

A Re-evaluation of Age Composition of Irrupting Populations of Black-capped Chickadee (*Poecile atricapillus*)

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ABSTRACT

Bagg (1969, repeated in Smith 1991 and Foote et al. 2010) characterized fall irruptions of Black-capped Chickadees (*Poecile atricapillus*) as consisting of mostly immature birds. He based his conclusion on 1968 fall banding data from numerous banding stations where skull examination was used to determine age. Since skull pneumatization in immature chickadees undergoes completion in Oct-Dec (Yunick 1980), the method is not applicable in separating age classes over the entire period of an irruption. Meigs et al. (1983) described a method based on rectrix shape to reliably age chickadees on a year-round basis thus allowing a more complete assessment of year-to-year variation in chickadee age composition during these irruptions. Here I present data over a 43-year period (1970-2013) from a banding station in the Adirondack Mountains of New York illustrating irruptive migration of Black-capped Chickadees, and more particularly age composition through entire irruptions using Meigs et al.'s rectrix method for the 30-year period, 1983-2013. Contrary to earlier findings, these data indicate that not all irruptions are heavily populated by immature birds. In 13 of the 30 years, adults made up over 50 percent of the birds captured, the highest being 88.5 percent in 1999-2000 when 260 chickadees were captured. In only six years was the adult percentage 30 percent or less; the average over the 30-year period was 52.0 percent adult based on the banding of 3144 chickadees and processing of 1260 return captures of birds banded in previous years.

INTRODUCTION

Irruptive migration is defined as migration induced in direct response to food availability (Able 2004). The Black-capped Chickadee (*Poecile atricapillus*) is known to be an irruptive migrant,

migrating south in the fall some years and not others, the possible causes including good or poor breeding success as well as food scarcity due to cone crop failures (Lawrence 1958, Hussell and Stamp 1965, Bagg 1969, Smith 1991, Hussell 1996 and Foote et al. 2010). Bock and Lepthien (1976) show a strong correlation in their Fig. 3 between irruptions of several species of boreal seed-eating birds in years of poor seed production, 1948-1971. Bagg's (1969) epic and exhaustive gathering of data on the fall 1968 chickadee irruption, as well as the 12 previous years, from banders and observers in the north-central and northeastern United States and southeastern Canada illustrates the late-summer, early-fall initiation of these irruptions. In particular he reports that during the 1968 flight banders commented on how many of the birds they handled were immatures; and he cites that of the 1300 chickadees banded 9 Sep to 24 Oct 1968 at Manomet, Massachusetts 85% were immatures, identified as such by skull examination (see Pyle 1997— for method).

The usefulness of this method of skull examination is limited to summer and early fall (Yunick 1980) because immature birds complete the pneumatization of their skulls starting in Oct and based solely on skull examination become indistinguishable from adults with completely pneumatized skulls. Meigs et al. (1983) introduced a new method to age chickadees through the use of rectrix shape, thus allowing year-round recognition of immatures still with juvenal rectrices (pointed or lanceolated rectrix tips) and adults in basic plumage (truncated or rounded rectrix tips). Their method followed prior published results on Willow Tit and Crested Tit (*Parus montanus* and *P. cristatus*, respectively) in Finland by Laaksonen and Lehikoinen (1976). Employing Meigs et al.'s (1983) method I was able to determine the age of chickadees year-round and gathered new insight on the annual age composition of chickadees in irruption as well as non-irruption years.

METHODS

Banding was conducted starting in Aug 1970 at my seasonal camp in the Adirondack State Park at Jenny Lake, Saratoga County, 7 km west of the Village of Corinth, Saratoga Co., New York. The banding station was at an elevation of about 387 m (1270 ft) at coordinates 431-0735. Black-capped Chickadees are year-round residents at this location. They were caught in mist nets placed near three sunflower seed feeders. By 1973 I had conceived of and constructed a weather-proof feeder which allowed uninterrupted feeding during the snow season despite heavy winter snow. It consisted of a large seed reservoir capable of holding up to two weeks or more supply of sunflower seed that fed seed into a wire cage. Between the reservoir and the cage was a snow shield protecting the seed in the cage. The cage was made of 1 x 2-in (25 x 50-mm) welded wire through which chickadees and similarly small birds could pass to access the seed, but excluding larger birds such as Blue Jays (*Cyanocitta cristata*) and Evening Grosbeaks (*Coccothraustes vespertinus*).

From Oct to Apr, I used three of these feeders, one each on the east, north and west sides of the camp, each with an adjacent mist net between the feeder and immediate forest cover. At each feeder refilling, I weighed the amount of seed needed and by dividing it by the number of elapsed days was able to calculate average daily consumption as well as total annual consumption. These data augmented my capture data in affirming monthly and annual changes in bird abundance. For May through Sep, I used an alternate tray feeder design which accommodated species up to Mourning Dove (*Zenaida macroura*) size. Since 1973, these two feeder designs have continuously supplied seed every day without interruption through 2013.

I employed different capture strategies depending on the season: 1) During Oct to Apr, the "winter" or irruptive season, I visited the site once every 6-15 days to operate one net at each feeder (two 12-m and one 6-m net, 30-mm mesh size) and to restock the feeders; 2) May, early Jun and later Sep were transition times when I made overnight weekend visits using 5.5 nets, 2.5 of them still at the same feeder locations as in winter; and 3) From late Jun

to early Sep, the fledging season, I was in residence and operated 5.5 nets on various days during the week. During all banding sessions, it was my intent to operate my nets for at least 2 hr as a standard measure, sometimes more when birds were especially abundant, unless prevented from doing so by the arrival of rain or snow during a banding session; or when I quit short of the 2 hr if I went an hr without making a capture, because birds were so scarce. Table 1 summarizes the number of banding sessions during the winter period, Oct through Apr, from 1970-1971 through 2012-2013.

