

## THE EFFECT OF COWBIRD PARASITISM ON BREWER'S SPARROW PRODUCTIVITY IN ALBERTA

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**Abstract.**—We observed 18 instances of Brown-headed Cowbird (*Molothrus ater*) parasitism in 13 of 25 Brewer's Sparrow (*Spizella breweri*) nests in southeastern Alberta. Nine of the 13 parasitized nests were abandoned by the Brewer's Sparrows. Despite the relatively heavy cowbird parasitism, reproductive success of the sparrows was similar to that reported in studies of other *Spizella* species. Cowbirds were present at only one of two sites used by nesting Brewer's Sparrows. Subtle habitat differences and relative distances to foraging sites may have influenced the observed cowbird distribution. Cowbird productivity from Brewer's Sparrow nests was low.

### EFFECTO DEL PARASITISMO DEL TORDO (*MOLOTHRUS ATER*) EN LA PRODUCTIVIDAD DE *SPIZELLA BREWERI* EN ALBERTA, CANADA

**Sinopsis.**—En 18 ocasiones se observó al tordo (*Molothrus ater*) parasitar 13 nidos de *Spizella breweri* ( $n = 25$ ). De los 13 nidos parasitados, 9 fueron abandonados. A pesar de la alta incidencia de parasitismo sobre *S. breweri*, el éxito reproductivo de esta especie fue similar a otras especies del mismo género. El tordo se encontró en solo una de las dos áreas utilizadas para anidar por *S. breweri*. Diferencias en habitat, y las distancias relativas a los lugares de alimentación, pueden haber influenciado en la distribución particular de los tordos. La productividad del tordo en nidos de *S. breweri* fue baja.

The frequency with which the Brewer's Sparrow (*Spizella breweri breweri*) is used as a host by the parasitic Brown-headed Cowbird (*Molothrus ater*) is poorly known: only nine instances have been published (Friedmann 1963, Friedmann et al. 1977, Friedmann and Kiff 1985, Rich 1978). Here, we report 18 instances of cowbird parasitism in 13 of 25 Brewer's Sparrow nests.

From 6 May to 2 July 1986, we studied the breeding ecology and feeding behavior of Brewer's Sparrows at two sites about 20 km apart near Onefour, Alberta (49°10'N, 110°19'W, elevation 900 m). Both sites, located along creeks, were vegetatively dominated by Sagebrush (*Artemisia cana*) and grasses. Breeding densities of Brewer's and Clay-colored sparrows (*Spizella pallida*) were determined by banding most males and subsequently mapping their feeding and singing territories. Densities of other passerine species, including Eastern Kingbirds (*Tyrannus tyrannus*), Horned Larks (*Eremophila alpestris*), and Common Yellowthroats (*Geothlypis trichas*), Western Meadowlarks (*Sturnella neglecta*), Brewer's Blackbirds (*Euphagus cyanocephalus*), Lark Buntings (*Calamospiza melanocorys*) and Vesper Sparrows (*Poocetes gramineus*), were determined by censusing the study areas for singing or calling males on three mornings in late May and early June, supplemented by observations of these species throughout the 2-mo study period.

Site 1 supported a larger density of passerines than site 2; however, Brewer's Sparrows were the most common breeding birds on both sites. Cowbird parasitism only occurred at site 1 where a group of at least four male and two female cowbirds (unbanded) were seen almost daily from 10 May to the end of the study in early July. No cowbirds were observed at site 2.

Brewer's Sparrows initiated clutches between 26 May and 27 June. Early nests were not as heavily parasitized as nests initiated later in the breeding season. One of five clutches initiated in May on site 1 was parasitized by the Brown-headed Cowbird, while nine of 12 clutches initiated in June on site 1 were parasitized. Additionally, three nests found abandoned in mid-June, contained only cowbird eggs. In six of the other 10 parasitized nests, the nesting attempt was also abandoned. In two nests monitored through the nest building phase, a cowbird egg was laid either prior to the first Brewer's Sparrow egg or replaced the first egg, since the first eggs observed in these nests were single cowbird eggs. Four nests, located while the parents were still attentive, contained only one or more cowbird eggs and were subsequently abandoned. As a consequence of abandonment, several pairs of Brewer's Sparrows were known to have had more than one nesting attempt parasitized by cowbirds. One pair was parasitized in three consecutive nesting attempts and two pairs were parasitized in at least two attempts.

Four nests containing cowbird eggs were not abandoned. A cowbird egg laid on the same day as the fourth (last) egg of one clutch was incubated. A female observed building a nest was found to have one cowbird egg and one sparrow egg in her nest 2 d later. Another (the last) sparrow egg was laid the next day. An incubating female was found to have four sparrow eggs and one cowbird egg. The order of laying was not known. Finally, a cowbird egg was laid in a nest just prior to the hatching of the sparrow young. The nest was preyed on 6 d later.

