North American Bird Bander

Volume 20 | Issue 1 Article 2

1995

Spring Wing Chord Values for American Goldfinches

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INTRODUCTION

Bowers and Dunning (1986) noted in the "Bander's Forum" section of the *North American Bird Bander* that large samples of primary biological data on birds were not available in the literature to researchers. They urged banders to publish their measurement data on birds. A large number of American Goldfinches *(Carduelis tristis)* were netted during a study (Hansrote and Hansrote 1993) of a local incursion into Campbell County, Virginia, during the spring of 1992. The size and uniqueness of the banded sample (791 birds) suggested a comparison of the measured wing chord lengths against literature values would add to the pool of American Goldfinch wing length data.

Pooled data, samples containing measurements collected at different geographic locations, seasons and years, are used in wing chord studies. It is generally accepted that pooling measurements yielded wing chord values that better reflect the general population of American Goldfinches. Pyle et al. (1987) used a pooled sample of 50 birds to report the range of the wing chord of the male and female American Goldfinch.

Prescott (1983) tabulated American Goldfinch wing chord measurements dating from the early 1900's to 1934. These earlier capture studies were done along the Atlantic coast. Prescott reported mean or median values (in millimeters) for wing chord length and range for the pooled literature samples. He also included evaluation of a pooled sample collected over three years at two sites in New Jersey.

METHODS

Station Location and Operation: The banding station is located near the western edge of the Virginia Piedmont in Campbell County. The majority of the netted birds flew into nearby trees and descended toward the feeders. Two mist nets were placed in a v-shape with the feeders in the center. The nets were randomly opened and closed during daylight hours, but never at night. Occasionally, a third net was used. The station was opened on forty-two days (55%) during the period 29 February 1992 to 16 May 1992. Total net hours were 561.4. All wing chord measurements reported in this spring of 1992 study were measured at the same geographic location on live birds.

General Background: Pyle et al. (1987) noted the wing chord or "unflattened" wing length is the measurement most frequently used and published in North America. The Bird Banding Laboratory Manual Vol. II (Anon. 1991) designated the wing chord as the length of the closed wing in a natural position from the bend to the tip of the longest primary. Either wing can be measured. A thin ruler with a perpendicular stop at zero is used to measure wing lengths. The ruler is placed under the wing with the bend of the wing pressed snugly against the stop and the length read. The Bird Banding Laboratory wing chord method should result in consistent and reproducible measurements when performed properly and in a standardized way, although Pyle et al. (1987) cautioned there exists a potential for non-conformity.

Wing Chord Measurement Technique Used in This Study: Wing chord measurements were made using the right wing of the goldfinches. The value was read to the nearest whole millimeter as recommended by the Bird Banding Laboratory. Parks and Parks (1968) reported wing chord lengths of American Goldfinches to the nearest 0.1 mm, while Prescott (1983) read the measurement to the nearest 0.5 mm. None of our measurements were discarded due to missing or broken wing feathers.

WING CHORD RESULTS

Table 1. Wing chord data for American Goldfinch, spring 1992, Campbell County, Virginia

Month	Number of Birds	% Per Month	Mean or Average, X	Standard Deviation (+/-) SD	Wing Chord Range, mm	Delta for Range, mm
MARCH (a)						
Female	87	32	69.83	2.00	62-73	11
Male	188	68	71.15	1.49	67-75	8
All	275		70.15	1.88	62-75	13
APRIL						
Female	120	36	68.66	1.49	65-74	9
Male	209	64	71.67	2.27	67-76	9
All	329		70.58	2.18	65-76	11
MAY						
Female	94	50	69.7	2.50	65-74	9
Male	93	50	73.03	2.25	69-76	7
All	187		71.36	1.65	65-76	11
SPRING						
Female	301	38	68.80	1.65	62-74	12
Male	490	62	71.44	1.50	67-76	9
All	791		70.43	2.07	62-76	14

(a) One female and six males banded on 29 February 92 were arbitrarily added to the March total.

RESULTS

Banding Results: Nine hundred and five (905) birds were banded during the period 29 February through 14 May 1992. The station yielded 1.6 birds banded per net hour. Eighty-seven percent (791) were American Goldfinches.

Ratio of Male to Female in Spring: Data in Table 1 revealed more male (62%) than female (38%) American Goldfinches were netted during the 1992 spring season. Monthly data in the percent column of Table 1 indicates there was a shift (increase) during the course of the three spring months in the ratio of males to females netted.

DISCUSSION

Male vs. Female Wing Chord: For the 1992 spring sample of American Goldfinch, the average male wing length of 71.4 mm was longer than the average female length of 68.8 mm. This observation agrees with Park and Park's (1968) and Prescott's (1983) claims that male American Goldfinches generally have longer wing lengths than the female.

Spring Monthly Average Wing Chord Values: The calculated monthly wing length values for each sex for each of the three spring months are listed in Table 1. The results reveal that the average male wing chord length was longer than the female American Goldfinch for each month of the 1992 spring period.

