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Wing Chord Data--re-examination of a Pine Siskin Irruption in Virginia

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INTRODUCTION

This study was undertaken in response to Bowers and Dunning's (1986) suggestion that bird banders should publish the physical measurements taken on netted birds. They urged the addition of new information to the pool of ornithological data. A 1988 irruption of Pine Siskins *(Carduelis pinus)* (Hansrote and Hansrote 1990) in Campbell County, Virginia, yielded over 1200 netted birds. Wing chord averages were calculated for each month. The changes in the average monthly wing chord and wing chord ranges of the Pine Siskins suggested the local population had undergone change in the five-month period.

METHOD

The banding station is one-fourth mile (440 meters) from the intersection of Routes 460 and 622 in Campbell County, Virginia. Nets were opened and closed randomly during daylight throughout the period. Ordinarily, one or two nets were used, occasionally, as many as four. To attract the birds, feeders filled with sunflower or Niger seed were placed near the nets.

The netted bird's wing chord (unflattened) was measured to the nearest mm using a ruler modified with an end stop. The bird was also aged and sexed using Bird Banding Laboratory (BBL) criteria before being released.

The supplies of zero-size bands were exhausted twice during the period and banding was suspended until a new supply of bands was received. Consequently, we not only underestimated the size of the invasion but incurred wing chord gaps in January and March data.

RESULTS

The station was opened for 46 out of 146 days (31%) from 1 January to 26 May 1988; net hours were 268.97. We banded 1264 Pine Siskins. The local irruption peaked in February based upon the average number of birds banded per day. Table 1 shows wing chord data for the banding period.

Table 1. 1988 Pine Siskin Irruption

Month	No. Days Nets Opened	No. Birds Netted	Wing Chord Avg., mm	Wing Chord Range, mm.	Ave. No. Birds Banded Daily
January	5	139	71.2	65-76	27
February	9	493	71.1	65-76	55
March	4	153	71.0	67-75	38
April	18	387	71.0	66-77	22
May	10	92	70.3	65-75	9
Total	**46**	**1264**	**71.01**	**65-77**	**27**

DISCUSSION

Ehrlich et al. (1988) and Ferrand (1983) describe Pine Siskins as nomadic and irruptive in nature, frequently because of the failure of food crops in their usual wintering range from southern Alaska and southern Canada south to northern Mexico. Migration to the nesting grounds generally takes place during April and May. The breeding range of Pine Siskins covers southern Alaska, across southern Canada, northern United States, and the southwestern and southeastern mountains. In 1988, we used BBL manual guidelines which cautioned that the breeding season is irregular and varies geographically from May to late August (Anon. 1991). We later learned (Yunick pers. com. 1995) that the Pine Siskin breeding season can begin as early as February in some parts of the Northeast.

Most breeding Pine Siskins can be sexed (Anon. 1991) by brood patch or cloacal protuberance. Lowther and Walker (1967) report the wing chord method of sexing to be of limited use for breeding Pine Siskins because of overlap between female and male wing chord lengths.

Yunick reported in 1976 that the amount and brightness of yellow in the flight feathers were related to sex determination for Pine Siskins. He found the wing coloration, when combined with age and wing chord data, may be useful for separating age groups in up to 35% of the Pine Siskins in a random population.

Our banding situation: Banding took place in a part of the Pine Siskin wintering range. The birds were aged after-hatching-year (AHY) following the BBL criteria which age all birds as AHY beginning 1 January. The banding manual states that Pine Siskins with wing chord values of 68 mm or less could safely be identified as female, while birds with wing chord values of 78 mm or greater could safely be identified as male. Only wing chord measurements were used to sex the Pine Siskins in this study.

Examination of average and monthly wing chord values: We calculated an average wing chord value of 71.72 mm using McEntee's (1976) data for a pooled sample of 902 Pine Siskins. Our five-month wing chord average value of 71.01 mm is in reasonable agreement.

Graphical Methods: The number of banded Pine Siskins were graphed (see Figure 1) versus their individual wing chord value for each month of the irruption. The five monthly graphs were examined for evidence that would show changes in the local Pine Siskin population.

