THE INFLUENCE OF FAT ON BIRD WEIGHT

By Robert C. Leberman

In recent years there has been a considerable increase in the amount of scientific data being gathered by the average or "back-yard" bird-bander. Wing, tail and bill measurements, fat classes, and body weights are the most commonly taken notes, while a few banders make detailed descriptions of the molts and plumages of some particular species. As small transient birds (such as warblers, vireos, kinglets and small finches) make up the major portion of many banders' total catch, the percentage of recoveries, returns and repeats is often extremely low. The collection and use of such data as can be taken while the birds are still in the bander's hand, then, may be virtually all the bander can reliably expect in return for his efforts.

At Powdermill Nature Reserve (a research station of Carnegie Museum, located three miles south of Rector, Westmoreland County, in the mountains of southwestern Pennsylvania) the recording of bird weights, whenever practical, has been a part of the normal routine of the banding station. The birds are collected from mist nets, placed in paper bags, and brought into a central banding room. There they are banded, measured (usually the wing only) and then placed in a dark sock, to keep them quiet, and weighed to the nearest tenth of a gram: all within a few minutes after they have been removed from the nets. The full data for each individual, whether a new banding, a return, or a repeat, is entered on a card which is later filed at Carnegie Museum in Pittsburgh. The result of six years' banding is an enormously rich source of raw data, relatively quickly retrievable from the files, and available to interested researchers.

When using weight data in various types of physiological and life history studies, it is important that the researcher take into consideration the influence of the stored fat a bird's body may contain. In this paper I shall try to demonstrate graphically the importance of keeping consistent records of the fat classification (or lipid level) of all birds weighed at a banding station, and to point out the decided influence that such fat deposits have on the weight of the bird. Without some system of estimating fat classes, in fact, bird weights are all but useless for studies involving comparisons.

The system of fat classification used when examining birds at Powdermill - a conventional one, with some modifications - is as follows:

0. No visible fat beneath the skin.
1. Some visible fat, but hollow of throat not nearly filled.
2. Hollow of throat nearly or completely filled.
3. Hollow completely filled and bulging, heavy fat accumulations also obvious on other areas of the body.

The amount of fat is determined by holding the bird breast side up (the usual position for banding) and gently blowing at the base of the neck. This parts the feathers and reveals the "hollow of the throat" - a relatively deep cavity between the neck and the furcula or wishbone; the fat stored therein usually appears as a white or yellowish mass, readily visible through the thin skin.

The particular system of fat classification used at a banding station is not nearly as important as having one person consistently making the determination. The fat class assigned to any given bird must be, at least to some extent, a subjective estimate, so that two persons examining the same group of birds would probably place a certain percentage of the sample in contradictory classes, each according to his own interpretation of the system in use. This is particularly true in assigning the intermediate categories (1. and 2. above). The fewer persons (and therefore opinions) involved in making a fat estimate, the more usable the data will be.

In order to illustrate the effect of fat on bird weight, I have selected the White-throated Sparrow, because we have both a sizeable sample of weights (334) for this species, and a good range of fat classes. All of the birds in this sample are fall or spring migrants; most of the weights were taken in the fall. In Table 1, wing measurements (the chord, from the bend of the wrist to the tip of the longest primary) have been used to indicate general body size; use of data from a sample of varying body sizes could mask the overall effect of the different fat classes. Because our interest here is only in the general relationships of body size and fat, and their influences on average weight, I have included all White-throated Sparrows banded, regardless of age or sex.

Examination of Table 1 will reveal the marked increase of weight that is associated with each fat class advance. The average overall weight increase for the total sample is plotted in Figure 1, as are the extreme high and low averages (longest and shortest wing length classes).

Wolfson (1954, Auk 71: 413-434) has presented data on the White-throated Sparrow similar to that shown in Figure 1, and banders interested in further reading on this subject should consult this important paper. Perhaps it will help to inspire EBBA members to do more with birds they handle in the future. The bander can make a significant contribution to ornithology by adding large quantities of carefully taken data to the much smaller amount of finely detailed information available from laboratory work.

Star Route South, Rector, Pennsylvania 15677

Figure 1.

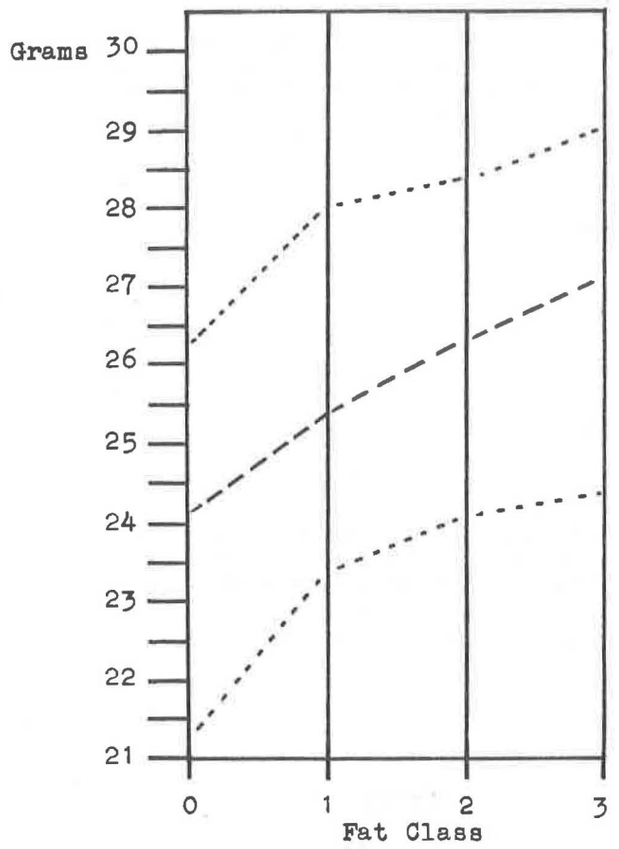

Figure 1. Relationship between mean weight and fat class for 334 transient White-throated Sparrows.

----- Average weight for the total sample of 334.

..... Average weights for the shortest and longest wing length classes.

Table 1. Weights of 334 White-throated Sparrows

	FAT CLASS 0		FAT CLASS 1		FAT CLASS 2		FAT CLASS 3	
Wing Length	Sample Size	Mean Wt.	Sample Size	Mean Wt.	Sample Size	Mean Wt.	Sample Size	Mean Wt.
66	7	22.6 g.	1	24.0 g.	2	24.5 g.	4	26.0 g.
67	6	21.8	1	25.5	3	25.2	2	24.3
68	19	23.0	4	23.4	8	25.9	5	26.3
69	21	23.5	10	24.9	11	24.1	3	25.0
70	12	23.3	11	23.7	14	26.3	9	27.6
71	15	24.0	9	25.2	6	25.8	6	27.0
72	14	25.1	14	26.5	4	27.0	7	27.8
73	15	25.5	4	25.4	9	26.2	2	28.5
74	10	25.2	11	26.5	8	28.0	2	29.0
75	11	25.8	11	26.7	4	27.8	3	28.8
76-78	10	26.3	2	28.0	3	28.3	1	27.5

Drawing by the Author