For analysis purposes, I selected 1 Jul as the beginning of the banding year, running to 30 Jun of the following year. This Jul commencement coincided with the typical annual first appearance of newly fledged chickadees at the feeders in Jul or Aug. On rare occasions they might first appear in late Jun, but the number doing so in years of early breeding was minuscule.

RESULTS

Table 2 summarizes the annual monthly captures of birds banded (n=4496) and birds recaptured as returns which had been banded in a previous year (n=1738) for the entire 43 yr, 1970-2013. A return bird was counted only once at time of first recapture in any given year regardless of the number of times it was captured in that year. Winter data were incomplete for the years 1970-1971, 1971-1972 and 1972-1973 because my feeders were not snow-proof and not in use; but as of 1973-1974, I had solved that problem of accumulated snow interfering with seed access and could provide continuous daily feeding throughout the year regardless of weather. The annual capture data for 1975-1976 through 2012-2013 from Table 2 are represented graphically in Fig. 1 along with seed consumption data for the same years for Oct through Mar. Seed consumption data for Apr through Sep are not included for two reasons: 1) A different feeder design during this period allowed access to a larger assortment of species; and 2) A large breeding population of Purple Finches (*Haemorhous purpureus*) arriving in Apr, staying into Sep, consumed copious quantities of sunflower seed that in no way reflected annual variations in chickadee numbers.

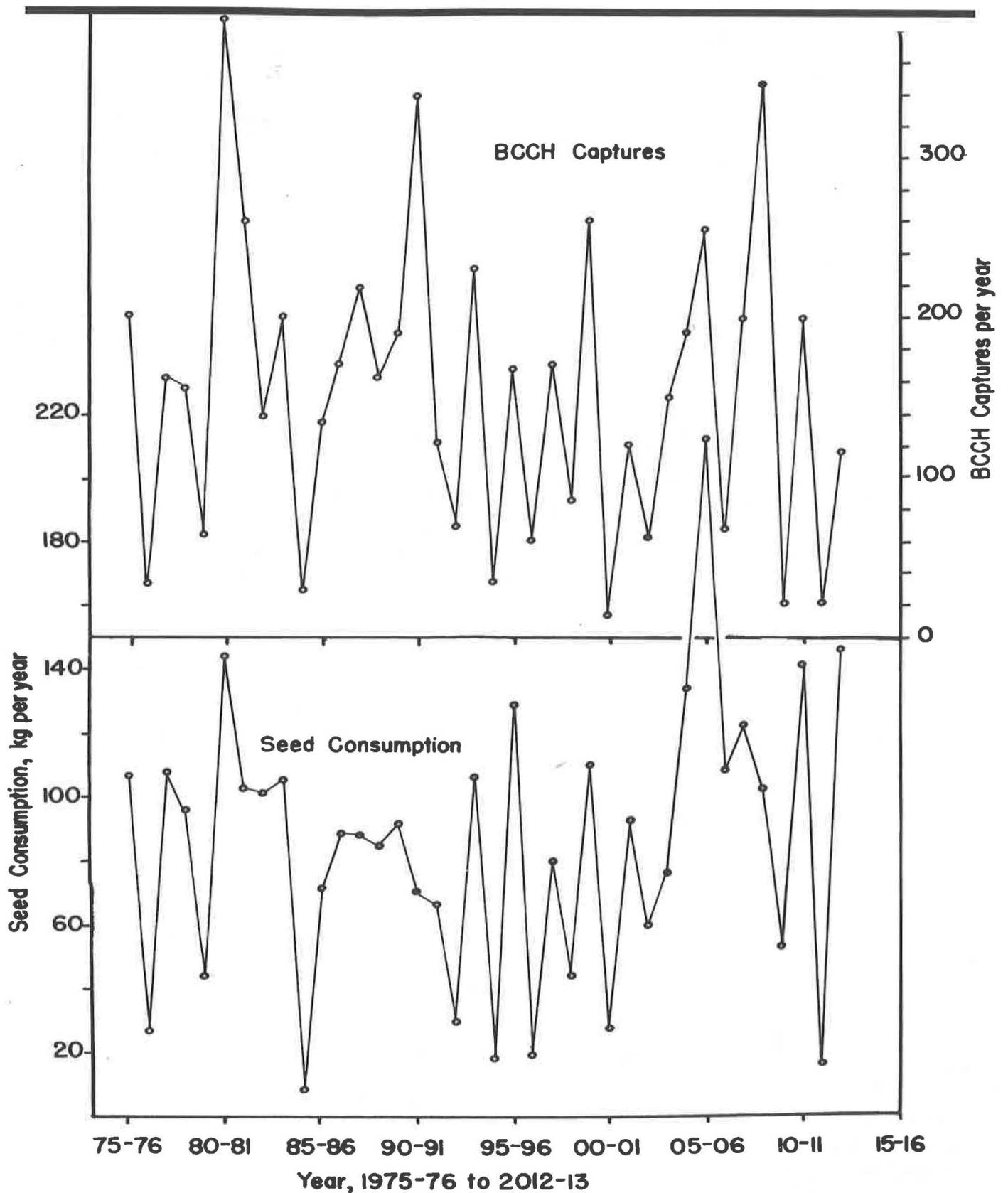


Fig. 1. A comparison of Black-capped Chickadee (BCCH) captures for October through April at Jenny Lake, New York for the years 1975-76 through 2012-13 (data from Table 2) with sunflower seed consumption for October through March for the same period of years. BCCH captures are measured on the upper right axis while seed consumption is measured on the lower left axis.

The annual capture totals in Table 2 show wide fluctuations year to year consistent with the irruptive nature reported for this species from a low of 16 birds captured during the year 2000-2001 to a maximum of 388 in 1980-1981. They show certain years of extraordinary abundance marked in bold print in the Total column at intervals of nine or ten years (see Discussion). May, Jun and Jul were the months of lowest chickadee abundance at the feeders with a surge of activity Nov through Feb, especially in Dec and Jan. Seed consumption in Fig. 1 fluctuates annually, similarly to the capture data.

