

## CENSUSING BREEDING RED-WINGED BLACKBIRDS IN NORTH DAKOTA

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The amount of damage done to ripening agricultural crops in late summer in many regions of the United States appears to be closely related to population levels of breeding Red-winged Blackbirds (*Agelaius phoeniceus*) (Besser 1978, Dolbeer 1978, Meanley 1971). To aid in predicting damage by red-wings to ripening corn and sunflower crops in the Dakotas, biologists of the U.S. Fish and Wildlife Service have censused breeding male red-wings in roadside and non-roadside habitats in sample areas in a 77,700 km<sup>2</sup> area of North and South Dakota in 9 years since 1965 (Besser et al., unpubl.).

The area censused lies almost wholly within the Drift Plains physiographic region of the Northern Great Plains. It contains much of the wetland habitat remaining in the United States (Shaw and Fredine 1971) and some of the highest numbers of breeding Red-winged Blackbirds recorded on the North American Breeding Bird Surveys (Dolbeer and Stehn 1979). These populations contribute heavily to severe blackbird damage of ripening corn in South Dakota (De Grazio et al. 1971) and ripening sunflower in North Dakota (Henne et al. 1979); hence the interest in the population status of red-wings in this region.

In censusing red-wings, non-roadside habitats were sampled by walking 137-m-strip transects, in which a very high proportion of the breeding males were counted (Besser et al., unpubl.). Roadside habitats have been sampled by driving 137-m-strip transects at speeds ranging from 24-72 km/h, and consequently many breeding males are missed. The Hewitt (1967) sight-capture/sight-recapture method has been most commonly used to sample breeding red-wing populations in roadside habitats, but it involves making two trips over the same route, a major time constraint in censusing multi-county regions. The procedure used by USFWS biologists (Besser et al., unpubl.) involved only a single census of roadside habitats with an adjustment for males missed. This adjustment was initially based on calculations made from weekly censuses from May-July during two morning and two afternoon periods (De Grazio, pers. comm.). In 1980, to assess numbers of breeding male red-wings missed while censusing roadside populations and to determine why these males are missed, marked males were censused four times daily for a 10-day period which included most of the dates on which the 77,700 km<sup>2</sup> area was censused, and less regularly for a 63-day period thereafter.

## METHODS

From 23–25 May 1980, 57 male Red-winged Blackbirds were captured on breeding territories along a 30.6 km route near Enderlin and Alice, Cass Co., in east-central North Dakota. Males were captured with traps described by Bray et al. (1975) and one leg was marked with a black-enamel, numbered 25 × 75 mm yellow-green streamer attached by an oversized USFWS band (as recommended by Guarino 1968). Twenty-seven of the tagged birds were also fitted with 1.7 g/164 mHz prototype leg transmitters described by Bruggers et al. (1981). These were attached to the other leg by two padded soft aluminum bands (split #7 size) placed 5 mm apart.

From 23–27 May the marked birds were monitored one or more times daily. During this period, we found that 5 of the 57 marked birds had much of their territorial areas more than 68.6 m from roads, the width of the strip transect recommended by Hewitt (1967); thus, observations of their activities were discontinued. An additional eight marked birds abandoned territories shortly after being marked. From 28 May–6 June the remaining 44 marked birds were monitored daily by one person during four periods: sunrise–10:00, 10:00–13:00, 15:00–18:00, and 18:00–sunset (DST). A second observer accompanied the driver on four occasions. The route was driven at a speed of about 48 km/h, but varied from 24–72 km/h depending on the visibility of each breeding territory and road conditions. The route was followed until the territory of a marked bird was reached and the bird not sighted. The driver then stopped and attempted to locate the marked bird.

To search for a non-radioed bird, the driver walked the road alongside its territory. To locate a radioed bird, the driver used a vehicle-mounted double-yagi antenna and a hand-held single-yagi in conjunction with LA-12 telemetry receivers (AVM Instruments). When a marked bird was found, it was tallied as present and its activity recorded. If the bird was not sighted or no signal was obtained within 3 min, it was tallied as absent and the driver resumed following the regular route. Marked birds were deemed to have abandoned and were dropped from the study the date after they were last encountered on a census. On 26 June, four of the tagged birds were shot by another person who notified the Bird Banding Office; these birds were excluded from the abandonment date analysis.

