Daily weight changes in migrant Yellow-rumped Warblers

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Diurnal weight variations were studied in a sample of 562 migrant Yellow-rumped (Myrtle) Warblers, *Dendroica coronata*. The data were collected from birds banded in fall from 1960 through 1973 at Carnegie Museum of Natural History's Powdermill Nature Reserve, located in the Ligonier Valley three miles south of Rector, Westmoreland County, Pennsylvania.

The study was undertaken on the hypothesis that these migrating birds would show an increase in weight during the day, as they fed and rested. Yellow-rumped Warblers are purely migratory at Powdermill; they neither breed nor winter in the area. The study was prompted by numerous studies of other species of birds in the field (Helms and Drury, 1960; Brown and Brown, 1965; Nisbet et.al., 1962) and also some studies of birds held in the laboratory and on dead specimens (Nisbet et.al., 1962; Evans, 1949; Ward, 1969.) In all of these studies, the birds gained weight throughout the day. This study on Yellow-rumped Warblers shows similar results.

For analysis, the birds were divided into two basic groups: these banded in the morning (AM, handled before 12:00 noon) and those banded in the evening (PM, handled after 6:00 PM.) These groupings were further divided into age/sex classes; adult males (AHY-M), adult females (AHY-F), immature males (HY-M), and immature females (HY-F). The age/sex classes were also analyzed by fat indexes, on a scale of zero to three (0 = no fat visible in the furcular area, 3 = maximum fat.)

Analysis of the weight data is found in Table I. The chi-square values were calculated using an assigned rank test for statistical significance, which takes into account the variable sample sizes. Those groups whose p values were less than .05 had an AM mean weight that differed significantly from the mean PM weight. The larger the p value, the less significant is the AM-PM weight difference.

As is usual with field studies involving large samples, certain uncontrollable variables are present in the data analyzed. The birds were placed into AM and PM groups according to the time they were banded and weighed, not the time they were netted and thus stopped feeding; however, the time between netting and weighing is rarely more than 1.5 hours. Also, the weight difference shown may not be represented to its fullest extent, since feeding takes place before and after the bird is netted. There was no way of knowing how much undigested food was present in the alimentary tracts of the birds. However, since Yellow-rumped Warblers are insectivorous birds, the change in weight due to this uncertainty is not as great as if the birds were fruit or seed eaters. It can be safely assumed that the birds were free of accumulated excretion materials, as the birds usually defecate at least once before they are weighed.

Figure 1. Diurnal weight changes of migrant Yellow-rumped Warblers by age and sex classes.

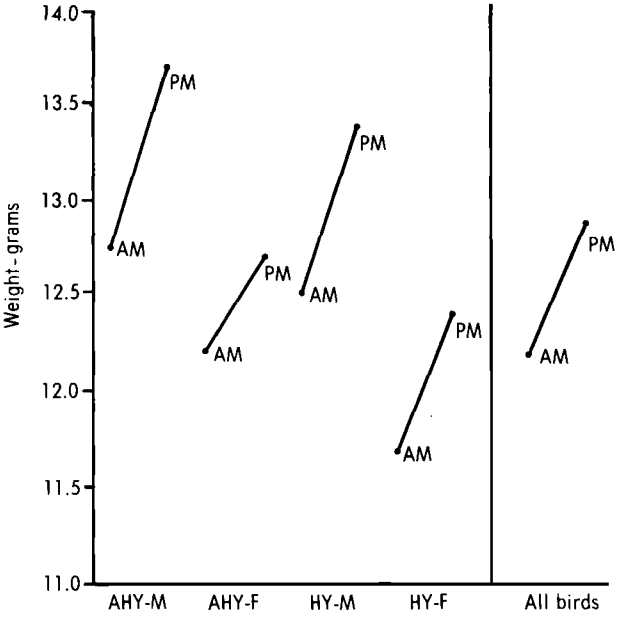

Table 1: Analysis of diurnal weight changes of migrant Yellow-rumped Warblers.

Age/sex	AM $\bar{x}$(g)	N	s.d.	PM $\bar{x}$(g)	N	s.d.	x^2	p
0-Fat								
HY M	12.13	58	.8900	12.75	14	.5011	1.773	.20
HY F	11.35	88	.8613	11.91	34	.6306	8.635	.01
AHY M	12.15	40	.7717	13.13	8	.7360	9.370	.01
AHY F	11.82	60	.8540	12.03	4	.5449	0.076	.80
1-Fat								
HY M	12.88	24	.8860	13.33	11	.7509	3.746	.05
HY F	12.04	37	.8531	12.53	25	.8297	7.702	.01
AHY M	13.28	17	.7550	13.83	7	.7313	0.0017	.95
AHY F	12.34	18	.6038	12.36	8	.5499	0.1940	.70
2-Fat								
HY M	14.14	8	.9068	13.58	11	.8375	0.0002	.99
HY F	12.77	15	.8691	12.95	14	1.0300	1.3960	.30
AHY M	14.21	8	1.1050	14.20	6	1.1776	0.0002	.99
AHY F	13.71	8	.9466	12.34	5	.4128	3.0000	.05
3-Fat								
HY M	14.00	2	.3000	14.31	8	.6936	0.0193	.80
HY F	13.00	2	1.1000	14.03	4	.2947	0.5000	.50
AHY M	14.50	2	.8000	14.03	3	.5907	0.1660	.70
AHY F	13.69	8	.6753	14.00	5	.7266	0.0081	.95

The results of the study are shown in Table I and Figure I. All age/sex classes showed a clear weight gain between morning and evening — the average being 0.74 grams, or an increase of 6.4% over morning weight. Males tended to weigh and gain more than females. Adults weighed more than immatures. The birds with low amounts of fat tended to gain proportionally more than did birds with a fat index of 2 or 3 (Table I.) These thin birds were probably migrants that had just arrived in the area, and thus fed more heavily than the birds that had been around for several days resting and feeding and had already stored some amount of fat to continue their migration.

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(Editor's note: These worksheets are not bound into NABB for two reasons: (1) They are easier to use in the loose-leaf format. They can be slipped into a clear plastic jacket to be taken into the field — protected against wind, rain, and other hazards. (2) The worksheets are, at this time, tentative. Everything possible is done to insure their accuracy, but it is difficult to be certain that everyone having significant data has been contacted. By issuing the worksheets as we have, they go out into the field where, hopefully, we can get critical feedback. Then, if need be, corrected sheets can be issued.)