Table 3 adds repeat captures to that total to represent total individuals present monthly on an annual basis. A repeat capture counted only once in any given month even though caught more than once in that month. The greatest abundance of birds captured at these feeders occurred in Nov through Apr, essentially a wintering population peaking in Jan. Again, as in Table 2, May, Jun and Jul were the months of lowest abundance as birds tended to nesting and raising young.

Table 4 condenses the data from Table 3 into monthly totals for the three capture classes. New bandings peaked in Dec, new return captures in Jan and repeat captures in Mar. Overall, the greatest number of individual captures occurred in Jan, declining thereafter as seed consumption declined also, suggesting the onset of migration.

Table 5 provides a comparison of birds banded and returns captured on an annual basis over the 43 years, including further capture history on return birds. Excluding the years 1970-1971 and 1971-1972, returns constituted 6.2 to 47.0 percent of a year's catch (2000-2001 and 1983-1984, respectively); and, for all years combined, averaged 27.9 percent of individuals captured. The capture histories of the two birds recaptured up to nine years after banding suggest they were local breeders. The first one was banded 16 Aug 1980 as a Hatching-Year (HY) bird, just newly fledged, and recaptured in eight of the following nine years, twice as a female with a brood patch on 24 May 1981 and 19 May 1984. Her age at last recapture on 7 Apr 1990 was 9yr 10mo. The second bird was banded as an

After-Second-Year (ASY) bird on 27 Jan 1990 and was recaptured in five of the following nine years, once as a male with a cloacal protuberance on 6 May 1990. His last capture was on 21 Mar 1998 when he was 10yr 9mo. old.

Table 6 addresses the age status of the birds captured from 1983 to 2013 using Meigs et al.'s (1983) rectrix shape method to determine age. The age classifications used are: HY/SY meaning Hatching Year/Second Year for immatures up to 31 Dec (HY) and thereafter (SY) until their first complete prebasic molt when they acquired adult rectrices, and AHY/ASY meaning After Hatching Year/After Second Year for birds with adult rectrices up to 31 Dec (AHY) and After-Second-Year (ASY) thereafter until the next prebasic rectrix molt when ASY and AHY birds were indistinguishable and their age reverted to AHY. Referring to only new birds banded, the percentage of adults (AHY/ASY) ranged 0-81.8 per year (2000-01 and 1999-2000, respectively) averaging 32.8 percent. All return birds were adults (AHY/ASY) leading to the total of all birds captured annually averaging 52.0 percent adults with a range over the 30 years of 6.3 to 88.5 percent (2000-01 and 1999-2000, respectively).

DISCUSSION

Irruptive Status and Age Composition. The data examined by Bagg (1969) and those presented here represent two different aspects of this chickadee irruptive phenomenon. His data are from the early stage of the irruption in Sep-Oct at banding stations which encountered migrants in passage from 1951 to 1968, while data here are from a wintering site over the course of many years involving numerous return captures of birds from previous years. Both sets of data exemplify alternating years of abundance and scarcity as reported by Lawrence (1958), Hussell and Stamp (1965), Smith (1991), Hussell (1996) and Foote et al. (2010).

Return birds from previous years enhanced the percentage of adults in any given year's total captures. But as shown in Table 6, where new bandings and return captures are presented separately, newly banded birds varied annually not

only in total number (15 to 281 per year), but also in age ratio (0.0 to 81.8 percent adult, average 32.8) for all years combined. There was considerable variation in age ratio even within irruption and non-irruption years with immatures prevailing some years, adults in others. Compare two flights enriched with adults: 1) the 1990-91 flight where 262 birds were banded and 52.7 percent of them were adult and, 2) the 1999-2000 flight where 165 banded birds were 81.8 percent adult with a flight that was overwhelmingly immature, i.e., the 2008-09 flight where 281 were banded and only 10.3 percent were adult.

In the four years of lowest total bandings (1984-1985, 2000-2001, 2009-2010 and 2011-2012) adults were very scarce ranging 0.0 to 12.5 percent per year. The immatures, which dominated these years, quite possibly were local offspring. Then the five-year period 1986-1987 to 1990-1991 represents an interesting comparison in that the first four years annually produced relatively high numbers of banded birds per year (116-175) that were overwhelmingly immature (only 6.5-17.2 percent adult). Next year, 1990-1991, a major irruption occurred dominated by 52.7 percent adults.

Age Composition of Periodic Mega-Flights. Another characteristic of these irruptions is illustrated in Table 2. The totals of birds captured in five of the 43 years are represented in bold font in the far right column. In each of these years, the number of captures was extraordinarily high and these extraordinary captures occurred at intervals of nine and ten years. These were years of mega-flights. In the three of those years when Meigs et al.'s (1983) rectrix method was used for age determination, the mega-flights of 1990-1991 and 1999-2000 were predominantly adult birds, 52.7 and 81.8 percent, respectively, unlike the 1968 irruption noted by Bagg (1969); while the 2008-2009 flight was overwhelmingly immatures with only 10.3 percent adult similar to the 1968 irruption described by Bagg (1969). These mega-flights exemplify the same wide range of age composition as occurred in years of lesser flights.

The inclusion of the 1971-1972 year in this mega-flight category when only 182 birds were captured compared to the much higher numbers of the other

mega-flight years requires further explanation. I had not yet begun using the snow-protected feeders, so was not feeding birds through that winter of 1971-1972. However, a year-round neighbor 50 m from my feeders had fed birds through the winter, noting extraordinary numbers of chickadees in Jan, Feb and Mar. I had put out feeders in Mar and on a visit on 19 Mar 1972, using one 6-m net, captured 73 chickadees and six other birds in just over three hours, for a yield of 23.7 chickadees per net-hr, an extraordinarily high yield. I estimated about 150 chickadees present in the area that day, suggesting that this was a year of a mega-flight.

