

DENSITIES OF BROWN-HEADED COWBIRDS IN RIPARIAN AND RANGELAND AREAS, WITH AND WITHOUT CATTLE PRESENT, ALONG THE MIDDLE RIO GRANDE, NEW MEXICO

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Abstract. We compared the densities of total Brown-headed Cowbirds (*Molothrus ater*), female cowbirds, and potential hosts during the morning hours on grazed and ungrazed riparian sites along the Rio Grande, New Mexico, in an attempt to evaluate the influence of the physical presence of cattle on these variables. In addition, we compared the densities of all cowbirds, female cowbirds, and potential hosts between morning and afternoon hours at riparian and rangeland sites, both with and without cattle present. We found no significant differences in total cowbird, female cowbird, or potential host densities during morning hours between riparian sites with and without cattle, indicating that the physical presence of cattle alone did not influence cowbird abundance or potential host abundance at our study sites. Cowbirds were absent from all of our riparian sites during the afternoon hours, indicating that habitat type and/or alternative feeding/congregation opportunities may have been more important in influencing cowbird densities during afternoon feeding periods than was the mere presence of cattle. Cowbird numbers in rangeland sites were low during both morning and afternoon periods, reflecting the low suitability of rangeland as cowbird breeding, and possibly feeding, habitat regardless of the presence of cattle. The lack of afternoon cowbird detections in both riparian and rangeland sites suggests that alternative feeding resources and/or congregation areas existed within the cowbird's commuting range. These findings have implications for current livestock management efforts to reduce cowbird parasitism of imperiled songbird species.

Key Words: abundance; Brown-headed Cowbird; cattle grazing; distribution; *Molothrus ater*; New Mexico; rangelands; riparian.

Brown-headed Cowbirds (*Molothrus ater*) exhibit a daily behavioral pattern that can influence their local densities during different diurnal periods (Rothstein et al. 1984, Thompson 1994, Goguen and Mathews 2000). Cowbirds commonly spend mornings engaged in breeding activities within riparian or woodland areas, and feed during afternoon hours in pastures or rangeland. Maximum distances reported for commuting between breeding and feeding areas are 12 km (Rothstein et al. 1984) to 15 km (Curson et al. 2000). However, in some situations where food is abundant within riparian areas, commuting distances may be much shorter. Anecdotal evidence suggests that cowbirds are commonly found feeding in the immediate vicinity of cattle during afternoon hours (Friedmann 1929, Mayfield 1965, Verner and Ritter 1983, Rothstein et al. 1984; Rothstein 1987, 1994). These observations have fostered an assumption that the presence (and therefore abundance) of cowbirds is dependent on the actual presence of cattle. This assumption has only recently been critically evaluated, with results varying from no apparent correlation (Goguen and Mathews 1998) to a seemingly direct association (Purcell and Verner 1999, Goguen and Mathews 2000, Curson et al. 2000).

The interpretation of relationships between cowbirds and cattle, and the effect of brood parasitism on some songbird populations, are influencing land management decisions (Rothstein et

al. *this volume*) and igniting controversies regarding the movement and seasonal locations of cattle on public lands in the West. Management agencies have begun removing cattle from public lands where endangered songbirds are known to breed, based on the perception that they are removing feeding sites that attract cowbirds (Bureau of Land Management 1997, 1998). Recently, concern over the decline of the federally endangered Southwestern Willow Flycatcher (*Empidonax traillii eximius*; U.S. Fish and Wildlife Service 1995) in New Mexico has resulted in the curtailment of livestock grazing over extensive areas of public land (Bureau of Land Management 1997, 1998).

The primary objective of this study was to compare the morning densities of Brown-headed Cowbirds at riparian sites where cattle were present and similar sites where they were absent. If the physical presence of cattle is the most influential factor determining cowbird distribution and abundance, then cowbirds should be more abundant at sites with cattle present. We also compared female cowbird densities, because females are often the focus of cowbird management efforts (Beezley and Rieger 1987, Whitfield and Placer 1994, Eckrich et al. 1999). Finally, potential cowbird host densities were compared to better understand their role in cowbird abundance.

A secondary objective of this study was to further investigate cowbird diurnal movement

patterns, and the effect of the presence of cattle on those patterns. We did this by comparing densities of all cowbirds and female cowbirds during morning and afternoon periods in riparian areas (cattle present and absent), and in rangeland sites (cattle present and absent). This was done to determine (1) if the presence of cattle in riparian areas influenced the afternoon feeding distribution of cowbirds, and (2) if the presence of cattle within the rangelands affected the number of cowbirds feeding there.

