Feather Replacement for Predicting Hatching Phenologies of Mourning Doves

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Abstract: Predicted hatching distributions of mourning doves (*Zenaida macroura*) derived from post-juvenal primary molt data obtained from (1) trapped samples throughout the year and (2) trapped samples from September–October only, were compared to hatching distributions observed in nesting studies during 1981 and 1982. A good fit of the predicted distribution to the observed was obtained in 1981, but not in 1982. It appears that sampling intensity and uniformity are major factors influencing how well primary feather molt data predicts hatching distributions. As a result, sampling of molt data during a restricted period such as September–October leads to a greater skew in the predicted hatching distribution as compared to sampling uniformly throughout the year.

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Post-juvenal primary feather replacement has been used to predict the age, and hence the date of hatch, of several game species (Schemnitz 1980). However, several problems with this technique in accurately predicting hatching phenologies have surfaced. For example, Smith and Cain (1984) working with scaled quail (*Callipepla squamata*), Thompson and Kabat (1950) with northern bobwhites (*Colinus virginianus*), and Swank (1952, 1955*a*), Bivings (1980), and Morrow (1983) with mourning doves have noted substantial variation, particularly for higher primaries, in the age at which individual primaries are molted. In fact, Smith and Cain (1984) stated that the accuracy of primary replacement in aging juvenile scaled quail is severely limited after 18 weeks due to variability in the growth rate of primary 8. Similarly, Morrow (1983) stated that the range observed in the age at molt of primaries 9 and 10 was so great as to negate their usefulness in predicting the age

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of juvenile mourning doves. Regarding its use in predicting hatching distributions, Swank (1955*b*) and Southeastern Association of Fish and Game Commissioners (1957) noted significant discrepancies between hatching distributions observed in nesting studies and those predicted from hunter collected wings based on primary feather replacement.

In this paper, we provide information on the accuracy of primary feather replacement in predicting hatching distributions of mourning doves. Although several models exist for predicting the age of juvenile mourning doves from post-juvenal primary replacement (Jenkins 1955, Allen 1963, Hanson and Kossack 1963, Haas and Amend 1976, Morrow 1983), the model developed by Swank (1952, 1955*a*) is still considered the standard in view of its presentation in the Wildlife Management Techniques Manual (Schemnitz 1980). As a result, Swank's (1952, 1955*a*) model was used in the data analysis for our paper.

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Methods

Estimates of actual monthly hatching distributions were obtained from nesting studies conducted during February–October 1981 and 1982. The study area, comprising approximately 325 ha of the Texas A&M University Campus, was systematically searched weekly for mourning dove nests. Searches were continued each year until fewer than 5 new nests were located on the weekly search. Only those nestlings considered to have a reasonably good chance of fledging, those reaching 9–10 days of age, (Cooperative Study by State Wildlife Agencies, State Universities, and the U.S. Dep. Int., Fish and Wildlife Service 1982) were included in the observed hatching distribution.

Predicted hatching distributions were obtained for each year by observing the primary molt pattern of juveniles caught in modified funnel traps (Bivings and Silvy 1979) throughout the year. Bivings et al. (1984) have shown that trapped juveniles behave similarly to banded nestlings in terms of survival and movements. Hatching distributions were also predicted from this molt data using only the portion collected during September–October, a period coinciding with the major portion of the hunting season in most areas of the United States. Doves were assigned to a particular hatch month based on the aging table presented for mourning doves in the Wildlife Management Techniques Manual (Schemnitz 1980). No attempt was made to allow for feather growth following molt of the primary in question. Because this paper is intended to evaluate feather replacement in predicting hatching distributions by simulating data collection as nearly as possible to that usually occurring with the use of this technique, no attempt was made to adjust or allow for any influx of migrant birds.

