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The Altitudinal Distribution of Birds in a Part of the Great Smoky Mountains

By JAMES T. TANNER

Mt. LeConte in the Great Smoky Mountains rises higher above its base than almost any other mountain in eastern North America. On its northwestern side is a valley containing LeConte Creek. This valley is fairly broad and slopes gently from Gatlinburg up to an elevation of about 2600 feet above sea level where spreads a large orchard called Cherokee Orchard. From here the valley narrows and steepens, ascending to the the top of Mt. LeConte at 6593 feet. Above Cherokee Orchard the valley is covered with unbroken forest which is in its primitive condition except for a lower fringe of second growth. Because the axis of the valley is approximately east-west, one slope faces south and is drier and warmer than the opposite north-facing slope. The south-facing slope at lower elevations bears a forest of oak and pine, the latter being mostly on the ridge, with a heavy undergrowth of laurel and blueberries. This gives way to yellow birch and spruce at an elevation of about 4800 feet. On the north-facing slope at low elevations is a deciduous forest with a greater variety of trees, such as yellow poplar or tulip tree, maple, buckeye, and silverbell. Many hemlocks are present, often in dense stands. It is usually damp and cool here and there is little undergrowth except on some of the ridges where there are impenetrable stands of rhododendron. This mixed forest changes to one of yellow birch, spruce, and hemlock a little above 4000 feet. At higher elevations the forest on both sides of the valley contains birch, spruce, and fir, the two evergreens becoming more abundant near the top.

Cherokee Orchard can be reached by a road, and from there a trail climbs the valley to the top of the mountain. Thus we have a steep mountain valley that is easily penetrated, providing a good opportunity for field work. I used this area in making a study of Black-capped and Carolina Chickadees (Auk, 69: 407-424. 1952) and another study of Juncos. For the years 1951 thru 1954 I made notes on the locations of other species of birds during late May and June, the peak of the nesting season. In addition, Philip Huff and James Liles kept a record during 1953 of the birds they saw at the top of Mt. LeConte, and their observations are included with mine.

This paper is concerned with the elevations at which different species of birds are present during the nesting season in the LeConte Creek Valley, described above, from 2600 feet to the top of Mt. LeConte.

Many of these species will extend either higher or lower in other parts of the Great Smoky Mountains.

Some kinds of birds were present at all of the elevations, from 2600 feet on up. In the case of Sharp-shinned Hawk, Broad-winger Hawk, and Chimney Swift, it is probable that a single individual bird may fly between the bottom and the top of the mountain in a short time. The species whose individuals are more sedentary but may nest from 2600 feet to the mountain top are: Ruffed Grouse, Ruby-throated Hummingbird, Flicker, Hairy Woodpecker, Downy Woodpecker, Blue Jay, Catbird, Robin, Cedar Waxwing, Black and White Warbler, Black-throated Green Warbler, Goldfinch, and Towhee. This makes sixteen species that have been observed at all the elevations studied during the nesting season.

