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Audio Census of Some Wisconsin Game Birds

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AUDIO CENSUS OF SOME WISCONSIN GAME BIRDS

by

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A. Introduction:

Audio censuses of Wisconsin game birds were commenced in 1948, and now include the bobwhite quail, the pheasant and the ruffed grouse, in the order in which censuses were introduced.

Briefly, audio censuses are based on the characteristic sounds given by the male of the species concerned during the breeding season. An observer strategically located at a station, or stations in the field tallies the number of individuals calling, and/or the number of calls heard during a given time period.

In Wisconsin, only the transect method is used, with the observer following a given route and making listening stops of several minutes, at approximately one mile intervals.

We here present some gleanings gathered in attempting to explore the complexities associated with audio censuses. The points raised may well result in more questions than they answer. However, we feel that it is well to at least recognize that audio censuses are not necessarily as unfettered as they might seem to be from their apparently simple structure.

B. Ruffed Grouse:

Let us consider first the ruffed grouse. In 1951 and 1952 a check transect was run by the P-R Grouse Project in Iowa county, which lies in the driftless area of southwest Wisconsin. Here distribution of the birds depends on the scattered woodlots on the ranges of hills. Populations here are relatively low. In 1951, and 1952 gave very nearly the same picture, six runs were made on this transect between April 3 and May 4, commencing 40 minutes before local sunrise. Numbers of individual birds and total drums were recorded at each of fifteen stops at one-mile intervals for time periods of 2, 3, 4, and 5 minutes.

Referring now to Figure 1, if we take the averages of the different dates for Total Drums (TD), and Total Birds (TB), we can compute a ratio of TD/TB, i.e., number of drums per bird. (See line A, Figure 1)--these are from 1.02, up to 1.55, as expected. Next, if we take a ratio of TB for each time period to the TB in the preceding interval we have an expression of the rate at which new birds are being picked up as the listening period is lengthened. (See line B, figure 3). Thus 1.28 means that 28% more birds are heard in three minutes than in 2 minutes. Similarly 14% more in 4 minutes than in 3 minutes. In going to 5 minutes, however, only 3 % more birds are heard. This may be taken to mean that very nearly all the birds that are going to drum near that location on that morning have been picked up in 5 minutes.

We could end this analysis here and recommend that a 5 minute listening period be used in making audio censuses of ruffed grouse, since essentially no additional birds would be picked up beyond 5 minutes. However, this would demand that individual birds be located and tallied rather than simply tallying total drums heard.

Since total drums is a much easier tally to obtain than individual birds, some may prefer a recommendation based on the former, i.e. total drums. If we assume that the total number of birds heard in the 5 minute interval (here 9.8) is very near the potential number of drumming individuals at that time of year, and under such conditions, then we may compute the ratio of the number of total drums to this assumed number of birds for each length of listening period. This is done in line C of figure 3. We note that this ratio is nearest 1.00 in the 3 minute period. Thus with a 3 minute listening period we may say that total drums heard approximates the total birds, and we may use our tallies of total drums heard in the 3 minute period as indicative of the number of drumming birds without the labor of tallying them. We may also use ratios between total drums to convert between time periods.

Where population indices are concerned the question is often raised as to what the counts actually represent. We have only partially answered the question here as we do not yet know what the ratio of drumming birds is to the total males in the population.

Before we pass on to Figure 2 note the 4 minute value, line A of figure 1. (1.35 drums per bird)

Formal transects (27 in all) were run in Wisconsin in 1952, for the purpose of censusing ruffed grouse. Fifteen mile routes were used and a 4 minute stop was made in each mile. Most were run twice to insure catching the peak period of drumming. Counts of both total drums and of total birds were made. If we compute the ratio TD/TB, i.e. drums per bird, for the high density routes and low density routes, we find a range of only 11% in the ratio, which may be considered as not demonstrated to be different. (See figure 2)

Similarly ratios were computed of drums per bird for the peak run, or highest count and off-peak runs of the same transects. (21 of the transects were run twice). Respective ratios of 1.33 and 1.29 were obtained, again indicating no difference.

The Iowa county ratio to which you were previously referred was 1.35 drums per bird. This falls near the mean of the formal transects on which a 4 minute stop was used.

