984), the four physiographic regions in North Dakota (the Missouri Coteau, and the three Drift Plain regions) that were most densely populated by blackbirds in 1967 were all censused in 1981. In 1967, these regions contained 72.7% of all blackbirds; 70.8% of the red-wings, 98.9% of the yellow-heads, and 68.8% of the grackles.

Methods employed in this census were similar to those employed by Stewart and Kantrud (1972). Twin 440- x 880-yard strips were censused by walking the mid-point of the strip (220 yards from each edge of the strip). If any land area on the strip was not visible with binoculars because of rolling terrain, trees, or shrubs, the observer adjusted his position to ensure as complete a count as practical. The point of departure from the mid-point of the strip was marked to allow the observer to return to that point. The perpendicular distances to feeding adult male red-wings and yellow-heads and adult grackles were estimated, so that the number of breeding birds that were not on territory could be estimated by formulas developed by Burnham et al. (1980). Acreages of each habitat in each sampling unit were determined by pacing or were visually estimated. Paired t-tests were used to determine the significance of changes in numbers of breeding red-wings and grackles per sampled units in 1967 and 1981-82; because most yellow-heads were found on only a few sampling units, the significance of changes in numbers for this species was determined by the Wilcoxon (1945) signed-rank test.

RESULTS AND DISCUSSION

Red-winged blackbirds

The number of breeding male red-winged blackbirds observed in the 130 sample units decreased by 29.0% ($P = 0.002$), from 980 in 1967 to 696 in 1981-82 (Table 1). The statewide population for North Dakota in 1981-82 was estimated at 1,512,000 (\pm SE 187,000) "pairs" (Table 2). Numbers in the three well-drained (Slope) southwestern physiographic regions declined by 56.9% ($P = 0.001$) compared to 21.6% ($P = 0.08$) in the less well drained remainder of the state.

Yellow-headed blackbirds

The number of breeding male yellow-headed blackbirds seen in the 130 sample units increased 370% ($P = 0.12$), from 94 in 1967 to 443 in 1981-82 (Table 1). The population for North Dakota in 1981-82 was estimated at 962,000 (\pm SE 430,000 "pairs" (Table 2). The 200 yellow-head males counted in one sample unit (3 miles south of Hurdsfield, Wells County) were more than double those counted in all 130 units in 1967. Counts of yellow-head males in three other units also exceeded the number (31) counted in the most densely populated unit in 1967.

Unfortunately both the 1967 and the 1981-82 estimates have wide confidence limits, because yellow-heads are colonial and were absent from most sampled units. However, the census data suggest that yellow-heads probably are replacing red-wings in North Dakota marshes, as forecast by the studies of Orians (1961) in Washington and Robertson (1972) in Ontario. In 1967, Stewart and Kantrud (1972) estimated a combined red-wing and yellow-head population of 2,333,000 breeding males of these predominately marsh-nesting blackbird species in North Dakota. In 1981-82, there were an estimated 2,474,000 breeding red-wing and yellow-head males in North Dakota or 6% more than in 1967. The

decrease of an estimated 617,000 breeding red-wing males has apparently been more than offset by the increase of an estimated 758,000 yellow-head males during this period.

Common grackles

Breeding pairs of common grackles on the 130 sample units increased 71.4% ($P = 0.002$), from 154 in 1967 to 264 in 1981-82 (Table 1); the 1981-82 population for North Dakota was estimated at 573,000 (\pm SE 94,000) "pairs" (Table

Table 1. Numbers of breeding blackbirds censused in physiographic regions of North Dakota, 1967 vs 1981-1982.

Region	N	Years		% change	P
		1967 ^a	1981-82		
Red-winged Blackbird					
Drift Plains ^b	50	549	389	-29.1	0.02
Slopes ^c	49	204	88	-56.9	0.001
Missouri Coteau	18	145	151	+3.4	0.40
Agassiz Lake Plain	13	82	68	-17.1	>0.50
Total	130	980	696	-29.0	0.002
Yellow-headed Blackbird					
Drift Plains	50	76	220	+189.5	0.51
Slopes	49	1	7	+600.0	0.56
Missouri Coteau	18	17	216	+1170.6	0.33
Agassiz Lake Plain	13	0	0	0	NC ^d
Total	130	94	443	+371.3	0.12
Common Grackle					
Drift Plains	50	105	171	+62.9	0.01
Slopes	49	34	44	+29.4	>0.50
Missouri Coteau	18	1	23	+2200.0	0.07
Agassiz Lake Plain	13	14	26	+85.7	0.43
Total	130	154	264	+71.4	0.002
All Three Species					
Drift Plains	50	730	780	+6.8	>0.50
Slopes	49	239	139	-58.2	0.001
Missouri Coteau	18	163	390	+139.2	0.33
Agassiz Lake Plain	13	96	94	-2.1	>0.50
Total	130	1,228	1,403	+14.3	>0.50

^aNumbers for physiographic regions ascertained from original field notes.