From 9 June–25 July, the route was run irregularly on 31 additional days during one or more of the four time periods. From 6 June–25 July, the status of nests on territories of 10 randomly chosen unmarked birds on roads adjacent to the study area were checked weekly to allow correlation of the nesting stages of females with the activity of territorial males. Temperature was recorded with a Weksler thermometer (Weksler Co., Freeport, New York) and wind speed with a Dwyer Wind Meter (Dwyer Instruments, Inc., Michigan City, Indiana) in open, unshaded areas at the beginning and end of the route each time the census was conducted.

## RESULTS AND DISCUSSION

*Date and time-of-day effects.*—During the 10-day period (28 May–6 June) when most red-wing censuses have been conducted in the Dakotas, 76.1% ( $\pm$ SE 1.1%) of the marked males were seen on driven roadside transects (Table 1). Higher percentages of breeding red-wing males were observed during after-sunrise and before-sunset censusing periods from 28 May–26 June than during mid-day (see Tables 1 and 2), a pattern also recorded by Hewitt (1967) in New York.

From 28 May–6 June, 11 (27.5%) of 40 males abandoned, shifted

TABLE 1  
PERCENT OF MARKED RED-WING MALES OBSERVED ON ROADSIDE TERRITORIES, 28 MAY–  
6 JUNE 1980

Date	N <sup>a</sup>	% ( $\pm$ SE) by time period (DST)				$\bar{x}$
		Sunrise–10:00 N <sup>b</sup> = 377	10:00–13:00 N = 378	15:00–18:00 N = 379	18:00–sunset N = 379	
28 May	44	84.1	68.2	75.0	81.8	77.3
29	44	85.7	55.8	75.0	77.3	73.5
30	44	79.5	70.5	59.1	75.0	71.0
31	42	66.7	73.8	81.0	81.0	75.6
1 June	38	78.9	60.5	68.4	76.3	71.0
2	35	74.3	74.3	77.2	91.4	79.3
3	34	85.3	73.5	73.5	85.3	79.4
4	33	69.7	78.8	69.7	78.8	74.2
5	33	84.8	81.8	75.8	72.7	78.8
6	32	84.4	78.1	71.9	87.5	80.5
$\bar{x}$		79.3 ( $\pm$ 2.2)	71.5 ( $\pm$ 2.6)	72.7 ( $\pm$ 1.9)	80.7 ( $\pm$ 1.9)	76.1 ( $\pm$ 1.1)
Omitting 15:00–18:00						77.2 ( $\pm$ 1.5)
Omitting 10:00–13:00 and 15:00–18:00						80.0 ( $\pm$ 1.4)

<sup>a</sup> Number of males monitored.

<sup>b</sup> Number of observations.

territories, or were displaced from roadside territories, whereas from 7–16 June only 4 (13.8%) of the 29 remaining males gave up roadside territories (Fig. 1). As the first fledglings were not seen on territories of unmarked males in Cass County until after 6 June (Table 3), and many males feed older nestlings and fledglings in North Dakota (Besser, Brady, Burst, Minkoff, and Cummings, unpubl.) and elsewhere (Patterson 1979), it is unlikely that any of the males abandoning before 6 June produced young. From 17–26 June, the number of males abandoning territories increased to 32.0% (8 of 25). From 5–22 June, dates spanning the peak of incubation in 1980, fewer than 10% of the males abandoned roadside territories in any 3-day period (Fig. 1). Since the nesting season in 1980 was somewhat late (because of a 10-month drought that was not broken until 4 June), the period 1–10 June would probably be optimal most years for censusing red-wings involved in production of young in North Dakota.