Apparently then, for a given time period, such as the 4 minutes used here, the number of drums per bird appears to remain constant irrespective of high and low populations and irrespective of whether drumming is at a seasonal peak or not. At least we have no evidence to indicate otherwise.

These values are all based on a 15 mile transect begun 40 minutes before sunrise, so that they occupied approximately the same portion of the day.

A curve representing the level of drumming through this portion of the day is given in Figure 3.

To construct this curve the average number of birds drumming at each stop for all transects for three years was computed. An average number of calls per stop for each stop was then calculated. These values were then submitted to a three stop curve smoothing process, and an average of these values was computed, (this was 2.36 drums per stop). Then a calculation was made of the per cent of the over-all average for each of the fifteen individual stop averages.

Note that the curve (Figure 3) appears to be essentially linear. The deviation of the first and last listening stops is about 20% above and below the general mean. Hence variation is kept within a reasonable range over the time used in completing the transect.

C. Pheasant:

We have Wisconsin data on crowing for three years of transects, (1950 through 1952) with a total of 193 runs. Not all are included in all time periods, as some of the routes were begun and ended earlier, and some later. Thus the first and last points are based on only 10 and 12 stops respectively. Computations are the same as for the ruffed grouse curve.

For the purpose of comparison, the curves published by Kimball, (1949) and Kozicky, (1952) are also given in Figure 4. Their curves have been converted to the same numerical basis as ours for this comparison, with values estimated from their published curves.

In Wisconsin we ordinarily consider the period one-half hour before sunrise to about 45 minutes past sunrise as useful for such counts, and we use the more or less standard two minute listening period. Only total calls are recorded.

We find that during this period Wisconsin results show a range of variation about the average of about 20% and Iowa about 20% also. South Dakota is about 7%. Why it should remain more level is unexplained. In Iowa and Wisconsin the variation may be due in part to the higher human population density. Farm noises, traffic, milk haulers, etc., may reduce audibility as daylight comes.

Now let us discuss the pattern of the distribution of pheasant crowing in Wisconsin. If we consider the cock pheasants are distributed at random during the breeding season and that crowing occurs at random, then we could expect a frequency distribution of the number of pheasant calls heard at a large series of stations, (here transect stops), to follow the normal pattern of distribution. Since the average number of calls per station in Wisconsin is low, (between 2 and 3) we should not expect the "normal curve" but rather a curve of the Poisson series. A theoretical curve of this type is shown by the solid line in Figure 5. The series of circles also plotted show the actual number of stations where a given number of crowings were heard during the 1952 transects.

It is at once apparent that the actual record departs widely from the theoretical. We are forced to conclude, therefore, that one of our original premises, random distribution both of cock pheasants and of crowing by cocks, has not been fulfilled.

Part of the discrepancy might be explained by gaps in the distribution of cock pheasants in the spring so that there are more than the expected number of stops with no pheasants crowing, and also more than the expected with only one crowing heard.

Such an explanation might be thought to fully explain the discrepancy between the observed and theoretical curves. There is, however, the additional possibility that crowing is not at random, but is affected by the presence of other cocks in the vicinity which act as a stimulus to crowing. Thus at locations with only a very small number of cocks, crowing might be sporadic. As the number of cocks increases a stimulatory effect could be postulated, which would serve to intensify crowing in such areas. Such a pattern could also be made to account for the higher than theoretical numbers of stops where zero and only one crowing were heard, and would also explain the larger than theoretical numbers of crowings heard at the higher intensities of crowing.

Solution of the phenomena involved here will require both detailed census and behavior studies.

BIBLIOGRAPHY

Kimball, James W. 1949 - The crowing count pheasant census. Journal Wildlife Management, 13: 101-120.

Kozicky, Edward L. 1952 - Variations in two spring indices of male ring-necked pheasant populations. Journal Wildlife Management, 16: 429-437.