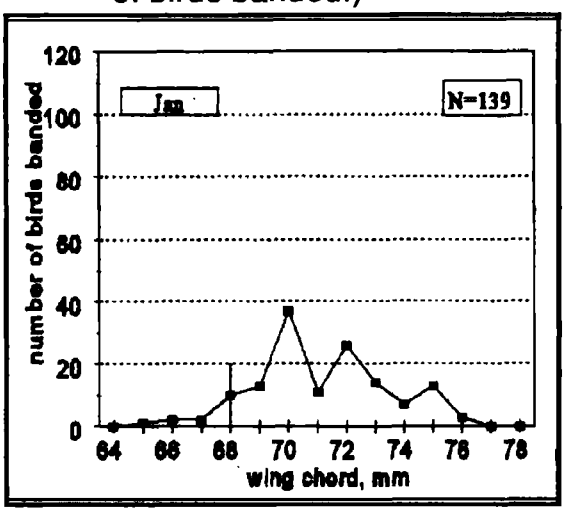
Variations in size and height of the age/sex peaks observed in the five-month sequence of population graphs suggest population changes had occurred. However, the difference in monthly sample size (e.g., 92 birds in May versus 493 birds in February) also could account for the observed shifts.

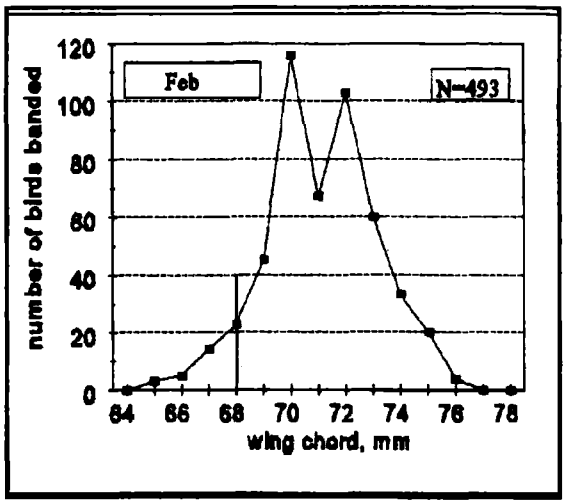
Station records were reexamined seeking a way to remove any question of the influence of sample size on the results. One hundred or more Pine Siskins were captured on five separate days during banding operations. Population graphs (Figure 2) were prepared for each of these five "peak count days." Major age/sex peaks are also easily visible in the graphs. Sequential examination of the five graphs revealed changes in the heights and sizes of the age/sex peaks. The "peak count day" graphs also show that the Pine Siskin population underwent change during the irruption.

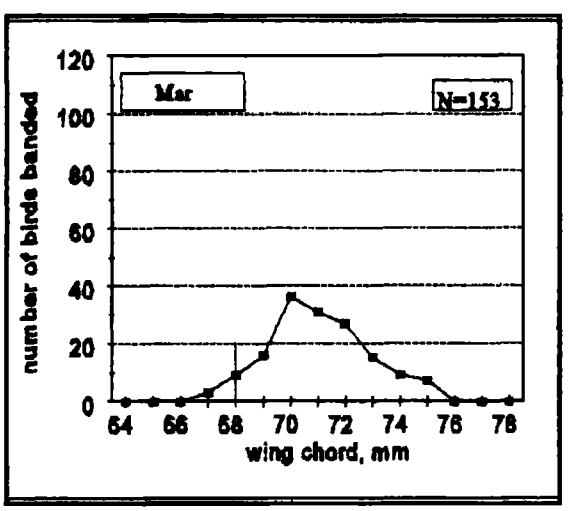
Sexing Pine Siskins: The BBL manual suggests that only Pine Siskins with wing chord values of 68 mm or lower can be sexed safely as female. We found 127 females (10%) in our banded sample. Our value agrees with a BBL statement that the number of female birds having wing chord values of 68 mm or lower should not exceed 10% of a random sample.