The productivity of the cowbirds on site 1 was low. Of 18 eggs laid in Brewer's Sparrow nests, only three could possibly have produced young (in two nests still active when the study terminated). Four cowbird eggs known to have been laid in Clay-colored Sparrow nests also were unsuccessful, due to abandonment, infertility, predation, and improper timing of laying. A cowbird egg found in one of three Vesper Sparrow nests on site 1 also was unsuccessful due to predation of the nest. No other evidence of cowbird parasitism was observed and no fledgling cowbirds were seen on the study area.

Brewer's Sparrows rejected cowbird parasitism through nest abandonment, although interpretation of abandonment as an anti-parasitic adaptation is open to question (Rothstein 1975). However, abandonment seems to be related to parasitism in this species since no unparasitized nests were deserted. Although the frequency of parasitism within the population of Brewer's Sparrows was high, the sparrow's tolerance (Mayfield 1965) was low so that few cowbird young were produced.

Brewer's Sparrows were more successful than cowbirds. From the 20

nests at site 1, 12 young were known to have fledged and eight eggs were still being incubated in three nests when the study ended. Additionally, five pairs whose nests were not located were observed feeding fledglings on or near their territories. Thus, at least nine of 19 pairs fledged young at site 1. At site 2, success was even higher with four of five nests fledging young. Additionally, three other pairs were known to have fledged young, so that at least seven of 10 pairs were successful.

Despite fairly heavy cowbird parasitism, the reproductive success of Brewer's Sparrows in southern Alberta was similar to that reported in other members of the genus *Spizella*. This is due, in part, to the higher frequency of predation experienced by Clay-colored (Knapton 1978), Chipping (*S. passerina*, Reynolds and Knapton 1984) and Field sparrows (Best 1978) in other areas.

Although the breeding biology of Brewer's Sparrows has been little studied, several investigators have located nests in other areas within the breeding range of cowbirds (Idaho—Petersen and Best 1985, Reynolds 1979, Rich 1978, 1980; Montana—Best 1972, Walcheck 1970; Utah—Castrale 1982; Wyoming—Schroeder and Sturges 1975). However, cowbirds are generally absent from the sage habitat used by Brewer's Sparrows. Of the eight studies, only Rich (1978) reported the presence of cowbirds. Similarly, Wiens and Rotenberry (1981) reported breeding Brewer's Sparrows in 38 of 42 surveys in 14 shrubsteppe plots in the northwestern U.S., but cowbirds were recorded in only nine surveys. Cowbirds may be more common in southeastern Alberta due to the patchy distribution of sage compared to the extensive coverage found further south. In Alberta, sage habitat is found intermixed with the pastures and riparian growth frequently inhabited by cowbirds.

Additionally, densities of nesting birds in the Alberta study sites were higher than those reported in other studies. Brewer's Sparrow densities range from less than one pair/ha (Castrale 1982, Feist 1968, Rich 1980, Wiens and Rotenberry 1981, Wiens et al. 1985) in unmanipulated habitat to about one pair/ha (Best 1972, Reynolds 1981, Schroeder and Sturges 1975, Walcheck 1970). Wiens and Rotenberry (1981) and Wiens et al. (1985) report a maximum density of about three pairs/ha although densities in most of their plots were lower. In the Alberta sites, Brewer's Sparrow densities were 2.4 and 1.1 pairs/ha on sites 1 and 2, respectively. Total densities of breeding birds were five and three pairs/ha. High nesting densities may be important in attracting cowbirds, since more nests are available to be parasitized where larger densities of birds are found.

Brewer's Sparrows require sagebrush (*Artemisia* spp.) for successful breeding (Braun et al. 1976) and indeed few nests have been reported in any other bush species (but see Grinnell et al. 1930, Warren 1910). Rothstein et al. (1984) suggest that cowbird distribution in sagebrush may be limited by the availability of adequate foraging habitat. Site 2 was 10 km further from a high quality foraging site (a feedlot) than site 1, although a few cattle grazed at both sites. Additionally, sagebrush

habitat is often treeless, and may not provide the exposed perches made use of and perhaps required by the cowbird for social and breeding displays (Mayfield 1965). Site 1 provided perches in the form of several dead trees up to about 4 m in height along the creek near the center of the study site. Cowbirds were frequently observed displaying in the trees. Site 2, where no cowbirds were observed, had no vegetation taller than the sagebrush. Although barbed-wire fences were located along some edges of the study areas, these were rarely used by cowbirds as perch or display sites.

#### ACKNOWLEDGMENTS

We thank John Lawson and Allan Ross for providing accommodations at the Agriculture Canada Research Substation at Onefour. P. Flaig and Stan and Dennis Ulrich graciously allowed us to conduct our work on their properties. We thank Peter Lowther, John Rotenberry and Steven Rothstein for their constructive comments on the manuscript. We are grateful to Gerriane Ross for her interest and support while we conducted the fieldwork.

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Received 22 Sept. 1986; accepted 8 Dec. 1986.