Figure 1. Iowa County Check Drumming Transect, 1952

Date	2 min. T.B.	int. T.D.	3 min. T.B.	int. T.D.	4 min. T.B.	int. T.D.	5 min. T.B.	int. T.D.
4/3	3	3	3	4	3	5	3	6
4/15	7	7	12	12	12	13	12	14
4/21	8	9	9	18	12	22	13	27
4/28	11	11	12	12	13	15	14	19
5/5	7	7	9	11	10	13	10	16
5/14	3	3	5	5	7	9	7	9
Average	6.5	6.6	8.3	10.3	9.5	12.8	9.8	15.2

	2 min.	3 min.	4 min.	5 min.
(A)Ratio of T.D. to T.B.	1.02	1.24	1.35	1.55
(B)Ratio of T.B. to preceding T.B.	----	1.28	1.14	1.03
(C)Ratio of T.D. to assumed T.B.	0.67	1.05	1.31	1.55

Figure 2. Drums Per Bird For High And Low Routes And Peak And Off-Peak Runs

	Drums Per Bird
High Density Routes	1.27
Low Density Routes	1.41
Peak Run On Transects	1.33
Off-Peak Runs	1.29

Figure 3.

Diurnal Curve of Ruffed Grouse Drumming, Wisconsin, 1950-1952

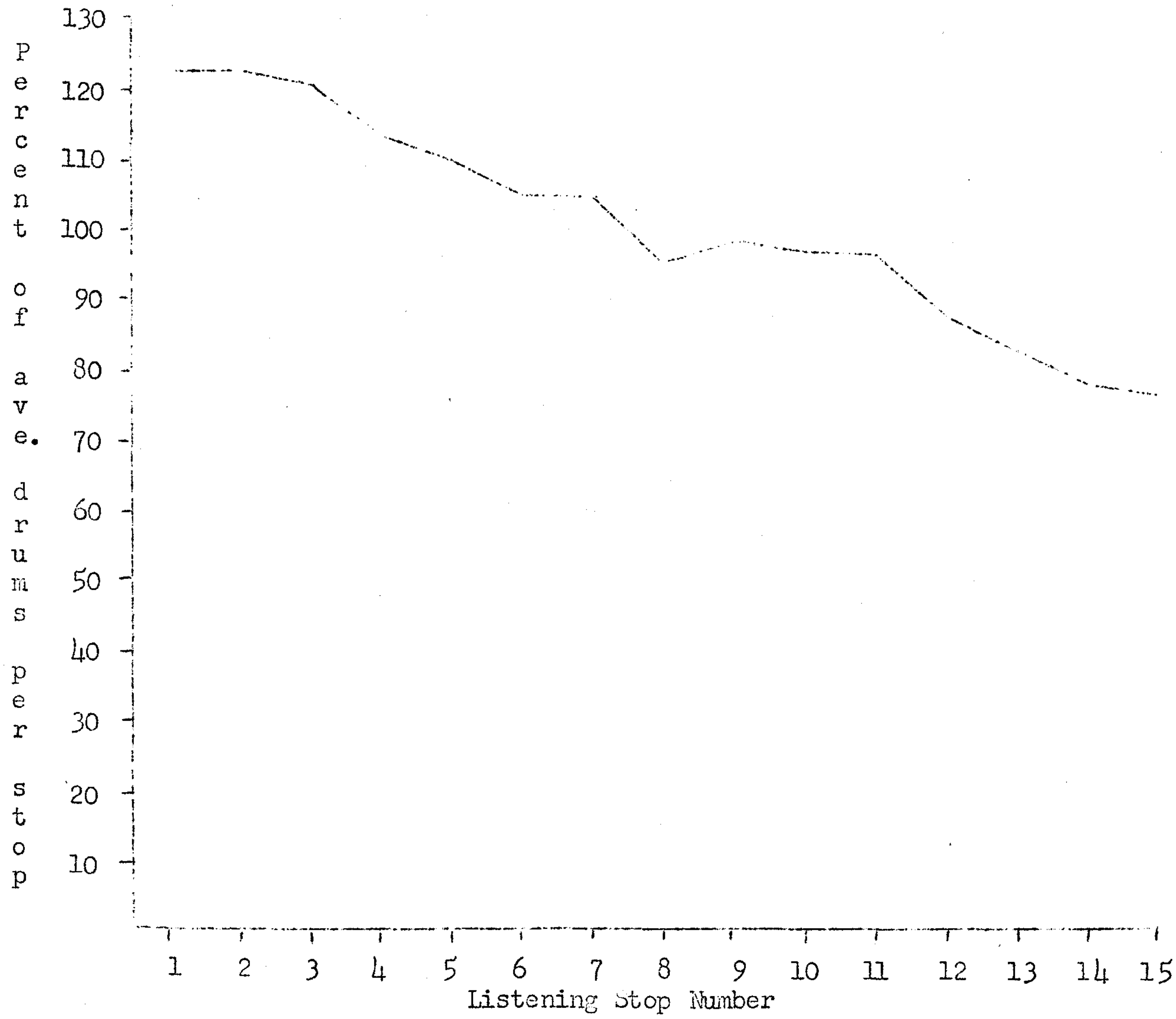

Figure 4.
Diurnal Curve of Pheasant Crowing
Wisconsin Transects, 1952

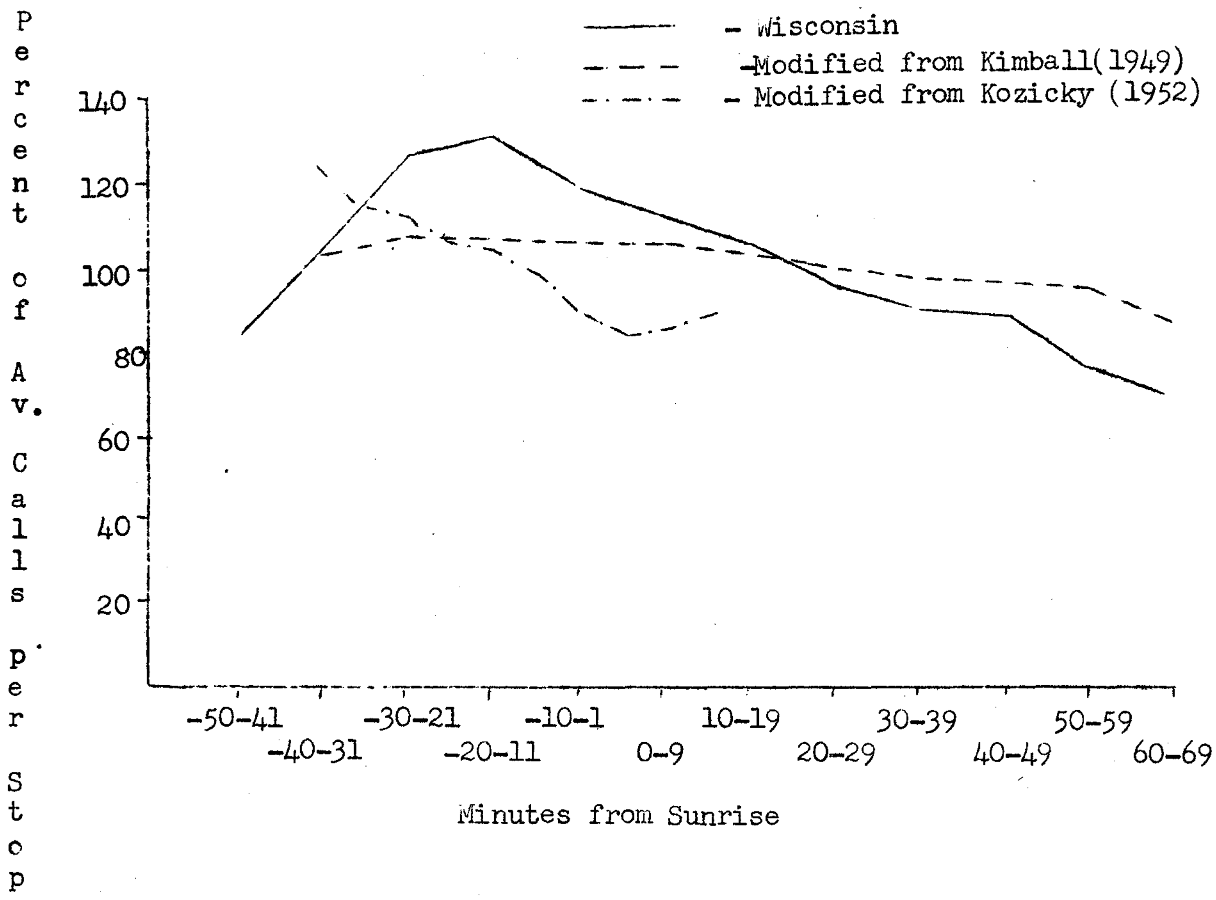

Figure 5.

Actual and Theoretical Distribution of Pheasant Crowing

Wisconsin, 1952