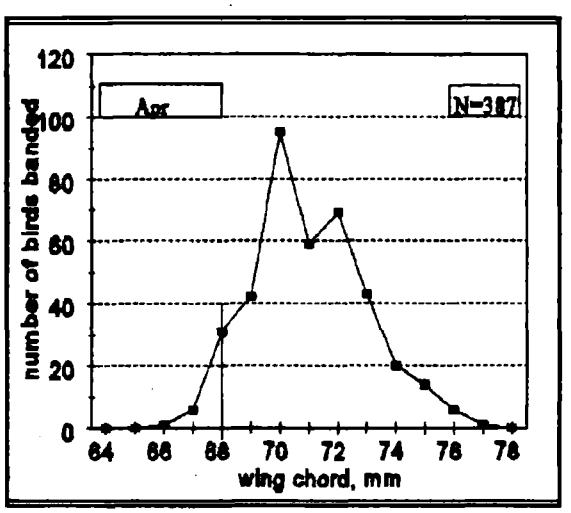
No Pine Siskins with wing chord values of 78 mm or higher were detected by us. Why did we not detect the longer wing chord values as reported by others? Yunick (1970) addressed the question of two researchers obtaining differing wing chord measurements for Pine Siskins. He suggested the differences in the wing chord values between his data and McEntee's was due