Results

During 1981, the peak (25%) in hatch of fledglings from a total of 1,556 nests was observed in August (Fig. 1). The observed hatching distribution and that predicted from the molt data collected throughout the year were similar, although hatching was predicted to have continued into October none was actually observed during that month. The peak of the distribution predicted from September–October data coincided with that observed in August. However, the magnitude of the predicted peak, 49%, was substantially greater than that observed. Only 3% of the hatch was predicted to have occurred by 1 June according to the September–October data, whereas 24% of the hatch was observed to have occurred by that time. There was close agreement between fledglings observed hatching by 1 September and those predicted to have fledged based on the entire year and the September–October

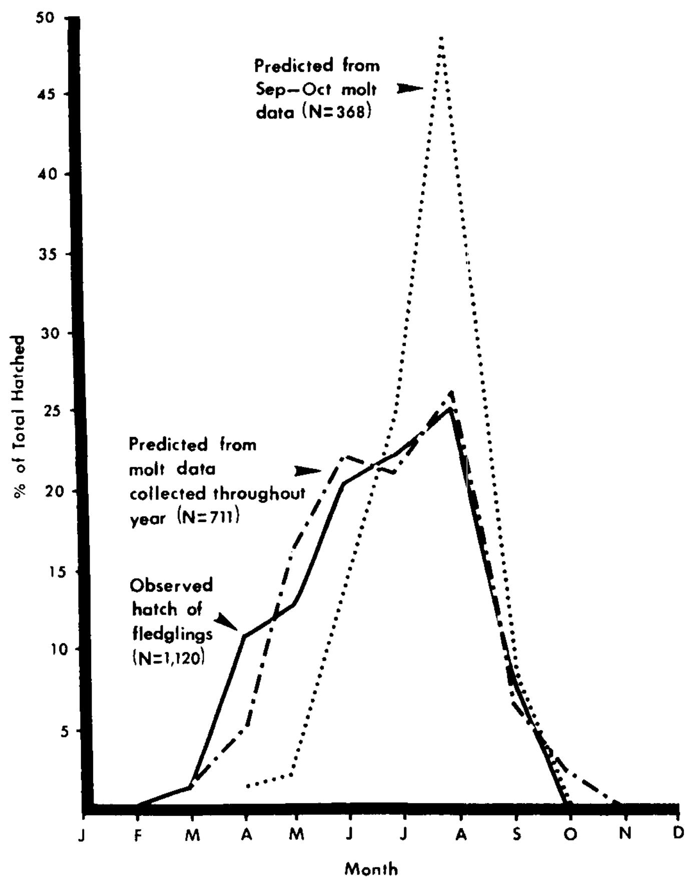

Figure 1. Hatching distributions of mourning doves during 1981 on the Texas A&M University campus.

molt data (92%, 90%, and 91%, respectively). Absolute deviations observed from the actual hatching distribution ranged from 0% in March to 6% in April for that predicted from the entire year's data, and from 0% in October to 24% in August for that predicted from the September–October data, and averaged 1.7 and 7.0% respectively.

During 1982, the actual hatching distribution was constructed from observation of 872 nestlings considered capable of fledging from 1,364 nests. The peak (21%) in fledgling hatching was observed in July (Fig. 2). In contrast, the peak of hatch was predicted in June (36%) from the entire year's molt data, and in August (43%) for the September–October data. Only 5% of the hatch was predicted by the September–October data prior to 1 June while 37% of the hatch was observed to have occurred prior to that month in the nesting study. Prior to 1 September, 95% of