METHODS

The study area consisted of four riparian sites (two with cattle, two without) and four rangeland sites (two with cattle, two without) located on public and private lands along the Rio Grande in Socorro County (34°15'N, 106°30'W), New Mexico, at an elevation of 1350 to 1650 m (Fig. 1). We chose cattle-absent sites within cowbird commuting distance of cattle-present sites to allow us to isolate the effect of the presence of cattle from other factors that may influence cowbird abundance, such as distance to foraging areas. Sites without cattle (both riparian and rangeland) were located on the Sevilleta National Wildlife Refuge (NWR) and Bosque del Apache NWR, and had not supported livestock since 1939 and 1973, respectively. The distance to nearest active livestock grazing from the cattle-absent sites ranged from 0 km (at refuge boundaries) to 9.5 km (at center of point count route) for the Bosque del Apache NWR, and from 3 km (at north refuge boundary) to 4.5 km (at south refuge boundary) for the Sevilleta NWR. Study sites with cattle present included San Acacia North and San Acacia South (both riparian) managed by the Middle Rio Grande Conservancy District with a stock density of 0.10–0.15 cattle ha⁻¹ during the study period, and two rangeland sites (Mulligan Gulch and Scott Ranch) managed by the U.S. Bureau of Land Management with a stock density of 0.02 cattle ha⁻¹ during the summer of 1999.

We surveyed the songbird community at each site with either 5-min unlimited radius point counts (riparian sites) or line transects (rangeland sites) during morning and afternoon periods every two weeks during May–July 1999 (Tisdale-Hein 2001). The species and distance of each bird detected, as well as the sex of cowbirds, were recorded (Buckland et al. 1993). Counts included visual and aural detections. Point count route length and distance between stations on the riparian sites varied from 20 stations 250 m apart (Sevilleta NWR) to 25 stations either 760 or 800 m apart (Bosque del Apache NWR and both San Acacia sites, respectively). Line transects on the rangeland sites began at randomly selected points and extended 2300 m at 189 degrees from true north.

Point count and line transect data were analyzed using Program DISTANCE (Buckland et al. 1993, Thomas et al. 1998) to estimate the density of all cowbirds, female cowbirds, and potential host species on each site. Potential host species were defined as passerines that had been documented in the scientific literature as a cowbird host. Point count observations were truncated at 90 m. The half-normal/hermite poly-

nomial and the uniform/cosine polynomial models were used in the analysis, with the half-normal/hermite polynomial model providing a better fit. We performed an unpaired two-tailed t-test on the average density of the two riparian sites with cattle and the average density of the two riparian sites without cattle, to determine if morning density estimates differed for all cowbirds, female cowbirds, and potential host species. Data were insufficient for statistical analysis of afternoon riparian point counts and rangeland line transects. The alpha level for all statistical tests was 0.05.

RESULTS

The riparian sites with and without cattle present did not differ significantly in morning densities of cowbirds, female cowbirds, or potential hosts. The average morning cowbird density was 1.8 ha⁻¹ (\pm 0.4 SE) in the two riparian sites without cattle, and 1.2 ha⁻¹ (\pm 0.3 SE) in the two riparian sites with cattle ($t = 1.1$, $df = 1$, $N = 2$, $P = 0.46$). The average density of female cowbirds during morning hours was 0.6 females ha⁻¹ (\pm 0.2 SE) on the two cattle-absent riparian sites, and 0.3 females ha⁻¹ (\pm 0.2 SE) at the two cattle-present sites ($t = 1.0$, $df = 1$, $N = 2$, $P = 0.33$). The average density of potential hosts was 5.9 ha⁻¹ (\pm 1.3 SE) on the two riparian sites without cattle, and 3.7 ha⁻¹ (\pm 0.5 SE) on the sites with cattle ($t = 1.6$, $df = 1$, $N = 2$, $P = 0.29$; Table 1).

Too few cowbirds were detected in the rangeland areas for statistical analysis. In contrast to the total of 603 cowbird detections recorded during the morning hours at riparian sites, only 43 cowbird detections were recorded during morning hours at rangeland sites. The average number of cowbirds detected per morning survey was the same (1.8) for rangeland sites with and without cattle present. No cowbirds were detected during afternoon surveys at either the riparian or rangeland sites.

Low densities of potential host species were detected on all rangeland sites. At the Sevilleta NWR and the Bosque del Apache NWR, we detected a total of four and five bird species, respectively; of these, only Mourning Dove (*Zenaidura macroura*) and Black-throated Sparrow (*Amphispiza bilineata*) were potential cowbird hosts. Seven total avian species were detected at both the Milligan Gulch and the Scott Ranch allotments; of these, only Mourning Dove, Yellow-breasted Chat (*Icteria virens*), and Black-throated Sparrow were potential cowbird hosts. All detections of potential host species in the rangeland areas were infrequent, suggesting very low densities.