Alternating Annual Periodicity of Abundance and Scarcity. The results in the far-right column of Table 2 illustrated graphically in Fig. 1 suggest some intervals of periodicity of years of alternating abundance and scarcity, but the pattern is not consistent. The pattern exists for years 1970-1971 through 1977-1978, but is interrupted in 1978-1979 through 1990-1991. The alternating abundance pattern reoccurs again in 1991-1992 through 2003-2004, but is interrupted in 2004-2005 through 2007-2008, and resumes in 2008-2009 through 2012-2013. Similar inconsistent periodicity was found in New York state's Christmas Bird Count data, 1960-1981, when comparing irruptions of Black-capped Chickadee with those of Boreal Chickadee (*P. hudsonicus*) (Yunick 1984). Loery et al. (1997) at a year-round feeding station providing sunflower seed and suet used capture-recapture data for Nov-Jan over a 35-year period, 1959-1993, to determine survivability of Black-capped Chickadees in Connecticut. In their Fig. 2 they showed annual population-size estimates which varied year to year, but did not fit a continuously alternating-year pattern of abundance and scarcity.

Bock and Lepthien (1976) used Christmas Bird Count data to demonstrate inter-specific synchronous irruptions of eight boreal seed-eating species, not including Black-capped Chickadee, for the years 1962 to 1971. For one of those eight species, Red-breasted Nuthatch (*Sitta canadensis*), Bock and Lepthien (1972) found between 1950 and 1970 perfect synchronization in continent-wide irrup-

tions comparable to the data presented by Bagg (1969) for Black-capped Chickadees in Ontario, 1961 to 1968. As shown here, however, periods of synchronously alternating years of abundance followed by scarcity in numbers of irrupting Black-capped Chickadees do exist, but over longer durations the pattern is periodically disrupted. Suffice it to say these data illustrate the complexity of these irruptions both in terms of timing and age composition.

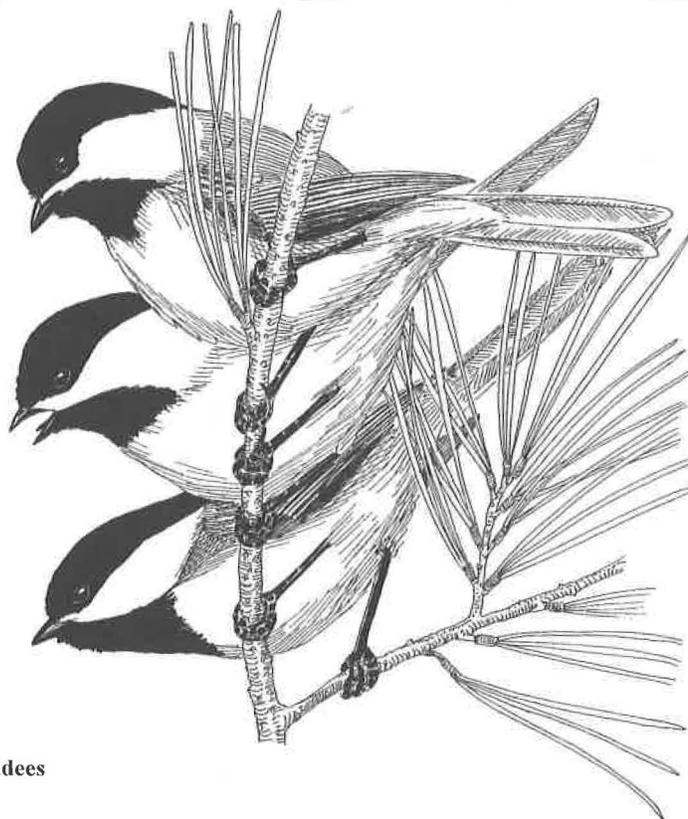
Re-encounters and Foreign Retraps. Brooks (1991) summarized re-encounters from nearly 15,000 Black-capped Chickadees banded in fall between 1922 and 1988 in the files of the U.S. Bird Banding Laboratory. She selected birds banded from 1 Aug to 12 Jan to exclude birds that might be spring migrants after 12 Jan. She found records of 83 re-encountered chickadees (~0.55 percent). Among the 4496 bandings reported here in Table 2, there has been no report to date of a re-encounter or recovery of any of these birds outside the Jenny Lake ten-minute block where banded. Similarly, no foreign-banded chickadee from another ten-minute block has been recaptured at Jenny Lake in these 43

years. Given this lack of recapture data, it is not possible to sort out annual local movements from long-distance irruptive migrants; but the capture data and seed consumption data in Fig. 1 are totally consistent with the pattern of irruptive migration portrayed by other authors cited numerous above.

In summary: 1) The age composition of these irrupting chickadees is not limited primarily to immatures as previously reported; and 2) Age composition is highly variable year to year, implying there is complexity to these events which we may not fully understand. We know the events occur, and breeding success and food availability play a role, but are there other factors at play to explain the annual age variations observed?

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Black-capped Chickadees
by George West

Table 1. Summary of Banding Sessions conducted by month, Oct through Apr, at Jenny Lake, NY, for the years 1970-1971 through 2012-2013.