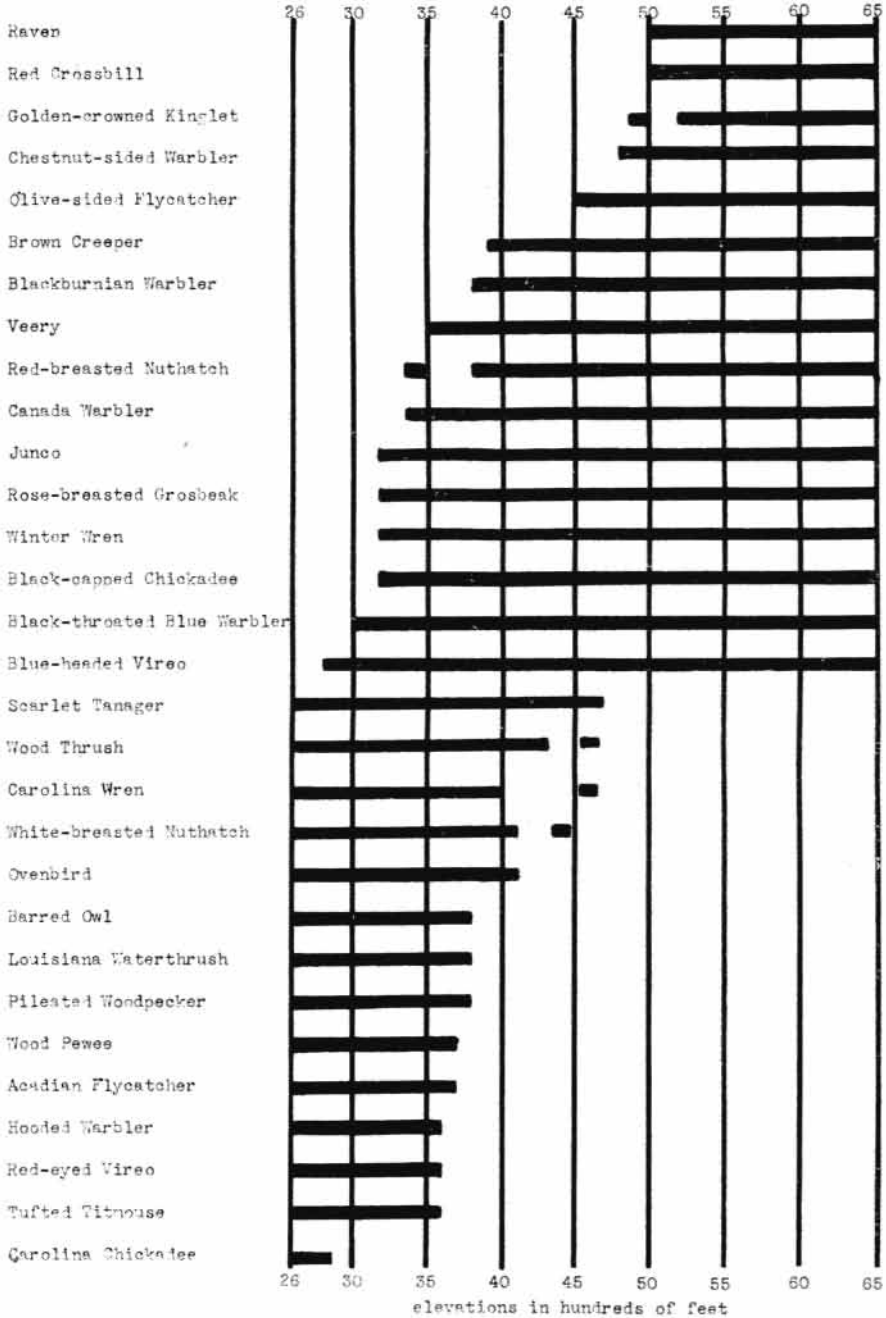
The thirty species of birds not found at all elevations, having either an upper or a lower limit in the area described, are shown on the chart. This extends from where the forest above Cherokee Orchard begins at 2600 feet to 6500 feet; the mountain is higher, but there is very little area above this elevation. The solid bar indicates the elevations at which each species was found; gaps are present in the bar only when there was an interval of at least 200 feet in elevation between records.

Most of the upper limits were on the warmer and drier south-facing slope. Some of the lower limits of birds found commonly at high elevations were in tongues of evergreens, usually hemlocks, that extend down the north-facing slope.

The Black-throated Blue Warbler provides a good illustration of how the density of a species usually changes toward the limit of its range. This warbler is common from about 4000 feet upward in LeConte Creek Valley; two or more birds may be heard singing simultaneously in many places, and squeaking in almost any area will attract a pair. Below 3500 feet the species is scarce and the pairs are scattered. The extreme lowest may be well separated from other Black-throated Blue Warblers, but the male sings regularly and the pair nests; they are like pioneers that have pushed ahead into the wilderness. The other species are similar in that the individuals or pairs become scarcer toward either the upper or lower limit. This could have been illustrated on the chart by having the bars end, not abruptly in a square end, but in a tapering point.

The bar on the chart shows the extreme high or low elevation at which a species was observed during the four nesting seasons. Few species were recorded at the same limit each of the four years. The lower limit of the Black-throated Blue Warbler and the upper limits of the Tufted Titmouse and Wood Pewee were practically the same from year to year, but most species showed considerable variation. These variations appeared to be random, making it illogical to attempt to find causes for them. Because the four-year record does show variations, it is to be expected that more observations in this area would extend the limits of many of the birds shown on the chart and also fill in the gaps.

After the nesting season many birds move up and down the moun-



ALTITUDINAL DISTRIBUTION OF BIRDS IN LECONTE CREEK VALLEY

tain going well beyond their nesting range. Small flocks of crows, which are usually found only as far up as Cherokee Orchard, have occasionally flown up the valley as high as 5000 feet, and as another illustration, Golden-crowned Kinglets have moved down in late July at least to 4100 feet.

A study of this kind usually exposes more problems that it solves. Why are there several species with approximately the same altitudinal limits, such as the concentration of lower limits at 3200 feet (see chart) and of upper limits between 3600 and 3800 feet? Why are there no species with lower limits of above 5000 feet? It is generally true that closely related species of birds do not occupy the same habitat or range; this is illustrated by the altitudinal separation of the Black-capped and Carolina Chickadees (see chart). But other pairs of related species show altitudinal overlap: Veery and Wood Thrush, the two Nuthatches, Canada and Hooded Warblers, Blue-headed and Red-eyed Vireos. Are there habitat or other ecological differences separating the members of these paired species?

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NEWS AND NOTES

On October 1 and 2, 1955, members of the T.O.S. met with members of the Carolina Bird Club at Fontana, N. C. About 16 attended from Tennessee; Lawrence C. Kent, president of T.O.S., Albert F. Ganier, and Arthur Stupka participated in the program of field trips and talks.

Thomas W. Finucane, Route 1, Blountville, volunteered to coordinate and report observations of hawk migrations this fall. Any data on migrating hawks should be sent to him.