

## ALTITUDINAL MIGRATION IN THE MOUNTAIN CHICKADEE

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Seasonal altitudinal movements of Mountain Chickadees (*Parus gambeli*) in the Rocky Mountain-Great Basin region have been reported by many observers. Descent into the lowlands in autumn has been recorded by such investigators as Rockwell and Wetmore (1914), Hand (1941) and Hayward (1948). Occurrences above timberline in late summer and autumn have been reported in Colorado (Cooke, 1897:123), New Mexico (Cooke, *in* Bailey, 1928:509), and Utah (Behle, 1955:24). Drew's terse summary (1885:15) indicated seasonal changes in altitudinal limits in Colorado that were not elucidated fully by subsequent observers. "Chickadees" have been listed among altitudinal or vertical migrants in the Rocky Mountain region by Lincoln (1920; 1935:55) and Woodbury (1941:472). This situation warrants further examination, especially for *Parus gambeli*, in view of Behle's (1956:51) statement that "Mountain Chickadees are essentially resident birds showing no pronounced migratory movements although some individuals move to lower elevations in fall and winter, and occasionally vagrants wander out of their breeding range."

We have gathered data on altitudinal movements of Mountain Chickadees in northern Utah from three sources: observation and collection of wintering individuals below the lower limits of the breeding range, study of a population of marked individuals at an elevation of 7300 feet, and specimen records from the northern Wasatch Mountains. The data will be detailed in the order listed.

*Wintering of chickadees at lower elevations.*—We have observed Mountain Chickadees on the campus of Utah State University (4800 feet) in Logan through each of the past four winters, 1959 to 1963. On the campus the birds showed a strong preference for conifers, such as Norway spruces and arbor vitae. Hand (1941:228) similarly noted a preference of Mountain Chickadees for conifers in Idaho. However, these birds may be found wintering in deciduous growth as well. Gilbert took two individuals that were traveling with Black-capped Chickadees (*Parus atricapillus*) in riparian thickets along the Logan River, 2.3 miles west of Logan in Cache County, Utah, on February 3, 1963. Hayward (1948:489) reported Mountain Chickadees to be common in winter in chaparral of the lower western slopes of the Wasatch Range.

Wintering Mountain Chickadees were found in greatest numbers at the lower edge of the belt of Douglas fir in canyons annectent to Cache Valley. An early arrival date was September 17, 1962, at Guinivah Picnic Ground (Cache National Forest), 7 miles east of Logan, 5000 feet (D. K. Darnell). A late departure date was April 21, 1960, east of the University campus (Dixon).

Eighteen of 19 specimens taken in autumn at elevations below 5900 feet proved to be immature as indicated by the condition of the skull. Eleven were males, 4 females, and 3 unsexed. Two birds taken at 6200 feet on September 25 were adults and may not have moved appreciably from their breeding territories. Thus, the influx at lower elevations appeared to be composed largely of immature birds. Our findings confirm and expand the statement of Rockwell and Wetmore (1914:332) that "during August the young worked slowly down the slopes of the mountains." We have no data to indicate whether or not the levels to which wintering populations descend differ from one year to the next.

*Study of marked individuals.*—Between July 18 and September 6, 1961, we color-banded 15 Mountain Chickadees at the Beaver Mountain Ski Area, 7300 feet, in the Logan River drainage, 30 miles by road northeast of Logan in Cache County, Utah. Only three were immature, but two of these remained on the area until January 27 and

February 24, respectively. Four of the 12 adults remained to breed in 1962, but four others disappeared shortly after they were banded. None was seen after September 30. Perhaps their departure represents a shift of domicile as reported for some Great Tits (*Parus major*) by Kluijver (1951:27). Four of the adults from 1961, plus five others that were present there as adults in the breeding season of 1962, constituted the nuclei of five small flocks totalling 18 birds that wintered over several hundred acres in 1962-1963. The sex and age composition of these birds is indicated in table 1. Age was deter-

TABLE 1  
SEX AND AGE COMPOSITION OF A GROUP OF MOUNTAIN CHICKADEES  
WINTERING AT THE BEAVER MOUNTAIN SKI AREA, 1962-1963

	Male	Female	Totals
Adult	7	6	13
Immature	2	1	3
Age unknown	0	2	2
Totals	9	9	18

mined by the degree of ossification of the skull, and sex was determined by breeding behavior or by wing measurements. Individuals with the chord of the wing measuring 68 mm. or more were judged to be males.