| Year | Oct | Nov | Dec | Jan | Feb | Mar | Apr | Total |
|-------|-----|-----|-----|-----|-----|-----|-----|-------|
| 70-71 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 71-72 | 1 | 1 | 0 | 0 | 0 | 3 | 2 | 7 |
| 72-73 | 4 | 5 | 2 | 1 | 1 | 5 | 2 | 20 |
| 73-74 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 20 |
| 74-75 | 1 | 1 | 3 | 2 | 3 | 3 | 2 | 15 |
| 75-76 | 1 | 4 | 1 | 3 | 4 | 2 | 3 | 18 |
| 76-77 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 10 |
| 77-78 | 2 | 3 | 3 | 1 | 2 | 2 | 3 | 16 |
| 78-79 | 4 | 1 | 2 | 2 | 2 | 3 | 1 | 15 |
| 79-80 | 2 | 3 | 2 | 1 | 2 | 3 | 5 | 18 |
| 80-81 | 2 | 2 | 3 | 3 | 5 | 3 | 3 | 21 |
| 81-82 | 3 | 4 | 3 | 3 | 2 | 4 | 3 | 22 |
| 82-83 | 5 | 3 | 3 | 2 | 2 | 2 | 3 | 20 |
| 83-84 | 4 | 3 | 2 | 2 | 2 | 3 | 2 | 18 |
| 84-85 | 0 | 2 | 1 | 2 | 1 | 3 | 2 | 11 |
| 85-86 | 2 | 3 | 3 | 2 | 2 | 3 | 3 | 18 |
| 86-87 | 2 | 3 | 2 | 2 | 3 | 2 | 3 | 17 |
| 87-88 | 2 | 3 | 2 | 3 | 2 | 2 | 3 | 17 |
| 88-89 | 2 | 3 | 2 | 2 | 2 | 2 | 3 | 16 |
| 89-90 | 4 | 2 | 2 | 2 | 2 | 2 | 4 | 18 |
| 90-91 | 3 | 2 | 4 | 3 | 2 | 2 | 4 | 20 |
| 91-92 | 2 | 3 | 2 | 2 | 2 | 2 | 5 | 18 |
| 92-93 | 3 | 1 | 3 | 2 | 2 | 2 | 3 | 16 |
| 93-94 | 2 | 2 | 3 | 3 | 2 | 3 | 5 | 20 |
| 94-95 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 15 |
| 95-96 | 5 | 4 | 4 | 3 | 2 | 3 | 3 | 24 |
| 96-97 | 2 | 1 | 2 | 2 | 2 | 2 | 1 | 12 |
| 97-98 | 4 | 3 | 3 | 3 | 3 | 3 | 3 | 22 |
| 98-99 | 4 | 2 | 3 | 3 | 2 | 2 | 5 | 21 |
| 99-00 | 6 | 4 | 4 | 3 | 4 | 3 | 5 | 29 |
| 00-01 | 2 | 2 | 2 | 1 | 2 | 2 | 4 | 15 |
| 01-02 | 3 | 2 | 4 | 3 | 3 | 2 | 5 | 22 |
| 02-03 | 3 | 2 | 2 | 3 | 2 | 3 | 4 | 19 |
| 03-04 | 1 | 33 | 3 | 3 | 4 | 3 | 6 | 23 |
| 04-05 | 3 | 4 | 4 | 3 | 4 | 3 | 2 | 23 |
| 05-06 | 2 | 4 | 4 | 4 | 4 | 3 | 6 | 27 |
| 06-07 | 2 | 3 | 3 | 2 | 2 | 2 | 5 | 19 |
| 07-08 | 3 | 4 | 3 | 3 | 4 | 3 | 3 | 23 |
| 08-09 | 2 | 3 | 3 | 4 | 4 | 5 | 5 | 26 |
| 09-10 | 1 | 2 | 3 | 1 | 2 | 4 | 3 | 16 |
| 10-11 | 2 | 4 | 3 | 4 | 3 | 3 | 4 | 23 |
| 11-12 | 1 | 0 | 2 | 3 | 3 | 4 | 5 | 18 |
| 12-13 | 3 | 3 | 3 | 3 | 4 | 3 | 5 | 24 |
| Total | 105 | 111 | 109 | 101 | 105 | 116 | 145 | 792 |

Table 2. Black-capped Chickadees Banded/Returned (B/Rt) by month at Jenny Lake, NY, for the years 1970-71 through 2012-13; asterisks indicate months of either no feeding or no banding activity.