^bSouthern, Northeastern, and Northwestern Drift Plains.

^cCoteau, Missouri, and Little Missouri Slopes.

^dNot calculable.

Table 2. Estimates of statewide numbers of breeding blackbird "pairs" in North Dakota in 1981-82 compared with 1967.

Species	Numbers/mi ² sampled (± SE)		Estimated state total ^a (± SE)	
	1981-82	1967	1981-82	1967
Red-winged blackbird	21.42 (± 2.64)	30.15 (± 2.85)	1,511,798 (± 186,607)	2,128,680 (+ 200,896)
Yellow-headed blackbird	13.63 (± 6.09)	2.89 (± 1.17)	962,251 (± 429,914)	204,180 (± 82,458)
Common grackle	8.12 (± 1.34)	4.74 (± 1.08)	573,440 (± 94,391)	334,507 (± 76,211)
Total	43.17 (± 9.31)	37.78 (± 3.57)	3,047,489 (± 657,111)	2,667,367 (± 251,953)

^a70,594 mi² in North Dakota (Encyclopaedia Britannica, 1970).

2). Grackles had increased in all but one physiographic region. The increase in the number of breeding grackles since 1967 largely accounts for the estimated increase in the total number of sunflower-damaging blackbirds in North Dakota.

Total numbers of the three species of blackbirds

The 1981-82 density of breeding red-wings, yellow-heads, and grackles combined is estimated at 43.2 (\pm SE 9.3) males/mi² (2.59 km²) resulting in an estimate of 3,047,000 (\pm SE 657,000) "pairs" of these three species for the state in 1981-82 (Table 2). This is an increase of 14.3% ($P > 0.5$) since 1967. Because many yellow-heads migrate from North Dakota before late maturing sunflower fields are vulnerable (Royall et al. 1971), damage to sunflower from local breeding populations of blackbirds may not be increasing. The probable replacement of red-wings by yellow-heads in marshes can possibly benefit North Dakota sunflower growers suffering damage from these two species.

Densities of blackbirds in various habitats

In May-June 1981-82, wetlands made up 7.8% of the 20,800 acres sampled; 61.3% of the blackbirds were censused in wetlands (Table 3), and wetlands made up 69.3% of their breeding habitat (Table 4). Uplands made up 92.2% of the sampled acreage; 38.7% of the blackbirds were censused there, but uplands made up only 30.7% of their breeding habitat.

Upland habitats were categorized into non-cropland, cropland with breeding habitat, and cropland with only feeding habitat. Non-cropland made up 33.1% of the area sampled and 23.0% of the blackbirds were censused there; cropland with breeding habitat made up 12.1% of the sampled area and 6.0% of the blackbirds were censused there; and tilled and newly seeded cropland made up 47.0% of the area sampled where 9.8% of the blackbirds were observed feeding. The effect of change in land use on breeding habitats between 1967 and 1981 could not be fully determined, because small wetland acreages within tilled fields and pastures were separated from the chief land use in 1981-82, whereas they were not separated in 1967.

Breeding red-wings and yellow-heads preferred wetland habitats to upland habitats. There were 18.4 times more breeding red-wings per 100 acres (40.5 ha) in wetland habitats as in upland habitats (25.8 vs 1.4; Table 3). There were 9.9 times more red-wings per 100 acres in wetlands than in non-cropland uplands and cropland with breeding habitat (25.8 vs 2.6). Yellow-heads were found nearly exclusively in wetlands. Of the 443 adult male yellow-heads found in the census, 412 (93.0%) were holding territories in wetlands. The 31 individuals recorded in upland habitats were only feeding there. Marshes, lake edges, sloughs, ditches, ponds, and stream courses held 60.3% of the breeding male red-wings and 93.0% of the breeding male yellow-heads, even though composing only 5.1% of the area surveyed.

Breeding grackles preferred upland areas with trees and shrubs to other cover types. Densities of breeding grackles were 16.3 times greater per 100 acres in farmsteads, shelterbelts, and groves than in wetland areas (29.4 vs 1.7; Table

Table 3. Density (number per 100 acres) of blackbirds censused in 2 wetland and 11 upland habitats in North Dakota, 1981-82.

