

## GENERAL NOTES

**How far can a bird be seen?**—To judge distances accurately by sight is very difficult, but people frequently make statements as to how far they see an object across the water or in the air above, without considering how large it would appear at the distance stated. In order to judge by sight how high birds fly, an observer should know how far birds of such or similar sizes can be seen. Birds cannot be seen as far away as most persons believe. The visibility of a bird depends upon its size, but the amount of light, clarity of the atmosphere, character and contrasting color of the background and the acuity of vision of the observer are also important determining factors.

The following distances of the visibility of birds were determined either by direct measurement or by using a proportionately sized model and estimating the distances. A model of a Golden Eagle with outstretched wings, one-fifth natural size, painted black, was hoisted atop a tall flagpole and measurements were made of several visual distances. Cross-checking was also done by using models seen by the diminishing view of 8-power binoculars, a calculation which agreed closely with the direct measurements. The naked eye used, or ordinary vision with eyeglasses, was my own, which is more acute than the average person's, and gives a Snellen test of 38/20 (reading accurately at 38 feet the letters intended to be read at 20 feet), a visual acuity of 190 per cent.

A hummingbird on a telegraph wire appears as a mere dot at a distance of 100 feet; but a swallow can be recognized at that distance, and appears as a dot at 250 feet. Some birds can be heard much farther than they can be seen, as the Goldfinch announces its coming before it comes into the visual field at about 200 feet away. A Black-throated Green Warbler revealed its identifying colors at a 40-foot distance, but at 100 feet would be mistaken for a leaf and at 150 feet was only an inconspicuous dot on a branch. A perching Cedar Waxwing can be identified by its shape and position at 100 feet, shows definite form at 200 and becomes a little dot at 450 feet. A Robin flying at a distance of 150 feet shows its red breast distinctly and when perching in bright sunlight this coloration is visible at 200 feet. The Robin can be identified at 250 feet by its shape and by its position on a branch, the tail being just visible; at 350 feet it can be recognized as a perching bird, but appears as a dot at 500 feet, while at 750 feet it would be noticed only by acute eyes. Beyond this distance the perching Robin would not be seen. A flying Robin is recognized as such at 500 feet, is seen as a fluttering bird at 600, a moving dot at 800 and becomes invisible at about 850 feet. A Crow can be seen about twice as far as a Robin.

A Golden Eagle of average size exhibits its fan-shaped tail to the naked eye up to approximately 1500 feet, thereafter as a band and then as a dot at 2000 feet. The eagle is readily seen as a soaring bird at 3000 feet, is visible as a bird at 5000, loses its elongate breadth at 6000 feet to become a round dot scarcely noticed at 7250 feet; it is visible to only the best eyes at 7750 and becomes invisible at 8750 feet distance. A Golden Eagle a mile away appears as a minute soaring bird, and at a mile and a half as but a mere speck in the sky which few persons would notice.

A Turkey Vulture, according to a proportionate estimate, could be seen as a soaring bird as far as 4700 feet, but at about 6300 feet would change in appearance from a moving elongate figure to a round dot in the sky, and at a mile and a quarter would scarcely be recognized as a bird by any untrained eyes. Oblique views of the spread wings decrease their visibility. A Broad-winged Hawk could be identified

probably as a hawk at a half a mile, but at 3000 feet would appear as only a dot invisible a short distance farther away. The distance visibility of other birds can be estimated by similar procedure. A broad-winged bird is better visible than one with narrow wings, a perching bird with a rounded profile better than one with a long narrow outline; a flat view of the extended wings better than an oblique aspect. Looking toward the source of light, as the sun, diminishes the visibility by halation, and by glare into the eyes.

When estimating the vertical heights of birds it is remembered, according to the sine of the angle of elevation, that with an angle of 19 degrees the height is approximately one third the hypotenuse; with 30° it is one half; 48°, three fourths; with 54°, eight tenths, and with an angle of 65° the vertical height is 90 per cent of the oblique visual distance. These ratios with the estimated visual distances permit a close estimate of the distances a bird is flying above the ground.

This research is not a consideration of the *recognition* of distant birds, which depends in addition upon relative shapes, flight actions, perching positions, habits and other factors.—HAROLD B. WOOD, M.D., 3016 North 2d St., Harrisburg, Pa.

**Hailstorms and Avian Mortality.**—A violent hailstorm occurred at Ithaca, New York, on May 19, 1936. The storm, which lasted from 12.45 to 1 p. m., was accompanied by high winds and rain. A half hour after the storm, hailstones as large as marbles were lying several inches deep in small gullies and depressions. During the storm, one of my students, Daniel Embody, picked up a Flicker (*Colaptes auratus*) lying on the local golf course. The bird was warm; the extended tongue hung an inch from the bill. It was quite apparent that the Flicker had been killed by hailstones. Embody saw another Flicker lying along the roadside. A thorough search by the writer and four students a few minutes later in this same neighborhood failed to locate this second bird. It had apparently not received a fatal blow. No other casualties were noted, although a search was made. The Flicker was carefully skinned. A bruise on the right thigh and two clots on the skull indicated where the bird had been struck by the hail. The gullet and stomach contained about sixty ants (*Lasius* sp.) and eleven seeds of staghorn sumach. Evidently the bird had been feeding at the time of death. It was a male and weighed 140 grams.

On July 3, 1936, press reports described a slashing wind, hail and rainstorm at Rome, New York. Hailstones larger than marbles lay in streets four to six inches deep in places an hour after the storm. A number of birds were reported to have been killed by these hailstones.

Gates (Science, n.s., vol. 78, pp. 263-264, 1933) has recorded high mortality among birds, especially Scarlet Tanagers and Bob-white, at Baton Rouge, Louisiana, during a severe hailstorm on April 20, 1933.—WM. J. HAMILTON, JR., Cornell University, Ithaca, N. Y.

**Notes from northern Idaho.**—The unusual abundance of certain species of birds in the vicinity of St. Maries, Benewah County, Idaho, during the past summer is worthy of comment.

**LITTLE FLYCATCHER, *Empidonax traillii brewsteri*.**—While by no means rare, this species is always associated in my mind with the edges of alpine meadows and willow-bordered streams at high altitudes in the mountains. During the latter part of last May and to some extent throughout the early summer, they were to be found in almost every willow thicket in this locality. Even in the semi-arid "Palouse Country" and the lower Clearwater Valley they were occasionally met with. On two different occasions in late May I noted a pair in a single clump of willows sur-