*Temperature and wind effects.*—The data indicate that censuses should not be conducted when the temperature is above 27°C, particularly in mid-afternoon. In eight mid-afternoon censuses when temperatures were 27–34°C, we observed only 50.7% of the males on territory, whereas in 12 mid-afternoon censuses when temperatures were 9–26°C we observed

TABLE 2  
PERCENT OF RED-WING MALES OBSERVED ON ROADSIDE TERRITORIES DURING FOUR TIME PERIODS, 9–26 JUNE 1980

Time period	Censuses	$\bar{x}$ ( $\pm$ SE) %
Sunrise–10:00	6	72.9 ( $\pm$ 2.8)
10:00–13:00	5	62.6 ( $\pm$ 2.8)
15:00–18:00	4	62.2 ( $\pm$ 5.3)
18:00–sunset	6	66.8 ( $\pm$ 2.2)
$\bar{x}$		66.5 ( $\pm$ 1.6)
Omitting 15:00–18:00		67.4 ( $\pm$ 3.0)
Omitting 10:00–13:00 and 15:00–18:00		69.9 ( $\pm$ 3.0)

68.6% of the males, or 17.9% more ( $P < 0.01$ ,  $t = 2.95$ ,  $df = 17$ ). Morning temperatures did not reach 27°C during any census in this study. Winds ranging up to 56 km/h had no effect on the percentage of males observed on territory. From 25 May–24 July, we observed 71.0% ( $\pm$  SE 2.1%) of the marked males on territory during 24 censuses, when winds were 26–56 km/h, whereas we saw 71.0% ( $\pm$  SE 1.5%) during 63 censuses when winds were 0–25 km/h.

*Activities of missed roadside males.*—Red-wings were not seen in 366 instances while censusing roadsides between 28 May and 6 June. These birds were off territories 65.8% of the time and were on territories, but hidden, 34.2% of the time. Of the 125 instances when birds were missed, but were on their territories, 102 were loafing, 12 were feeding, 9 were courting or chasing, and 2 were actually in view but seen by a second observer rather than the driver. Birds off territory were located in only 37 of 241 instances; of those birds located, 15 were feeding, 10 were chasing, 5 were loafing, and 7 were occupying a non-roadside territory.

*Transmitter use and behavior of males.*—In attaching the leg transmitters, we sometimes fractured the glass-like cyanoacrylate potting material by which transmitters were attached, resulting in their loss after only a few days of recorded activity. Thus, transmitters provided information for an average of only 6.7 days, range 1–25 days. The greatest distance moved recorded for a marked male was 2 km, and this bird had abandoned its original territory and moved to another. All feeding and chasing activities noted occurred within 1 km of the territory. Numbered leg streamers were adequate to determine the presence or absence of an individual on its territory. In many of the instances where marked birds were repeatedly absent from territories, we suspected the bird was dividing his

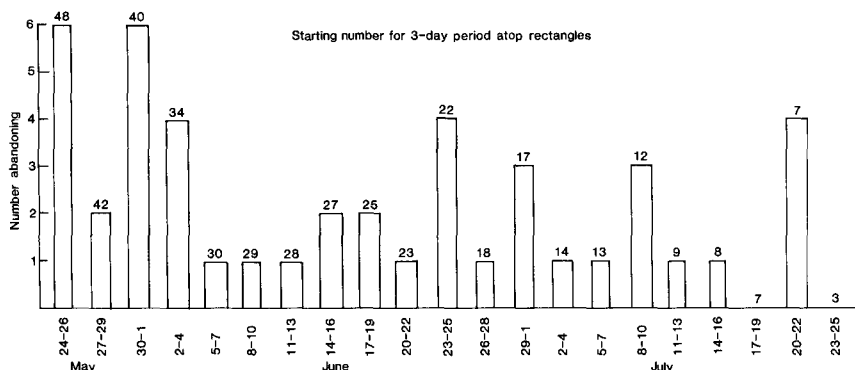


FIG. 1. Number of male Red-winged Blackbirds abandoning roadside territories by 3-day periods, 24 May–25 July 1980.

time between a second (non-roadside) territory and that he may not have been successful in attracting females to nest at either site. We recorded three instances in which males moved from 1–2 km to new roadside territories and were known to have occupied them for 8–14 days. This is too little time to allow production of fledglings from these territories, unless the interloping males displaced males with females already in advanced stages of nesting.