DISCUSSION

Discussions of declining songbird populations in the Western United States often include the

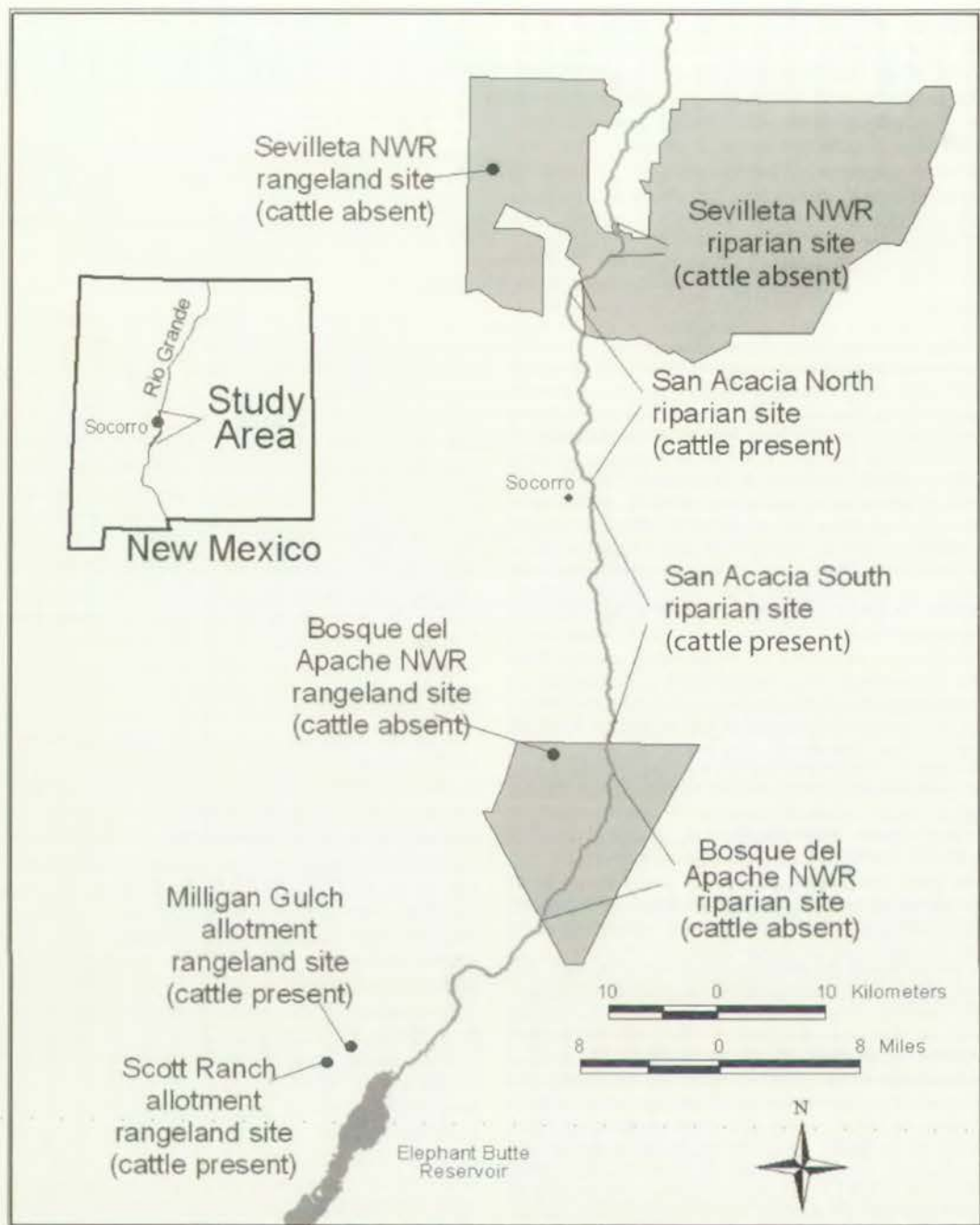


FIGURE 1. Brown-headed Cowbird study areas along the Rio Grande in New Mexico.

relationship between cowbird parasitism and the presence of cattle. Interpretation of this relationship varies, but in its simplest form is defined as one in which the presence of cattle is synonymous with the presence of cowbirds which is synonymous with negative impacts from

brood parasitism. The anecdotal association between Brown-headed Cowbirds and livestock (Friedmann 1929, Mayfield 1965, Verner and Ritter 1983, Rothstein et al. 1984; Rothstein 1987, 1994) is undoubtedly the origin of such interpretations. Unfortunately, a management

TABLE 1. DENSITIES (NUMBER PER HA; COEFFICIENT OF VARIATION IN PARENTHESES) OF TOTAL COWBIRDS, FEMALE COWBIRDS, AND POTENTIAL HOSTS AT RIPARIAN SITES WITH AND WITHOUT CATTLE PRESENT, DURING MORNING HOURS.