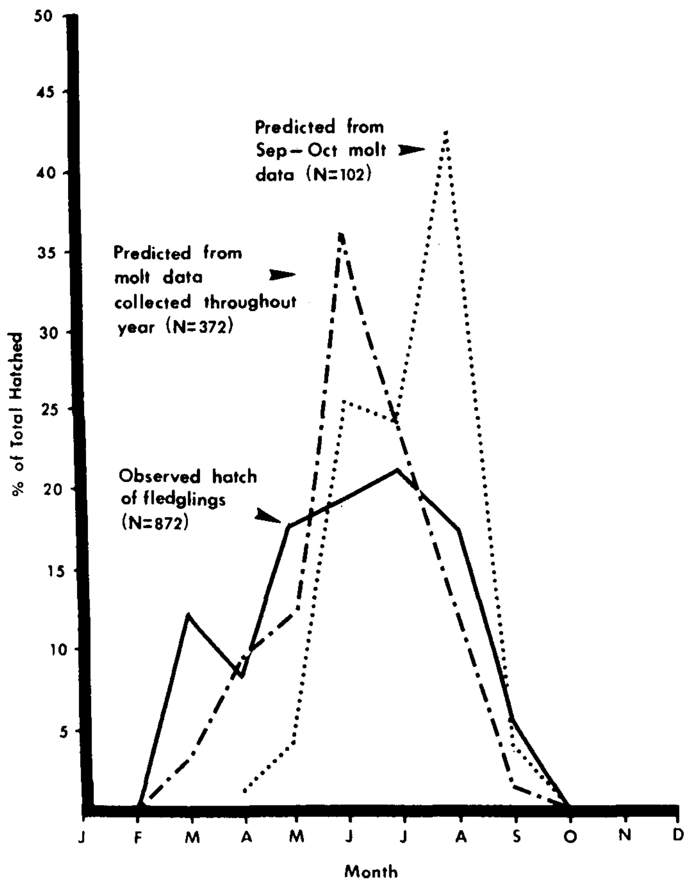

Figure 2. Hatching distributions of mourning doves during 1982 on the Texas A&M University campus.

the observed hatching had occurred in the actual distribution, while 98 and 97% was predicted from the entire year's and the September–October molt data, respectively. Absolute deviations of the predicted distributions from that observed ranged from 1% in April to 17% in June for the entire year's data, and 2% in September to 25% in August for the September–October data, and averaged 4.4 and 8.5%, respectively.

Discussion

Several differences were noted in comparing the 2 predicted hatching distributions to that observed in the nesting studies. These differences were: (1) peaks of the predicted distributions did not correspond to those observed during 1982; (2) differences in the magnitudes of the peaks between the predicted and the observed were substantial; especially for the September–October data; (3) hatching was predicted during the latter part of the year when none was observed during 1981; and (4) no hatching was predicted from the September–October data when a substantial amount of hatching was observed early in the season.

Several factors can be identified as influencing the predicted distributions in this study. The first of these are errors implicit in the aging technique. Ault et al. (1976) and Morrow (1983) have identified changes in the rate of molt progression of juveniles from different hatching periods as potentially impacting predicted hatching distributions. This may have been a problem for the distribution predicted from the entire year's molt data during 1981 when hatching was incorrectly predicted to have occurred in October.

Sample size would also appear to be a problem because the best fit for both estimates was obtained during 1981 when sample sizes were roughly twice as great for the entire year's data and >3 times greater for the September–October data as compared to 1982 data. However, probably more important than sample size is how uniformly the sample is collected over time. Changes in sampling intensity or catchability introduce biases into the predicted distributions by creating misrepresentations of birds from certain hatch periods in the sample. Older birds probably become less likely to be captured in traps or by shooting (Southeast. Assoc. Fish and Game Comm. 1957) due to experience or loss from the population to mortality. Thus, their representation in the hatching distribution would depend upon the trapping intensity at the time they were most available for capture. This is indicated in this study in 2 ways. First, the best fit of the predicted to the observed hatching distribution occurred during 1981, when variability in trapping success effort was less than in 1982. In 1982, although trends in observed hatching were approximated by the entire year's data, a substantial drop in trap effort beginning in September resulted in a magnification of the contribution of earlier hatched birds. Thus, a peak of higher magnitude was predicted in June–July than was actually observed. Secondly, substantial deviations were observed between the observed and the predicted distributions when molt data were collected only during September–October. Later hatched birds were over-represented in the predicted distribution because of changes in the probability of capture as discussed above, and also because birds hatched early in the nesting season would have completed molt by this time (Swank 1955*a*), becoming effectively lost from the juvenile molt sample for purposes of age prediction. Over-representations of late hatched birds in hatching phenologies predicted from hunter collected wings have been observed by Swank (1955*a*) and Southeastern Association of Fish and Game Commissioners (1957). Although in our study hatching levels after 1 September were estimated with absolute deviations of only 1% and 2% by the September–October data, misrepresentations in the hatching distributions due to improper sampling during a restricted period can potentially be very important, particularly in view of recent criticisms of early September hunting (Coop. Study by State Wildl. Agencies, State Univ., and the U.S. Dep. Int., Fish and Wildl. Serv. 1982).

Conclusions

Although trapability of doves will inherently change with changes in food supply, weather conditions, etc., every effort should be made to minimize the effect of changes in trapping effort over time to ensure collection of a representative molt data sample. Investigators should be aware that substantial changes in sampling intensity over time can have drastic effects on the predicted hatching distribution, and in particular, sampling during a restricted period of the year such as the hunting season may produce a significantly skewed predicted distribution. Fits may also be enhanced if an improved model of post-juvenal primary feather molt were available which reduced variation in molt rate of birds during the late fall and winter.

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