Habitat	Acres		Red- wings	Yellow- heads	Grackles	All three species
	No.	%				
Wetlands						
Marshes, sloughs, pot- holes, ditches, and stream courses	984	4.7	37.6	41.0	2.2	80.8
Lakes, reservoirs, and ponds	647	3.1	7.7	1.4	0.9	10.0
Subtotal	1,631	7.8	25.8	25.3	1.7	52.7
Uplands						
Non-croplands:						
Grazed pastures and prairie	4,404	21.2	0.3	0.0	0.1	0.4
Ungrazed pastures and prairie	1,110	5.3	2.8	0.1	0.7	3.6
Woodlands and brush- lands	500	2.4	0.0	0.0	0.2	0.2
Roadsides, fencerows, railroads	451	2.2	19.3	0.0	2.2	21.5
Farmsteads, shelterbelts, groves	402	1.9	9.2	0.5	29.4	39.1
Rockpiles, gravel and sand pits	20	0.1	40.0	0.0	0.0	40.0
Croplands						
Breeding habitats:						
Weedy stubbles	1,055	5.1	1.6	0.9	0.9	3.3
Alfalfa and other hay lands	793	3.8	4.0	0.0	0.0	4.0
Ripening small grains (>12")	660	3.2	2.3	0.0	0.3	2.6
Feeding habitats:						
Newly seeded (<12")	6,225	29.9	0.3	0.1	0.2	0.6
Bare, tilled	3,549	17.1	0.5	0.4	2.0	2.8
Subtotal	19,169	92.2	1.4	0.2	1.2	2.8
Wetlands and Uplands total	20,800	100.0	3.3	2.1	1.3	6.7

Table 4. Use of North Dakota habitats for breeding by blackbirds that damage sunflower, 1981-82.

Habitat	Percent of total			
	Red-wings	Yellow-heads	Grackles	All three species
Marshes, sloughs, potholes, ditches, and stream courses	56.0	97.8	13.0	64.1
Lakes, reservoirs, and ponds	7.6	2.2	3.6	5.2
Total in wetlands	63.6	100.0	16.6	69.3
Farmsteads, shelterbelts and groves	5.6	0.0	69.8	12.5
Roadsides, fencerows, and railroads	13.2	0.0	5.9	7.8
Ungrazed pastures and prairies	4.7	0.0	4.7	3.1
Alfalfa and other hay lands	4.8	0.0	0.0	2.6
Grazed pastures and prairies	2.0	0.0	2.4	1.4
Weedy stubbles	2.6	0.0	0.0	1.4
Ripening small grains (> 12"	2.3	0.0	0.0	1.2
Rockpiles, gravel and sand pits	1.2	0.0	0.0	0.6
Woodlands and brushlands	0.0	0.0	0.6	0.1
Total in uplands	36.4	0.0	83.4	30.7
Totals	100.0	100.0	100.0	100.0

3). The May-June dates of the survey were somewhat late for censusing breeding grackles, for we occasionally observed fledged grackles in 1981. The late dates also contributed to the high percentage (31.8%) of grackles found feeding in tilled and newly seeded cropland.

Estimates of feeding blackbirds not seen

While walking strip transects, we observed 85 pairs of breeding grackles feeding, 34 single adult male red-wings, and 19 single adult male yellow-heads in tilled and newly seeded croplands. Perpendicular distance estimates were obtained on 33 (38.8%) of the grackles, 28 (82.4%) of the red-wings, and 5 (26.3%) of the yellow-heads. From the method of Burnham et al. (1980), it was calculated that 58.8% of the grackles and 20.0% of the red-wings feeding on the 220-yard strip transects were not observed. The sample size for yellow-heads was too small to estimate the number of feeding males not seen. When the estimated numbers of breeding blackbirds feeding and not seen are added to those seen, they constitute a negligible 1.0% (7 of 703) of all red-wings, but a substantial 15.9% (50 of 314) of all grackles. These additions increased the estimated blackbird numbers for North Dakota by 124,000 — 15,000 red-wings and 109,000 grackles (Table 5). The estimated state total for 1981-82, therefore, was 1.5 million breeding red-wings, 1.0 million yellow-heads, and 0.7 million grackles or 3.2 million for the three species of blackbirds (Table 4). These ex-

Table 5. Estimates of breeding blackbird numbers in North Dakota in 1981-82, adjusted for feeding breeders not seen.

Species	Density/mi ² (± SE)	Estimated state total ^a
Red-wings	21.63 (± 2.67)	1,527,003
Yellow-heads ^b	13.63 (± 6.09)	962,251
Grackles	9.66 (± 1.59)	682,047
Total	44.92 (± 9.69)	3,171,301

^a70,594 mi² sampled.

^bNo adjustment, mean perpendicular distance of five males sighted was 111 yards.

trapolated estimates for 1981-82 were not compared with estimates made in 1967, as distances to feeding birds were not taken in 1967.

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