# A Census of the Turkey Vulture in Delaware

BY CHARLES J. PENNOCK

So far as the writer has found there has been but little published on efforts at an enumeration of the individuals of any species of birds, resident in any extended territory. In Illinois a few years ago there was a careful bird census reported,[1] and various writers have mentioned points bearing on this subject.[2] It is obvious that the larger birds may be counted with more accurate results. They are to be seen farther and hereabouts are fewer in numbers.

My notes on the occurrence of the Turkey Vulture in Delaware extend over several years and may prove of interest. The deductions are probably subject to criticism, but are intended to be conservative. The territory covered is for the most part level, except in the extreme northern part (less than one-tenth of the total area of the state), and there the species are less numerous than elsewhere in Delaware. Many of these notes were taken from railway trains and trolleys, but this bird is so readily recognized even at a long distance that there is little chance for an error in identification. Probably this would hold true for comparatively few species of birds. It will be noted that the count in winter sometimes equals or exceeds that for warmer weather. This may not exactly reflect actual conditions, as in May and June incubation takes place and fewer birds would be moving; in summer more dense foliage would usually interfere with a full count. Nevertheless, this bird is strictly resident throughout the state, unless there is a slight increase in the colder weather from birds that drifted northward in summer, Delaware being almost the northern breeding

[1] An Ornithological Cross Section of Illinois in Autumn. Bull. of the Ill. State Lab. of N. Hist., Vol. VII, Article IX, April, 1907, by S. A. Forbes, Ph.D.

[2] Knight, Birds of Maine, 1898, pp. 236–237, and p. 348. Wilson Bulletin, No. 14, etc.

limit of the Turkey Vulture along the Atlantic seacoast. The factor of timber land interposing has been used, because the birds can be observed at such a long distance, that woods close at hand would cut off open country beyond, and again this species may be found in woods, feeding when opportunity offers, and frequently roosting there in the day time, and then they are not likely to be seen in passing.

The separate figures represent separate observations (birds close together or in the same immediate neighborhood) and are given to indicate better the distribution of this bird throughout the region.

It has been assumed that the observer was able to see a belt one mile wide, an arbitrary assumption dependent on various conditions, including height of the bird above the earth, but numerous observations suggest this distance as being within bounds.

| | Number. | Distance in miles. | To square mile. |
|---|---|---|---|
| Dec. 18, 1900. Odessa to River Farm. Driving . . . . . | 18 | 3 | 6. |
| Mar. 8, 1901. Wilmington to Dover. From car window. (8 per cent. added) . . . . | 49 | 48 | 1. |
| Oct. 8, 1904. Hockessin. From trolley. | 10 | 4 | 2.5 |
| Oct. 11, 1906. Hockessin. Walk, various. | 6 | 1 | 6. |
| Feb. 9, 1907. Greenbank. Trolley. 75 (not considered). These birds were feeding and probably had been attracted from a distance. | . . | . . | . . |
| Dec. 27, 1907. Middletown to Lewes. From car window. 1-1-1-1-2-2-1-2-2-2-2-3-23-3-2-3-3-2-2-1-3-3-3-3-2-1-2-2-2-1-2-2-1-10-3-2-2-3-2-2-2-9-1-19-1-1-2-1-3-1-2-12-2-2-1-3-2. 57 observations, 174 birds seen. Add 8 per cent. for loss from woods, 14. . . . . | 188 | 77.5 | 2.4 |
| | | | 17.9 |

| | Number. | Distance in miles. | To square mile. |
|---|---|---|---|
| | | | 17.9 |
| Dec. 30, 1907. Lewes and vicinity. Walking. 129 were counted in 3 days' tramping. Different routes taken each day, and none counted on homeward bound trip, say . . . | 50 | 10 | 5. |
| May 15, 1908. Rehoboth and vicinity. Walking. 2-1-2-2-4-3-4-2-2 . . . . . | 22 | 3 | 7. |
| May 16, 1908. Morning, Rehoboth. Walk. 1-5-1-1-3-1 . . . . . | 12 | 3 | 4. |
| May 16, 1908. Afternoon, Rehoboth. Walk. 1-3-2-3-3-4-1 . . . . . | 17 | 3½ | 5. |
| June 6, 1908. Porters and vicinity. Walking. 1-1-2-3-4-3-2-5-1. . . . . | 22 | 2½ | 8.8 |
| Sept. 29, 1908. Rehoboth to Wilmington. From car window. To Georgetown, 20 miles, 1-1-5-1-8-5-2-1-1-1-10-1-6-1-2-13 = 59. To Harrington, 23 m., 7-3-5-5-2-3-1-1-2-1-1-2-3-4-4-1-2-2-3-2-7 = 61. To Dover, 17 m., 3-2-1-2-1-1-1-5-1-1-1-3-11-3-2-1-1-1-1 = 42. To Wilmington, 47.5 m., 1-1-1-1-1-2-2-4-1-1-2-1-1-1-3-41-1-1 = 66. 72 observations. Total 228 counted one side of car only, add 8 per cent. for loss by woods and then ½ for other side of car . . . . . | 369 | 107.5 | 3.4 |
| Jan. 2, 1909. State Line to Summit Hill. Trolley, various . . . . . | 10 | 4 | 2.5 |
| March 29, 1909. State Line to Summit Hill. Trolley, 3-3-2. . . . . | 8 | 4 | 2. |
| Sept. 11, 1909. Yorklyn. Walk, 1-3-2 . | 6 | 1 | 6. |
| Sept. 30, 1909. Summit Hill. Walk, 1-1-2-3-1 . . . . . | 8 | 2 | 4. |
| Oct. 13, 1909. Wilmington to Dover. Railroad, 6-1-1-2-3-1-1-1-1-2-1-2-2-1-1-1-1-2-2-4-1-2-1-1-1-3-1-2-1-3-1-5-2 = 60. Add 8 per cent, (5) . . . . . | 65 | 48 | 1.3 |
| | | | 66.9 |

