

MOVEMENTS OF BROWN-HEADED COWBIRDS BANDED IN THE SACRAMENTO VALLEY, CALIFORNIA

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INTRODUCTION

Extensive information on the movements of Brown-headed Cowbirds (*Molothrus ater*) from specific populations is generally lacking. Exceptions to this were studies in Arkansas by Neff and Meanley (1957), Meanley (1971), and James (1964), and in New Jersey by Knorr (1965). Little is known about the distributional patterns of this species in the western United States, partly because it has only recently invaded or become more abundant in that region (Mayfield, 1965; Friedmann, 1929, 1963). One study by Royall (1968) in Arizona yielded significant movement data, but was not extensive enough to cover general population movements.

Personnel of the Bureau of Sport Fisheries and Wildlife have conducted bird damage control studies in the Sacramento Valley of California since 1964. These studies required basic movement data for the Brown-headed Cowbird. This paper analyzes data obtained on the subsequent distribution of cowbirds captured and banded in the Sacramento Valley during the fall months (August-December) of 1964-71.

METHODS

Three decoy enclosure traps were operated adjacent to a major blackbird roost 4.5 miles west of Colusa, Colusa County, California. All three traps were large poultry wire enclosures with bird entrance holes in the top (see Meanley, 1971, for more complete descriptions). Two of the traps measured $6 \times 16 \times 30$ feet and the third measured $6 \times 30 \times 60$ feet. The traps were opened annually in mid-August and closed when heavy rains commenced, usually in mid- or late December. All traps were checked daily.

RESULTS AND DISCUSSION

Banding and Recovery Rates

From the 16,165 Brown-headed Cowbirds banded, there were 67 recoveries and 87 returns through December 1971 (Table 1). The recovery rate of cowbirds in this study was 0.41%, and the return rate at the original banding location was 0.54%, for a combined total of 0.95%. Our recovery and return rates were even less than the customarily low rates for icterids. For example, Neff and Meanley (1957) reported a recovery rate of 1.65% from 18,564 Brown-headed Cowbirds banded in Arkansas. Van Velzen (1965) reported a combined return and recovery rate of 4.0% from 231,618

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Brown-headed Cowbirds known to have been banded under the auspices of the Bird Banding Laboratory through November 1964. Our rates might increase slightly in the future because approximately 5,000 cowbirds were banded from 1969-1971 (Table 1), and some of these are still being found.

TABLE 1. Number of Brown-headed Cowbirds banded from 1964 through 1971 at Colusa, California, and the number of recoveries and returns in subsequent years.

Year	Number Banded	Number Recovered	Number Returned	Total
1971	154	6	6	12
1970	1,391	18	8	26
1969	3,735	11	7	18
1968	3,874	11	45	56
1967	2,467	8	8	16
1966	1,922	10	11	21
1965	2,622	1	2	3
1964	244	2	0	2
Totals	16,165	67 (0.41) ^a	87 (0.54)	154 (0.95)

^aThe number in parentheses is the per cent of the total cowbirds banded that were subsequently recovered or returned.

Sex Ratios

Of 10,000 cowbirds of known sex taken from the traps, approximately 7,500 were males and 2,500 were females, for a 3:1 ratio. Other workers have also reported an excess of males in cowbird trapping studies. McIlhenny (1940) and Giltz and Burt (1970) presented data showing sex ratios similar to ours. Stewart (1963) reported an even higher ratio of males (7:1), whereas Darley (1971) and Manwell (1962) reported slightly smaller ratios (1.5:1; 2:1). Some possible reasons for this excess of males are: (1) males may be more susceptible to traps than females; (2) males may be predominant in the area at the time of trapping; (3) the population may actually have an excess of males; or (4) any combination of these. The third possibility is supported by recent studies (Fankhauser, 1971; Darley, 1971) which indicate that female cowbirds have a higher annual mortality rate than males; however, the higher mortality rate by itself is not large enough to account for our observed ratio.

The male:female ratio for in-state recoveries was 4:1 and for out-of-state recoveries 9.5 : 1. Both ratios were greater than the original male:female ratio at trapping. However, a chi-square test showed that the observed ratios were not significantly greater than the expected ratio of 3:1 ($P < 0.10$).

Out-of-State Recoveries

Figure 1 depicts the location of the 25 birds recovered outside California: 13 in Oregon, 10 in Washington, and two in British Columbia. A recovery near Bakersfield, California is included to show the dispersal extremes of cowbirds banded at Colusa.

All out-of-state recoveries were north of California in the humid region west of the Cascade Mountains; none was reported from the arid, eastern parts of Oregon and Washington. Many of the recoveries in Oregon were in the Willamette Valley, and several in Washington were from the Puget Sound region, showing that these birds preferred lowland habitats.