Cattle		All brown-headed cowbirds	Female brown-headed cowbirds	Potential hosts
Absent	Sevilleta NWR	2.2 (15.5%)	0.8 (22.9%)	7.2 (11.1%)
	Bosque NWR	1.4 (16.8%)	0.4 (24.8%)	4.7 (13.0%)
Present	San Acacia N	0.9 (22.3%)	0.2 (35.7%)	3.2 (14.3%)
	San Acacia S	1.5 (31.2%)	0.5 (25.0%)	4.2 (12.4%)

corollary is developing; removal of cattle is synonymous with removal of cowbirds and therefore a reduction or elimination of brood parasitism. This corollary is becoming incorporated into, or suggested as, management policy (removal of cattle) for areas supporting threatened songbird populations (Bureau of Land Management 1997, 1998; Goguen and Matthews 1999), including the Willow Flycatcher. We believe actions such as cattle removal designed to benefit cowbird host species are based on an incomplete understanding of cowbird behavior and ecology, a misconception of the relationship between livestock and cowbirds, and lack of local data on factors affecting cowbird distribution and impacts.

Our data illustrate the importance of first evaluating habitat at the landscape level when contemplating cowbird management strategies to aid songbird populations. For purposes of discussion, we narrowly consider cowbird habitat in terms of the presence of food and potential hosts. Cowbirds parasitize host nests in riparian areas during morning hours, and congregate in feeding areas during afternoon (Thompson 1994). We found no evidence that our riparian sites with cattle supported higher numbers of Brown-headed Cowbirds during morning hours than our similar riparian areas without cattle, indicating that the presence of cattle alone was not a good predictor of cowbird abundance. We speculate that if food resources are adequate within commuting distance of cowbirds, then the densities of potential hosts likely determine localized cowbird densities during morning hours regardless of whether cattle are present in, or absent from, the areas in which the cowbirds are parasitizing hosts nests. This hypothesis is supported by observations of D. Krueper (pers. comm.), who noted an 80% increase in cowbird numbers in response to extensive riparian habitat recovery and a subsequent 2- to 10-fold increase in songbirds following removal of cattle from sites on the San Pedro River in Arizona. Thus, presence of cattle may not be an attractant to cowbirds that are actively engaged in parasitism behavior.

The importance of habitat to cowbird behavior patterns is further illustrated by our surveys of rangeland sites. Few cowbirds were detected on rangeland sites during morning surveys regardless of grazing status, and none were recorded during afternoon surveys. These sites supported limited vegetation, low cattle densities, and low songbird densities. We believe the data reflect that the rangelands had limited habitat suitability for cowbirds in terms of food and host abundance, and further illustrate that the presence of cattle alone may have little influence on the presence of cowbirds, depending on other local and landscape factors. For example, the fact that we did not detect cowbirds during any of our afternoon surveys, in either riparian or rangeland sites, suggests that they fed elsewhere. Given that cowbirds have been documented foraging and congregating at bird feeders, campgrounds, agricultural fields, and other non-livestock areas (Rothstein et al. *this volume*), there are likely alternative (i.e., not associated with cattle) foraging opportunities within the commute distance of locally-breeding cowbirds. This is supported by research showing that cowbirds in the Middle Rio Grande region, and often elsewhere, generally find host nests and meet their daily resource needs within a relatively small local area requiring daily movements of approximately 2 km (Sechrist and Ahlers *this volume*).

Our findings have implications for the controversies surrounding cowbirds, grazing, and riparian bird management, but should be viewed with caution and interpreted with an understanding of their limitations. Random selection of survey sites was not possible in this study; therefore, external validity of the study, and consequently the ability to generalize to other areas, is limited. Replication was also limited, and low replication has been common in studies of the effects of cattle and/or grazing on riparian bird communities (Mosconi and Hutto 1982, Schulz and Leininger 1991, Ammon and Stacey 1997). The small number of sample sites and limited time scale (e.g., a single year) increase the possibility of committing a Type II error (not detecting an effect when there is one); the presence

of cattle may influence the abundance of cowbirds, and our sample size may have been too small to detect the relationship. The limited spatial scale of our analysis may have influenced our results in a similar way, and it is possible that riparian sites more distant from cattle-present sites than was the case in our study may support a lower abundance of cowbirds than sites with or near cattle. Recent studies have found positive relationships between active livestock grazing and cowbird abundance (Goguen and Mathews 2000). However, based on apparent contradictory findings between this study and others, it is clear that results from cowbird impact and behavior studies should not be generalized, and more research is needed to identify specific factors influencing distribution and abundance of Brown-headed Cowbirds.

The results from our sites do not support the

common belief that riparian sites with cattle support higher numbers of Brown-headed Cowbirds during morning hours than similar riparian areas without cattle. These results should generate discussion and ideas for expanded research to empirically determine the threshold of association between cowbirds and cattle in differing habitat types.

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