Spring Seasonal Wing Chord Averages: Prescott (1983) examined his pooled New Jersey sample of American Goldfinch measurements and found seasonal variations in wing chord. He also demonstrated there were differences in wing length between male and female American Goldfinches captured in New Jersey during different seasons. Table 2 lists spring season wing length data from Prescott (1983).

Table 2. Wing chords of American Goldfinches[1], mm., spring season - March to May

Spring Season	Number of Birds	% Per Spring	Median	M S.D.	Wing Chord Range, mm	Wing Chord Delta, mm
Female	59	41	70.0	70.23 (+/-) 0.412	67.0-78.0	11
Male	86	59	72.0	72.25 (+/-) 0.376	67.0-78.0	11
All	145		71.5	71.43 (+/-) 0.435	67.0-78.0	11

[1]Pooled sample captured over a three-year period at two inland sites in New Jersey.

Comparison of the wing chord values (Table 1) of the 1992 spring American Goldfinch population in Virginia revealed shorter wing chord values than for spring birds banded in New Jersey.

Spring Season Wing Chord Ranges: Several factors such as weather, sample size, and age/sex differences (differential migration) are thought to contribute to observed differences in wing chord measurements for a population of birds.

Prescott (1983) noted that the wing chord range reported in the early literature was "markedly smaller" than his data. Our data were reexamined in an attempt to explain why our sample's wing chord range (14 mm) is longer than Prescott's pooled sample (11 mm). One of our female birds with a wing chord value of 62 mm stands suspect. The suspiciously low value for the wing chord could have resulted from a very late hatched bird or an error made during the measurement or recording the data. There is no way to determine if any of these events happened. Search of all station records located three examples of female American Goldfinch with wing chords of 65 mm or less. The suspected value was not dropped from the study.

As a result, the 1992 Virginia American Goldfinch population had a longer wing chord range than the New Jersey spring populations. In addition, the lowest and highest values for the male and female Virginia wing chord were generally lower than for those of the New Jersey spring population.

It is not known if the pooling technique used to obtain the New Jersey sample results in the wing length data being affected differently than a uniquely collected sample. Pyle et al.'s (1987) suggestion that North American passerine wing lengths are subjected to sex, age (yearly), and geographic variation is possibly the best explanation for the difference in measured values.

Spring Monthly Wing Chord Ranges: Any observed difference in wing chord range values could be due to several factors, among them: geographic location, weather, sample size, and age/sex differences. All birds in this study were captured at the same geographical location. The number of birds in each monthly sample for both sexes is considered sufficiently large (see Pyle et al. [1987] who used a pooled sample of 50 birds to report the range of the wing chord for male and female American Goldfinch).

Was Differential Migration a Possible Explanation? One explanation for the observed changes in monthly wing chord range values and average wing lengths can be based upon either a gain or loss of a component age group from the overall population being banded. Such a gain or loss of an age group from a population during migration is an indication of differential migration. Data in Table 1 show that the wing chord range for females changed from 11 to 9 mm over the three spring months. A decrease in wing chord range, if significant, suggests some portion of the female population left Campbell County during March. Examination of the average monthly female wing length was

found to change from 69.83 to 68.66 to 69.70 mm over three months. These wing length changes support the thought that some female component of the migrating birds had changed during the spring season.

The male wing chord range changed from 8 to 9 to 7 mm over the three months. This change is less clear and more difficult to interpret. The average monthly male wing length, however, was found to change from 71.15 to 71.67 to 73.03 mm over the same time period, suggesting some component of the male migrating population had also undergone a change. Parks and Parks (1968) stated that younger male birds have shorter wing lengths than older birds. The observed increase in wing length during the 1992 spring season suggest younger males left the population during the first two months of spring.