to a difference in individual measuring technique. This may be the case for our data.

Figure 1. Monthly population graphs. (Pine Siskin wing chord values versus number of birds banded.)









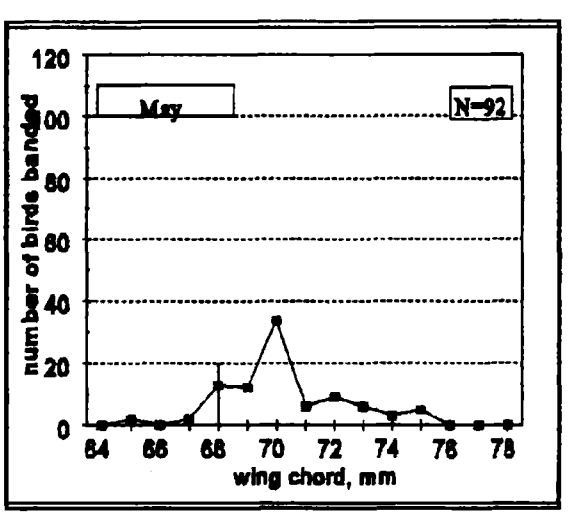
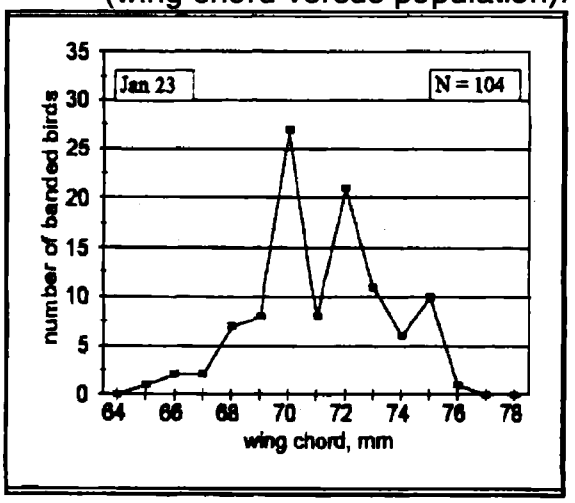
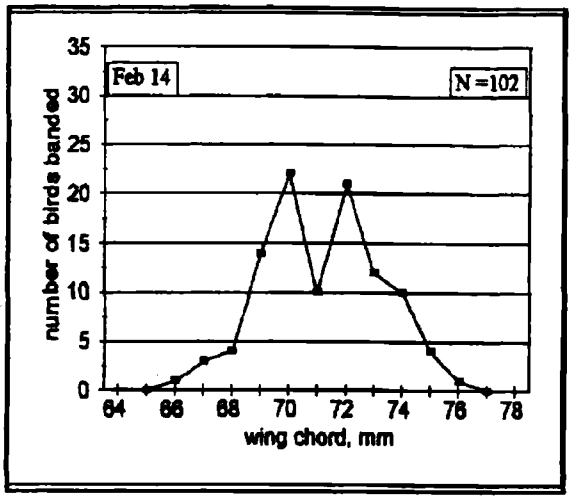
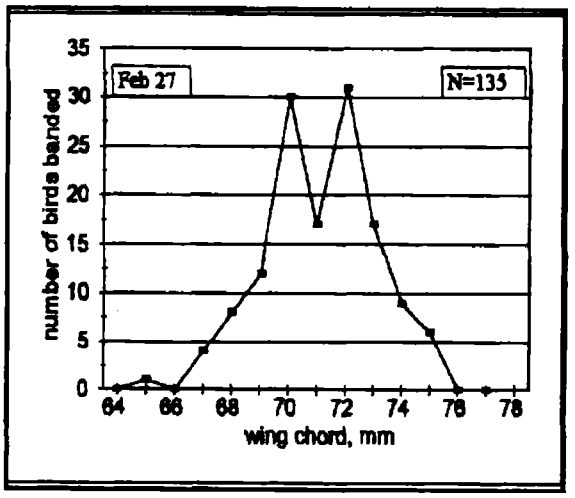
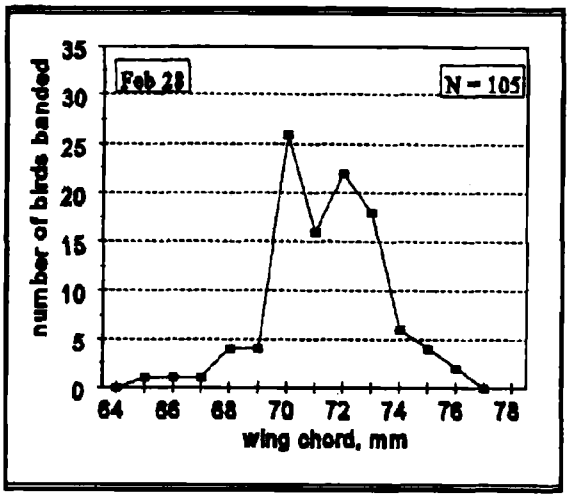