| | Number. | Distance in miles. | To square mile. |
|---|---|---|---|
| | | | 66.9 |
| Nov. 12, 1909. State Line to Wilmington. Trolley, 1-5-3-4-2-3. . . . . | 18 | 9 | 2. |
| May 14, 1910. State Line to Yorklyn. Walk, 3-2 . . . . . | 5 | 1 | 5. |
| Oct. 29, 1910. Springs to Newport. Walk, 1-1-3-2-2-4-3-2-5-2-3 . . . . . | 28 | 3 | 9.3 |
| May 27, 1911. Henderson to Clayton. From car window. Seen 76 birds, add 10 per cent. for heavier timbered country. (Both sides of car were observed, but opposite side only in part.) Equals about . . . . . | 84 | 16.6 | 5. |
| November 30, 1912. Newport. Walk, 1-2-4. | 7 | 1 | 7. |
| Dec. 30, 1912. Brenford to Rehoboth. From car window. To Dover, 8.2 miles, 8-20-5-1-1-1-2-2-1-3-2-2-1-1-1-4-6 = 61. Dover to Harrington, 16.7 miles, 2-5-2-4-2-3-1-3-3-1-2-1-3-1-1-1-1-5-2-5-2-3-2-1 = 56. To Rehoboth, 43.6 miles, 2-1-1-2-1-4-1-1-1-2-1-1-2-2-1-2-3-1-1-2-1-1-2-1-2-1-1-3-1-1-1-1-1-1-1-7-12-1-1-5-1-1-1-1-1-1-1-1-1-1 = 87. Total of 204. Add 8 per cent., say 16. 91 observations . . . . | 220 | 68.5 | 3.2 |
| Number of trips 22 . . . . . | . . | 22 | 98.4 |
| Average . . . . . | . . | . . | 4.47 |

It is to be noted that the observations *off* the cars average 6.1 while from a car window the average is only 2.53 which would indicate that many birds are missed on hurried trips, as might be expected. Taking the average of all of these Records we have 4.47. It is probable that such a method in counting would not embrace over 50 to 60 per cent of the entire Vulture popu-

lation, as many birds would not be moving. Granted that two-thirds of all these birds were seen and we would have an average of 6.71 birds to the square mile. About $\frac{1}{12}$ of the area of the state may be included in the hilly section of the North, where the Turkey Vulture is less numerous than in the remainder of the state. Again *assuming*, and taking 3, per square mile as a fair number for this hilly region we would have the *general average* for the entire State as 6.40 birds to the square mile. The area of Delaware is somewhat over 2100 square miles so that under such a system of reckoning we have a total of about 13.440. It would appear that we might almost ignore the R. R. records, as they are so constantly lower than the others and by so doing and adding $\frac{1}{2}$ would have an average about 8.5 to square mi., and a total of about 17.850, [1] as a number for the Turkey Vulture population of the state. It is evident that the factor of uncertainty has appeared several times in the forgoing estimate and that the result may be far from exact. However the records are given as taken and those interested may draw their own conclusions.

For reference Wilson Bulletin No. 74, March, 1911, p. 41 and other "Bird Horizons." Bunes in Wilson Bulletin No. 37, Dec., 1901, and Osprey, Vol. II, p. 48. Gault in Wilson Bulletin No. 28, Vol. 6, No. 5, p. 65.

[1] With one exception no Records *on cars* equalled $3\frac{1}{2}$ to the square mi., while off the cars none was below 4.