TABLE 3  
NESTING STAGES OF FEMALES ON TERRITORIES<sup>a</sup> OF 10 UNMARKED MALE RED-WINGS, CASS COUNTY, NORTH DAKOTA, 24 MAY–25 JULY 1980

Dates	Pre-nest-building	Nest-building and egg-laying	Incubation	Nestlings	Fledglings	Total females seen	Chief activity
24–29 May	—	—	—	—	—	—	nest-building <sup>b</sup>
30 May–5 June	—	—	—	—	—	—	egg-laying <sup>b</sup>
6–12 June	2	4	7	4	1 <sup>c</sup>	18	incubation
13–19 June	0	4	4	1	0	9	incubation
20–26 June	1	1	6	2	2	12	incubation
27 June–3 July	0	0	2	7	1	10	feeding nestlings
4–10 July	0	0	2	2	3	7	feeding fledglings
11–17 July	0	0	2	1	2	5	feeding fledglings
18–25 July	0	0	0	0	2	2	feeding fledglings

<sup>a</sup> Different territories selected each week.  
<sup>b</sup> From incidental observations.  
<sup>c</sup> First fledging banded on 10 June.

TABLE 4  
 PERCENT OF ROADSIDE MALE RED-WINGS HOLDING TERRITORIES ON 1 JULY 1980 NOT  
 RESPONDING TO TERRITORIAL TRESPASS, 28 MAY–6 JUNE 1980, CASS COUNTY,  
 NORTH DAKOTA

Territorial males (N = 18)	No.	% observations
Observations	720	—
On territory	642	89.2
Off territory	78	10.8
Not responding to 3-min trespass on territory	60 <sup>a</sup>	8.3

<sup>a</sup> Seventeen from sunrise–10:00, 16 from 10:00–13:00, 17 from 15:00–18:00, and 10 from 18:00–sunset.

Some additional aspects of the behavior of breeding males which we learned about through the use of transmitters may affect censusing, and have not, to our knowledge, been reported before. On the evening of 24 May, five instrumented males, which had occupied and contested for territories only minutes before, roosted in a small cattail (*Typha* sp.) marsh 200–600 m from their territories. This marsh was occupied by about 200 breeding Yellow-headed Blackbirds (*Xanthocephalus xanthocephalus*) during daylight hours. One week later, several of these instrumented males roosted on the territories on which they were marked.

In late May, some unmarked adult males occupied territories just as soon as marked males left them to feed at points at least several hundred meters distant. This usurping activity often occurred at about 10:00 after females had completed nest-building or egg-laying activities for the day. Sometimes within minutes, an unmarked male was seen to alight on the same perch just vacated by the marked male. If not for the marker, one would have assumed that it was the same male. This behavior may partially explain the slightly lower territory occupancy by males during the 10:00–13:00 period in our study, and may present special problems with the Hewitt (1967) sight-capture/sight-recapture census method. Perhaps the most important information obtainable from censuses is the determination of productive territories, and in this regard, the replacement is as predictive as the owner. Thus, inclusion of the 10:00–13:00 period in our analyses appears to have few detrimental influences on our results.

*Findings applicable to censusing non-roadside habitat.*—For 60 (8.3%) of 720 observations, made from 28 May–6 June, the 18 males that were still holding territories on 1 July did not respond to a 3-min trespass by an observer on their territory and were probably feeding off territory at the time (Table 4). Males still holding territories on 1 July were the ones

most likely to have had females that produced fledglings. Thus, it appears that feeding adult males must be counted when making non-roadside censuses to obtain a complete census.

#### SUMMARY

Marked territorial male Red-winged Blackbirds (*Agelaius phoeniceus*) were censused on a 30.6-km roadside route in Cass County, North Dakota from 23 May–25 July 1980 to determine the proportion observed during the most favorable daily and seasonal time periods for surveys. We found that censuses conducted in early morning and late afternoon in early June were the most reliable; 80.0% ( $\pm$ SE 1.4%) of territorial males were seen at this time. Numbers of territorial males decreased steadily until early June, when most female red-wings were incubating and feeding nestlings. Most (65.8%) of the territorial males missed during censuses were off their territory. Radio transmitter information indicated that territorial males in late May sometimes roosted communally, and that unmarked adult males often quickly replaced the owner of the territory after he left to feed.

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