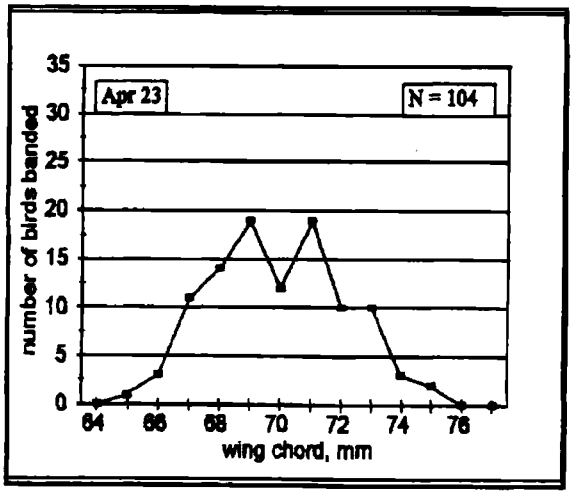
Figure 2. Population graphs "peak count days" with over one-hundred birds netted (wing chord versus population).









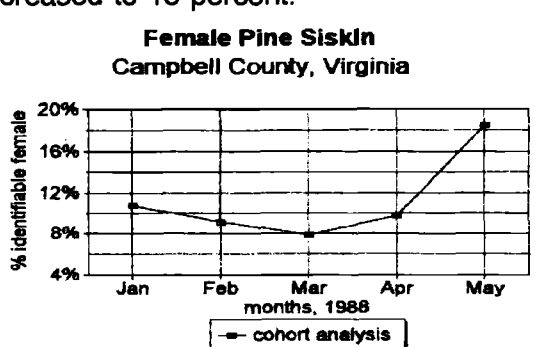


Lack of age group data: At this point in the study, we had no reliable criteria with which to determine the percentage of age groups within a given sex of Pine Siskins. The wing stripe color, bright or dull, of the banded Pine Siskins had been noted by us during banding operations. However, these observations could not be used since we had not established a color standard. McEntee (1976) and Yunick (1970, 1976) reported some success using the color and wing stripe width of Pine Siskins as additional predictors of the bird's sex and age. We were unaware of their work at the time we were banding the Pine Siskins, thus we had no reliable visual observation predictors to determine age ratios. Yunick (1995) more recently reported the successful use of rectrix shape as an age-determining criterion for Pine Siskins.

% Female Pine Siskins: The graphed data did not permit separation into sex ratios of male and female because of the wing chord overlap of the two sexes. Our only reliably useful data for further analysis was the number of female Pine Siskins with a wing chord measurement of 68 mm or less. We calculated monthly percentages of female Pine Siskins knowing that only five to ten percent or less of female Pine Siskins in a random sample would have a wing chord of 68 mm or less.

Calculations: Each monthly graph was analyzed for the percent of identifiable female Pine Siskins using a cohort method, which involved summing the number of birds with wing chord values of 68 mm or less, then dividing by the total number of birds in each monthly sample. The calculated monthly percentages of identifiable female Pine Siskins were plotted versus month banded.

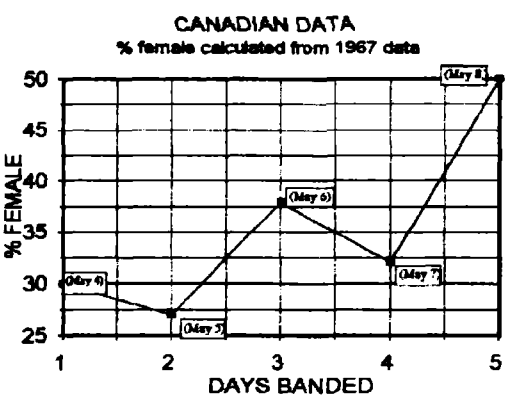
In the following graph the monthly value for percentage of identifiable female Pine Siskins remained between 8% and 11% until May when it increased to 18 percent.



Further analysis: The average percentage of female Pine Siskins for each "peak count day" was also analyzed using the cohort technique. The local identifiable female Pine Siskin population varied between 7% and 12% over the first 59 days of the irruption. The highest peak count day female population (14%) occurred 104 days into the irruption period. This increase in the measurable local female Pine Siskin population took place in late April during movement to the northern breeding grounds. There were no "peak count days" after 23 April even though banding continued well into May. The "peak count day" wing chord data supported the monthly average wing chord data results.

Literature: Lowther and Walker (1967) at Algonquin Park, Ontario, Canada, used the cloacal protuberance method to sex 371 Pine Siskins over a period of five days. The authors concluded the detected population shift was due to two possibilities: either differential migration had occurred or the male Pine Siskins had a greater attraction for calcium deposits on a wall near where the birds were banded.

We converted their published male/female ratios into percentages and plotted the data. The following graph shows their female population increase over the five-day period.



Speculation: What caused the increase in our female Pine Siskin population? Did a sex and/or age portion in our local siskin population change during the irruption period? On one hand a new group of female Pine Siskins may have arrived at the banding site in larger-than-previous numbers; or, on the other hand, an age group of male Pine Siskins departed for the northern breeding grounds earlier than either another age group of

males or even the females. Any of these events would explain the observed population change in May. More evidence is needed to determine if our observed female population change is part of the typical Pine Siskin movement to their breeding grounds.

SUMMARY

Increases in female Pine Siskin population were uncovered during a routine reexamination of wing chord data of Pine Siskins banded from January to May 1988. Population graphs were developed based upon wing chords and sexing criteria from the BBL manual. Numerical analysis revealed that the percentage of identifiable females in the local population increased in late April and May.

ACKNOWLEDGMENTS

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