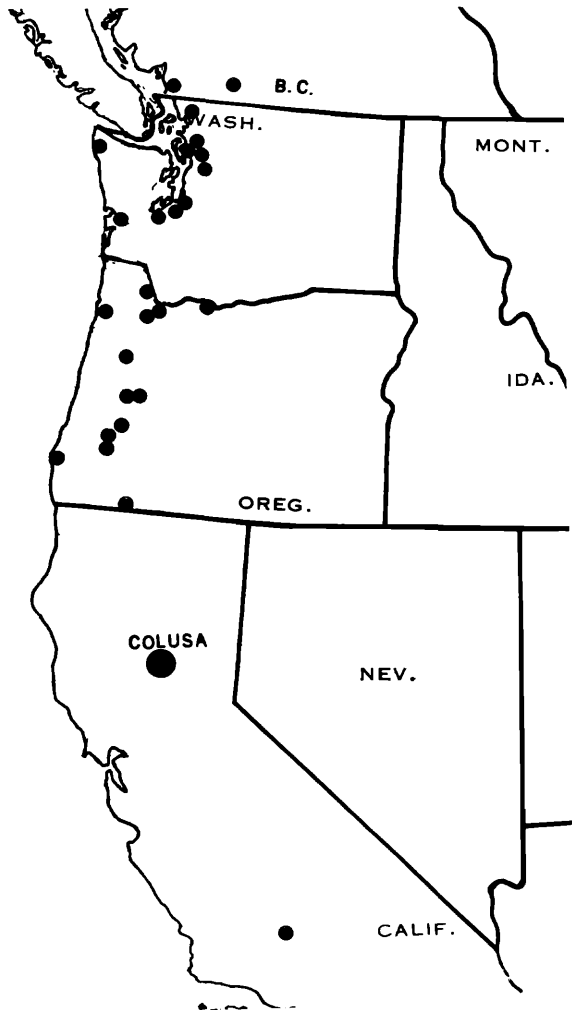


FIGURE 1. Out-of-state recoveries of Brown-headed Cowbirds banded near Colusa, California, 1964-1971.

The northernmost recovery of a Brown-headed Cowbird was at Hope, British Columbia, an airline distance of about 1,000 miles from Colusa. This was a male banded 13 December 1965, and recovered the following spring on 6 May. The southernmost recovery was also of a male, banded 12 November 1965, and recovered near Bakersfield 7 March 1967, a distance of over 300 miles. Fourteen (56%) of the 25 out-of-state recoveries were of birds banded in the fall and recovered the following spring and summer (Figure 2). Since only one season was involved between banding and recovery, the northward movement from California was apparently a spring migration to more northerly breeding areas. Of the eleven remaining out-of-state recoveries, seven were recovered the second spring-summer period after banding, three the third, and one the fourth. There were no out-of-state recoveries during the fall or winter months.

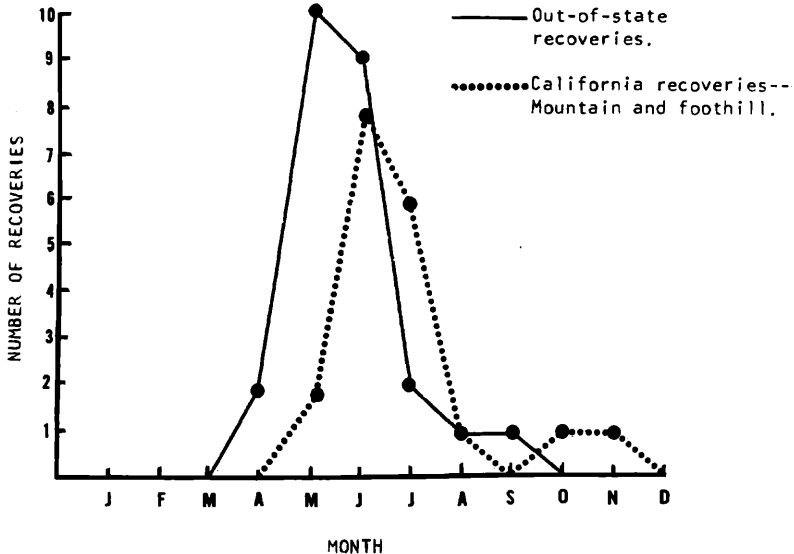


FIGURE 2. Monthly distribution of Brown-headed Cowbirds recovered outside of California and in California mountainous areas.

In-State Recoveries

Of the 42 in-state recoveries, 14 were recovered within 30 miles of the original banding location. Recovery dates of these birds were scattered throughout the year and no seasonal concentration was apparent. The 28 in-state recoveries that were more than 30 miles from the original banding site showed a substantial movement of Brown-headed Cowbirds from Colusa to mountain and foothill areas within California (19 recoveries). The recovery dates of these birds indicated an altitudinal movement, also ap-

parently associated with the breeding season. All but two of the 19 recoveries from California mountain and foothill areas were during spring and summer months (Figure 2).