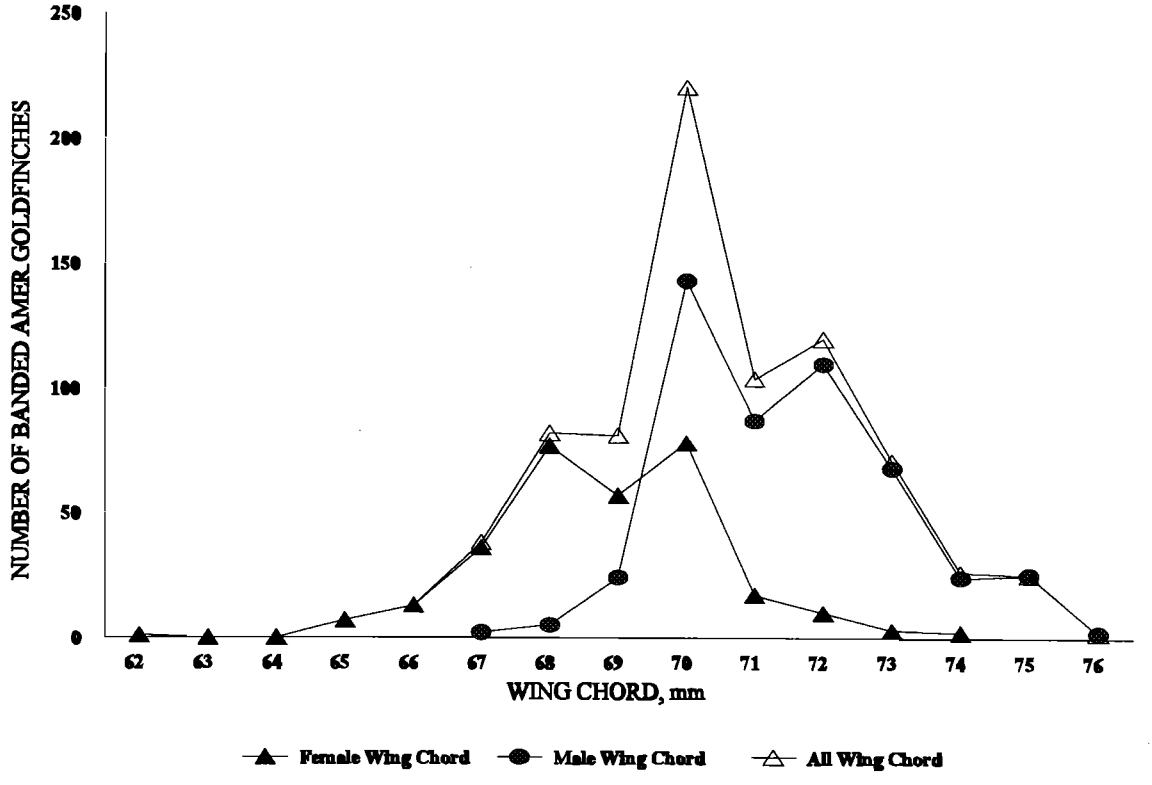
Initially during the banding process, the birds were aged as after hatching year (AHY) as well as second year (SY) and after second year (ASY). Later during the study period the birds were only listed as AHY. Individual plumage markings were noted in the station log. It was felt improper to return at this later time and reassign them as either SY or ASY. Because of this oversight by the authors, another technique was sought to examine the wing chord measurements for a sex or age component loss.

Wing chord values were plotted versus the number of American Goldfinch with that particular wing chord value. The result, Graph 1, gave a plot with three major peaks and one minor peak for the total netted 1992 spring population of American Goldfinch. Separate plots of male and female wing lengths revealed the nature of the major peaks in the total population. The female peaks were located at 68 and 70 mm wing length. The male peaks were at 70, 72 and 75 mm wing length. The peak at 68 mm represents AHY females, while the peak at 70 mm represents older females.

Plot of wing chord versus number of banded birds

1992 SPRING SEASON - CAMPBELL CO., VA

GRAPH 1



The peak at 70 mm represents AHY males, while the peak at 72 mm represents older American Goldfinch males. These assignments agree with Prescott's (1983) statement that for either female or male American Goldfinch, older birds have longer wing lengths. In addition, both Park and Park (1968) and Prescott (1983) stated that female American Goldfinch have shorter wing lengths than males. The minor peak at 75 mm appears to represent a small but detectable population of males that are at least three years old.

Frequency plots of wing length vs. number of birds with that particular wing length for each spring month are included in Figure 1. Examination of the qualitative changes in the two major peaks for females show the 68 mm peak to be present for all three months. The data in the three female frequency plots suggest the 72 mm peak appears to increase through April and then is no longer present as a peak in May. This wing chord increase suggests older female American Goldfinches passed through the Virginia Piedmont in March and April but were no longer present in large numbers in May.

Qualitative examination of the changes in the frequency plots for male American Goldfinches show the 70 and 72 mm peaks are present in each of the three spring months. In April, the minor peak at 75 mm appears, suggesting the oldest males are migrating through Virginia.

We submit that our wing length data suggest differential migration of American Goldfinches took place in Campbell County, Virginia, in the spring of 1992. A more rigorous analytical method beyond the scope of this paper is needed to confirm these speculations.

SUMMARY

1. The 1992 spring American Goldfinch male population wing lengths were longer than female wing lengths.
2. The 1992 wing chord averages and ranges differed from a pooled New Jersey sample taken over several springs and reported in 1983.
3. Overall 1992 spring capture ratios favored males (62%) over females (38%). Early 1992 spring monthly capture ratios changed to a normal population of 50/50 males/females by May. Calculation using Prescott's New Jersey spring data revealed a similar capture ratio favored males (59%) over females (41%).
4. Qualitative evidence suggested differential migration of American Goldfinch took place during the 1992 spring migration through the Virginia Piedmont.

ACKNOWLEDGMENTS

Acknowledgment is made to Dr. Raymond Underwood for his constructive comments and to Dr. Elsa Tiner for her valuable suggestions on an earlier rough draft of this article. Kathy Klimkiewicz of the Bird Banding Laboratory took valuable personal time to read and make many useful comments on a later draft. My grateful thanks go to Hannah Suthers, a skilled reviewer whose patience with the author was remarkable.

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Figure 1. Graphs of wing chord frequency for male and female goldfinches for each 1992 spring month.