Our information is wholly inadequate for estimating productivity in this species, but if the number of immatures joining the population equals the number of adults, at least two-thirds of the first-year birds must migrate. That percentage is essentially the reverse of those in Swedish Great Tits (14.2) and Blue Tits, *P. caeruleus* (34.6), as determined by Ulfstrand (1962:114, 116).

Gilbert color-banded four nestlings of one brood in July, 1962, but they left the area within 10 days after fledging. We have no other data on migratory movements of marked individuals.

The influx of unmarked chickadees into the study area in late winter was a noteworthy event in 1962 and 1963. The earliest arrivals in 1962 were noted in mid-March (none was detected on February 24), and invasion of the area continued at least until mid-May. Four of the eight chickadees captured and marked during this interval settled on the area. Some of the immigrants moved elsewhere, and two individuals that wintered on the study area may have moved also. One disappeared after February 24 (first-year male), and another after April 22 (adult male).

In 1963, two new individuals were noted on February 28. The behavior and movements of one of these suggested that he was an immigrant. Two additional birds were banded on March 19, and another unmarked one was detected on March 23. This influx preceded the arrival of summer resident species such as Downy Woodpecker (*Dendrocopos pubescens*), Robin (*Turdus migratorius*), Red-shafted Flicker (*Colaptes cafer*), and Gray-headed Junco (*Junco caniceps*), populations of which winter in Cache Valley.

*Data from other stations.*—Two of four Mountain Chickadees taken by us on October 11, 1962, at 8200 feet, 3 miles to the east of Beaver Mountain, were first-year birds. This observation supports others of overwintering of immatures in higher parts of the Wasatch Range. However, each of 14 specimens at the University of Utah from the vicinity of Brighton, 8700-9000 feet, Salt Lake County, Utah, September 22-29, 1946, was an adult. The proportion of the sexes was 8 males and 6 females, but from the retarded stage of their molt we inferred that reproduction in that year must have been negligible. The summer of 1946 was characterized by subnormal temperatures (U.S.

Weather Bureau Climatological Data). An alternate possibility in that year of unusual conditions is that all the immatures may have moved to lower elevations by late September.

#### DISCUSSION

Our data from a marked population indicate that adult Mountain Chickadees are sedentary on their breeding grounds, and that in the winter months they form stable social groups in which the sexes are approximately equal. Presumably the same social structure exists in the populations of this species overwintering near timberline above Alma, Colorado, as reported by Bradbury (1918:199), and at Cedar Breaks in southwestern Utah (Grater, 1943). The lack of exchange of banded birds at stations one mile apart at Florence Lake in the southern Sierra Nevada of California (Lofberg, 1928:309) further supports our conclusions. To our knowledge adult Mountain Chickadees on our study area did not visit points more than about 0.8 miles apart in an area of discontinuous woodland.

It appears probable that most and perhaps all adult Mountain Chickadees remain in the vicinity they occupied during their first breeding season and that altitudinal movements are performed largely if not solely by first-year birds. Thus members of this species are partial migrants in the terminology of Lack (1943-1944). The altitudinal movements may be termed a migration in that they show seasonal regularity, involve a considerable percentage of the first-year age group, and involve travel of at least a few miles magnitude. The orientation component stressed by Hinde (1952:35) is manifested in altitudinal (and temperature gradient) changes rather than in compass orientation.

The sedentariness of adults suggests that vagrant chickadees reported above timberline in late summer probably are immatures. The rather rapid exodus of Mountain Chickadees from their natal territories seems no different from that reported for other species of the genus by Goodbody (1952), and the wandering would seem to merge imperceptibly with the downslope migration. The fact that an undetermined percentage of immature chickadees remains in upper elevations, however, means that dispersal for these individuals, in the sense that the term is used by Johnston (1961), ends in late summer. For others migration is interposed prior to eventual settling.

We propose that the term "partial altitudinal migrant" be used to set *Parus gambeli* apart from those altitudinal migrants such as *Leucosticte atrata* (French, 1959) that vacate much of their breeding range in winter. Use of the term also would help eliminate certain inconsistencies in distributional studies or in check-lists. An example is found in the American Ornithologists' Union Check-list (1957:386), which stated of *P. g. grinnelli*: "Resident in the mountains . . . Descends to lower altitudes in winter." Substitution of the term "partial altitudinal migrant" would clarify the status of the population since sedentariness of a fraction of the breeding population would be implicit in the term. Regional and seasonal differences in tendency to migrate do not invalidate the general concept.

Finally, we renew the plea of Van Tyne (1952) for more complete data on specimens and for widespread adoption of certain procedures. Considerable additional factual information could have been brought to bear on this problem had age by degree of skull ossification been indicated on the labels of specimens available to us or in records in the literature.

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