Table 2 shows the number of Brown-headed Cowbirds banded and returns at Colusa each month during the fall trapping period. Although the traps were not opened until mid-August, the very small number of cowbirds banded and the few returns during this month reflect a scarcity of cowbirds in the Sacramento Valley at that time. The increased catch and return figures during September and October were probably due to an influx of migrant cowbirds during these months.

TABLE 2. Monthly distribution of Brown-headed Cowbirds banded and returns near Colusa, California 1964-71.

Month	Number Banded	Per cent of Total Banded	Number Returned	Per cent of Total Returns
August	266	0.5	3	3.4
September	3624	22.4	33	37.9
October	6816	42.2	39	44.9
November	3180	19.7	5	5.7
December	2279	15.2	7	8.1
Totals	16,165	100.0	87	100.0

The lower catch and return figures for November and December apparently show a reduction in the number of cowbirds present in the area. This may be due to a slight southward movement of cowbirds as winter approaches, *i.e.*, many of the birds were transients. Blackbird roosts in the area generally decrease in size during these months, showing a movement of birds from the general vicinity. All of the recoveries from the San Francisco and Monterey regions were during the winter months of December through February, indicating that the final wintering area may be several miles south of Colusa. Additionally, several large blackbird roosts, containing large numbers of cowbirds, are known to exist during the winter months in the Bay-Delta region and northern San Joaquin Valley (approximately 75-150 miles south of Colusa).

Of the 42 in-state recoveries, 41 were from central and northern California, indicating only minor movement of cowbirds to the more southern areas of the state. The fact that all 87 returns were of birds banded at the same location one-three years earlier suggests that many of the same individuals return to the Sacramento Valley each year.

The proportion of recoveries during the April-August period that were out-of-state (25 of 49) indicated that about one-half of the fall-banded cowbirds migrated northward from California in the spring. Of the 24 in-state recoveries during the spring and

summer, 16 (67%) were from mountainous regions of the state. Eight central valley recoveries during this time period are not included in Figure 2. Therefore, about 80% of the cowbirds banded during the fall months at Colusa moved to other areas in and out of California during the breeding season.

The seasonal movements of Brown-headed Cowbirds presented here are strikingly similar to those reported by Neff and Meanley (1957) for cowbirds in Arkansas. This general movement pattern may be typical of other fall populations of Brown-headed Cowbirds in the United States.

Local Movements

Two traps operated by Dr. Albert J. Beck near Chico, Butte County, California (approximately 35 air miles northeast of Colusa), provided the opportunity to record some short-term cowbird movements within the Sacramento Valley during the fall of 1970. Four cowbirds that we banded in early September 1970 were captured near Chico within three weeks, the earliest in three days. Nine cowbirds banded near Chico in early October were subsequently captured at Colusa within nine weeks, the earliest in 11 days.

The northeasterly movements were probably the result of daily feeding and wandering by blackbird flocks. In Oklahoma, it was recently discovered (using radio transmitters) that Common Grackles (*Quiscalus quiscula*) change roosts frequently and that daily movements up to 25 miles from the previous night's roost are common (unpublished Study Plan Report, Denver Wildlife Research Center). Similar behavior by cowbirds would account for their short-term movements.

The larger number of individuals retrapped at Colusa could have resulted from: (1) a higher trapping effort at Colusa; (2) daily feeding and wandering movements; (3) a southward movement of cowbirds; or (4) any combination of the above.

Subspecific Distributions

In light of our movement data, the distributional relationship of the two cowbird subspecies, *M. a. artemisiae* and *M. a. obscurus*, in California might become less confusing. Neff (1931) was the first to report both subspecies in the central valley of California. Bent (1965) and Grinnell and Miller (1944) appeared uncertain as to the seasonal movements of these subspecies on the west coast. From our movement data and the morphological data and breeding-range descriptions of the above authors, we postulate that both subspecies winter in the central valley of California, but that *M. a. artemisiae* migrates northward to breed, whereas *M. a. obscurus* remains and breeds in the valley and mountain areas of California.

SUMMARY

Movement data are presented for 67 recoveries and 87 returns from 16,165 Brown-headed Cowbirds (*Molothrus ater*) banded from 1964 through 1971 near Colusa, Colusa County, California. Of the 67 recoveries, 25 were from Oregon, Washington, and British Columbia, and the remainder from California. The distribution of in-state recoveries showed that cowbirds are present year-round, and there is only minor southward movement from Colusa. About one-half of the April-September recoveries of cowbirds banded at Colusa were north of California, and it is suggested that these reflect a spring migration. Of those remaining in California, about 65% moved to mountainous areas to breed, and the rest remained in the central valley. There is an apparent concentration of cowbirds in the northern Sacramento Valley each fall, with many of the same individuals apparently returning to this area each year.

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