| Year | Jul | Aug | Sep | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | B/Rt | Total |
|-----------------|-----------|------------|------------|------------|------------|------------|------------|------------|------------|------------|-----------|----------|-------------|-------------|
| 70-71 | * | 8/0 | 2/0 | * | * | * | * | * | 0/0 | 0/0 | 0/0 | 0/0 | 10/0 | 10 |
| 71-72 | 3/0 | 7/1 | 2/0 | 0/0 | 4/1 | 6/1 | * | * | 127/1 | 29/0 | 0/0 | 0/0 | 178/4 | 182 |
| 72-73 | 0/0 | 0/1 | 1/1 | 2/1 | 5/2 | 0/0 | 0/0 | 0/1 | 2/1 | 0/1 | 2/0 | 0/0 | 12/8 | 20 |
| 73-74 | 1/0 | 3/2 | 1/0 | 1/0 | 8/1 | 24/7 | 32/8 | 24/7 | 17/5 | 6/0 | 0/0 | 0/0 | 117/30 | 147 |
| 74-75 | 0/0 | 4/0 | 3/1 | 0/0 | 6/0 | 6/1 | 1/0 | 0/0 | 3/7 | 0/0 | 2/1 | 0/0 | 25/10 | 35 |
| 75-76 | 2/0 | 17/13 | 9/8 | 8/6 | 33/17 | 29/3 | 22/7 | 13/2 | 8/0 | 3/0 | 0/0 | 0/0 | 144/56 | 200 |
| 76/77 | 7/3 | 5/1 | 3/0 | 0/0 | 0/0 | 0/0 | 6/3 | 1/0 | 2/0 | 2/0 | 1/0 | 0/0 | 27/7 | 34 |
| 77/78 | 0/0 | 10/2 | 3/1 | 0/2 | 19/21 | 32/10 | 6/1 | 29/11 | 5/1 | 7/3 | 1/0 | 0/0 | 112/52 | 164 |
| 78-79 | 2/1 | 7/1 | 5/1 | 1/6 | 14/6 | 15/11 | 14/25 | 17/11 | 11/5 | 1/2 | 1/0 | 0/0 | 88/69 | 157 |
| 79-80 | 3/1 | 12/4 | 17/0 | 1/0 | 5/0 | 1/1 | 1/2 | 2/1 | 5/3 | 3/3 | 0/0 | 0/0 | 50/15 | 65 |
| 80-81 | 2/0 | 11/0 | 16/0 | 6/0 | 37/8 | 100/22 | 78/26 | 51/9 | 19/1 | 0/1 | 0/1 | 0/0 | 320/68 | 388 |
| 81-82 | 0/1 | 9/2 | 6/1 | 4/2 | 18/9 | 22/17 | 35/35 | 25/23 | 27/10 | 7/7 | 0/1 | 0/0 | 153/108 | 261 |
| 82-83 | 0/0 | 9/0 | 3/0 | 7/0 | 16/6 | 11/5 | 13/10 | 9/14 | 14/5 | 7/11 | 2/0 | 0/0 | 87/51 | 138 |
| 83-84 | 1/1 | 13/8 | 24/19 | 7/22 | 12/8 | 10/8 | 5/12 | 16/5 | 15/4 | 2/5 | 1/2 | 0/0 | 106/94 | 200 |
| 84-85 | 0/0 | 8/2 | 10/1 | 0/0 | 0/1 | 3/1 | 1/1 | 0/1 | 0/2 | 0/0 | 0/1 | 1/0 | 23/10 | 33 |
| 85-86 | 0/0 | 2/0 | 3/1 | 1/0 | 23/2 | 16/5 | 28/15 | 12/3 | 14/8 | 0/1 | 0/1 | 0/0 | 99/36 | 135 |
| 86-87 | 1/0 | 3/1 | 9/4 | 2/0 | 22/2 | 30/11 | 22/9 | 29/15 | 7/4 | 0/0 | 0/1 | 0/0 | 125/47 | 172 |
| 87-88 | 4/0 | 16/5 | 2/0 | 0/0 | 20/2 | 36/4 | 41/7 | 32/10 | 22/10 | 5/4 | 0/1 | 0/0 | 178/43 | 221 |
| 88-89 | 9/5 | 14/4 | 29/21 | 17/4 | 16/5 | 4/2 | 2/0 | 1/1 | 4/4 | 16/2 | 6/0 | 0/0 | 118/48 | 166 |
| 89-90 | 6/1 | 8/3 | 9/7 | 1/0 | 3/1 | 15/9 | 8/11 | 24/19 | 27/7 | 10/15 | 5/2 | 0/0 | 116/75 | 191 |
| 90-91 | 1/0 | 12/2 | 7/5 | 0/1 | 38/1 | 144/4 | 39/14 | 13/4 | 8/1 | 6/3 | 0/0 | 0/0 | 268/71 | 339 |
| 91-92 | 1/0 | 8/2 | 20/2 | 3/1 | 12/4 | 8/2 | 5/4 | 2/2 | 25/5 | 5/9 | 1/1 | 0/0 | 90/32 | 122 |
| 92-93 | 0/2 | 5/3 | 2/8 | 4/1 | 2/1 | 1/0 | 3/3 | 2/4 | 8/12 | 6/3 | 0/0 | 1/0 | 34/37 | 71 |
| 93-94 | 2/2 | 16/4 | 1/1 | 3/1 | 12/1 | 86/20 | 32/5 | 14/1 | 12/2 | 12/3 | 1/0 | 0/0 | 191/40 | 231 |
| 94-95 | 3/0 | 5/1 | 10/0 | 0/0 | 3/0 | 0/0 | 1/2 | 5/0 | 2/1 | 1/2 | 0/0 | 0/0 | 30/6 | 36 |
| 95-96 | 2/1 | 12/13 | 14/16 | 7/3 | 19/13 | 27/1 | 15/0 | 10/0 | 3/2 | 3/0 | 7/0 | 0/0 | 119/49 | 168 |
| 96-97 | 7/4 | 32/3 | 11/0 | 0/0 | 0/0 | 4/0 | 1/0 | 0/0 | 0/0 | 0/0 | 0/0 | 0/0 | 55/7 | 62 |
| 97-98 | 2/3 | 9/10 | 8/3 | 3/3 | 15/11 | 37/3 | 25/7 | 9/3 | 8/4 | 4/1 | 1/1 | 0/0 | 121/49 | 170 |
| 98-99 | 4/2 | 12/2 | 5/2 | 0/0 | 8/2 | 0/1 | 8/18 | 1/0 | 8/1 | 5/5 | 2/0 | 0/0 | 53/33 | 86 |
| 99-00 | 1/1 | 12/26 | 7/8 | 10/16 | 29/19 | 36/15 | 20/6 | 32/2 | 7/2 | 11/0 | 1/0 | 0/0 | 165/95 | 260 |
| 00-01 | 1/0 | 3/1 | 6/0 | 0/0 | 1/0 | 0/0 | 0/0 | 1/0 | 0/0 | 3/0 | 0/0 | 0/0 | 15/1 | 16 |
| 01-02 | 0/0 | 4/4 | 10/2 | 9/3 | 13/3 | 19/5 | 20/3 | 13/0 | 2/0 | 7/2 | 2/0 | 0/1 | 99/23 | 122 |
| 02-03 | 1/0 | 5/3 | 10/0 | 2/1 | 3/0 | 15/2 | 5/6 | 1/2 | 2/0 | 2/1 | 2/1 | 0/0 | 48/16 | 64 |
| 03-04 | 0/1 | 4/0 | 4/0 | 0/0 | 3/0 | 21/3 | 8/2 | 53/11 | 28/0 | 11/3 | 0/0 | 0/0 | 132/30 | 152 |
| 04-05 | 0/0 | 9/4 | 7/6 | 4/2 | 24/13 | 29/15 | 31/2 | 15/5 | 7/4 | 8/1 | 5/0 | 0/0 | 139/52 | 191 |
| 05-06 | 0/0 | 21/4 | 10/0 | 5/4 | 53/36 | 23/15 | 7/5 | 2/8 | 6/6 | 46/2 | 1/0 | 1/0 | 175/80 | 255 |
| 06-07 | 2/1 | 13/1 | 2/2 | 4/2 | 4/1 | 7/2 | 6/6 | 3/2 | 1/1 | 2/4 | 2/1 | 0/0 | 46/23 | 69 |
| 07-08 | 0/1 | 6/16 | 3/6 | 9/1 | 30/28 | 21/8 | 16/1 | 14/5 | 9/2 | 11/3 | 7/0 | 1/0 | 127/71 | 198 |
| 08-09 | 3/0 | 7/2 | 6/0 | 0/0 | 27/2 | 50/4 | 81/29 | 87/18 | 14/9 | 4/2 | 1/0 | 1/0 | 281/66 | 347 |
| 09-10 | 0/1 | 2/1 | 0/0 | 0/0 | 0/0 | 5/0 | 1/0 | 1/0 | 4/0 | 0/0 | 2/4 | 0/0 | 15/6 | 21 |
| 10-11 | 0/0 | 5/5 | 11/9 | 2/1 | 27/12 | 35/12 | 24/18 | 12/5 | 5/4 | 2/4 | 3/0 | 0/0 | 126/70 | 196 |
| 11-12 | 0/1 | 2/1 | 0/0 | 0/0 | 0/0 | 7/0 | 5/2 | 0/1 | 0/0 | 1/1 | 0/1 | 1/0 | 16/7 | 23 |
| 12-13 | 0/0 | 3/2 | 4/2 | 3/6 | 13/12 | 6/12 | 21/4 | 4/7 | 0/6 | 8/2 | 1/0 | 0/0 | 63/53 | 116 |
| Total B | 71 | 373 | 315 | 126 | 592 | 941 | 689 | 579 | 488 | 256 | 60 | 6 | 4496 | |
| Total Rt | 33 | 160 | 138 | 89 | 251 | 278 | 309 | 213 | 140 | 106 | 20 | 1 | 1738 | 6234 |

Table 3. Total captures of individual Black-capped Chickadees (bandings, returns and repeats) by month at Jenny Lake, NY, for the years 1970-71 through 2012-13; asterisks indicate months of either no feeding or banding effort.

| Year | Jul | Aug | Sep | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun |
|--------------|-----|-----|-----|-----|------|------|------|------|------|------|-----|-----|
| 70-71 | * | 8 | 2 | * | * | * | * | * | * | * | 0 | 0 |
| 71-72 | 3 | 8 | 3 | 1 | 6 | 9 | * | * | 132 | 46 | 3 | 0 |
| 72-73 | 0 | 1 | 2 | 3 | 9 | * | * | 3 | 11 | 1 | 3 | 0 |
| 73-74 | 1 | 5 | 1 | 1 | 11 | 40 | 62 | 77 | 55 | 29 | 5 | 0 |
| 74-75 | 0 | 4 | 6 | 4 | 7 | 11 | 7 | 0 | 14 | 2 | 8 | 1 |
| 75-76 | 2 | 32 | 25 | 21 | 83 | 46 | 95 | 62 | 45 | 25 | 6 | 0 |
| 76-77 | 11 | 7 | 7 | 2 | 2 | 2 | 14 | 4 | 7 | 4 | 10 | 0 |
| 77-78 | 0 | 12 | 12 | 5 | 49 | 68 | 32 | 83 | 43 | 38 | 3 | 0 |
| 78-79 | 3 | 10 | 9 | 10 | 23 | 49 | 62 | 57 | 44 | 14 | 2 | 0 |
| 79-80 | 4 | 17 | 29 | 2 | 12 | 14 | 9 | 11 | 19 | 25 | 2 | 0 |
| 80-81 | 2 | 13 | 19 | 10 | 61 | 170 | 221 | 187 | 86 | 14 | 8 | 1 |
| 81-82 | 1 | 12 | 9 | 12 | 36 | 64 | 98 | 97 | 116 | 83 | 3 | 0 |
| 82-83 | 0 | 9 | 3 | 11 | 29 | 36 | 43 | 47 | 39 | 41 | 8 | 1 |
| 83-84 | 2 | 21 | 47 | 60 | 46 | 44 | 60 | 45 | 72 | 53 | 20 | 3 |
| 84-85 | 0 | 11 | 21 | 0 | 4 | 6 | 8 | 5 | 4 | 3 | 10 | 1 |
| 85-86 | 0 | 2 | 5 | 1 | 26 | 43 | 64 | 38 | 54 | 9 | 4 | 0 |
| 86-87 | 1 | 5 | 16 | 7 | 34 | 64 | 56 | 85 | 36 | 4 | 3 | 0 |
| 87-88 | 4 | 21 | 7 | 0 | 34 | 71 | 88 | 95 | 99 | 40 | 3 | 1 |
| 88-89 | 14 | 22 | 66 | 46 | 50 | 30 | 33 | 27 | 24 | 36 | 26 | 3 |
| 89-90 | 7 | 15 | 27 | 9 | 14 | 39 | 38 | 72 | 59 | 114 | 30 | 4 |
| 90-91 | 1 | 15 | 24 | 1 | 46 | 227 | 134 | 47 | 21 | 44 | 6 | 0 |
| 91-92 | 1 | 11 | 27 | 11 | 35 | 25 | 32 | 20 | 50 | 57 | 15 | 5 |
| 92-93 | 2 | 10 | 16 | 12 | 7 | 11 | 11 | 10 | 31 | 18 | 15 | 4 |
| 93-94 | 4 | 21 | 7 | 6 | 18 | 131 | 103 | 38 | 71 | 70 | 5 | 0 |
| 94-95 | 3 | 7 | 16 | 0 | 10 | 6 | 10 | 11 | 7 | 7 | 3 | 0 |
| 95-96 | 3 | 26 | 52 | 32 | 51 | 33 | 39 | 16 | 45 | 20 | 9 | 1 |
| 96-97 | 11 | 42 | 31 | 5 | 0 | 19 | 3 | 5 | 4 | 0 | 8 | 2 |
| 97-98 | 5 | 23 | 30 | 13 | 43 | 63 | 67 | 43 | 50 | 29 | 14 | 4 |
| 98-99 | 6 | 18 | 12 | 1 | 17 | 13 | 38 | 7 | 12 | 25 | 13 | 6 |
| 99-00 | 2 | 39 | 32 | 49 | 75 | 92 | 68 | 72 | 51 | 60 | 6 | 1 |
| 00-01 | 1 | 5 | 9 | 0 | 1 | 1 | 0 | 2 | 0 | 4 | 2 | 0 |
| 01-02 | 0 | 8 | 17 | 16 | 29 | 40 | 31 | 36 | 13 | 25 | 6 | 4 |
| 02-03 | 1 | 9 | 15 | 10 | 9 | 27 | 32 | 13 | 16 | 16 | 13 | 0 |
| 03-04 | 1 | 4 | 6 | 0 | 7 | 31 | 26 | 81 | 71 | 47 | 5 | 0 |
| 04-05 | 0 | 13 | 19 | 12 | 51 | 72 | 58 | 61 | 45 | 36 | 15 | 1 |
| 05-06 | 0 | 25 | 14 | 23 | 109 | 93 | 51 | 70 | 58 | 86 | 2 | 1 |
| 06-07 | 3 | 15 | 8 | 8 | 12 | 19 | 21 | 8 | 7 | 15 | 9 | 4 |
| 07-08 | 1 | 22 | 22 | 17 | 75 | 53 | 36 | 54 | 39 | 31 | 13 | 3 |
| 08-09 | 3 | 11 | 8 | 1 | 36 | 72 | 167 | 196 | 151 | 37 | 14 | 6 |
| 09-10 | 1 | 3 | 0 | 0 | 0 | 5 | 2 | 1 | 5 | 2 | 9 | 0 |
| 10-11 | 0 | 10 | 25 | 11 | 52 | 75 | 90 | 56 | 56 | 63 | 11 | 2 |
| 11-12 | 1 | 3 | 0 | 0 | 0 | 7 | 14 | 4 | 2 | 7 | 2 | 3 |
| 12-13 | 0 | 5 | 8 | 14 | 34 | 34 | 34 | 38 | 30 | 27 | 2 | 0 |
| Total | 105 | 580 | 714 | 447 | 1253 | 1955 | 2057 | 1884 | 1795 | 1307 | 354 | 62 |

Table 4. Summary of Black-capped Chickadee monthly captures at Jenny Lake, NY, as new bandings, returns and repeats for the years 1970-71 through 2012-13.

| Month | Jul | Aug | Sep | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun |
|----------------|-----|-----|-----|-----|------|------|------|------|------|------|-----|-----|
| Banded | 71 | 373 | 315 | 126 | 592 | 941 | 689 | 579 | 488 | 256 | 60 | 6 |
| Returns | 33 | 160 | 138 | 89 | 251 | 278 | 309 | 213 | 140 | 106 | 20 | 1 |
| Repeats | 1 | 47 | 261 | 232 | 410 | 736 | 1059 | 1092 | 1167 | 945 | 274 | 55 |
| Total | 105 | 580 | 714 | 447 | 1253 | 1955 | 2057 | 1884 | 1795 | 1307 | 354 | 62 |

Table 5. A summary of Black-capped Chickadee bandings and return captures showing return capture history after banding at Jenny Lake, New York for the years 1970-71 through 2012-13.

| Year | Banded | | Returned | | Returned, Years after Banding | | | | | | | | |
|--------------|-------------|-------------|-------------|-------------|-------------------------------|------------|------------|-----------|-----------|-----------|-----------|----------|----------|
| | N | % | N | % | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 70-71 | 10 | 100 | 0 | 0 | | | | | | | | | |
| 71-72 | 178 | 97.8 | 4 | 2.2 | 4 | | | | | | | | |
| 72-73 | 12 | 60.0 | 8 | 40.0 | 6 | 2 | | | | | | | |
| 73-74 | 117 | 79.6 | 30 | 20.4 | 5 | 24 | 1 | | | | | | |
| 74-75 | 25 | 71.4 | 10 | 28.6 | 8 | | 2 | | | | | | |
| 75-76 | 144 | 72.0 | 56 | 28.0 | 11 | 30 | 2 | 13 | | | | | |
| 76-77 | 27 | 79.4 | 7 | 20.6 | 3 | | 3 | | 1 | | | | |
| 77-78 | 112 | 68.3 | 52 | 31.7 | 12 | 28 | 1 | 6 | 1 | 4 | | | |
| 78-79 | 88 | 56.1 | 69 | 43.9 | 43 | 5 | 14 | 2 | 2 | | 3 | | |
| 79-80 | 50 | 76.9 | 15 | 23.1 | 6 | 3 | 2 | 3 | | | | 1 | |
| 80-81 | 320 | 82.3 | 68 | 17.7 | 10 | 24 | 20 | 3 | 8 | 1 | 1 | | 1 |
| 81-82 | 153 | 58.6 | 108 | 41.4 | 74 | 7 | 13 | 8 | | 6 | | | |
| 82-83 | 87 | 63.0 | 51 | 37.0 | 14 | 18 | 5 | 5 | 6 | | 3 | | |
| 83-84 | 106 | 53.0 | 94 | 47.0 | 31 | 23 | 29 | 5 | 4 | 1 | | 1 | |
| 84-85 | 23 | 69.7 | 10 | 30.3 | 7 | 2 | 1 | | | | | | |
| 85-86 | 99 | 73.3 | 36 | 26.7 | 9 | 11 | 5 | 4 | 6 | 1 | | | |
| 86-87 | 125 | 72.7 | 47 | 27.4 | 24 | 6 | 8 | 3 | 2 | 4 | | | |
| 87-88 | 178 | 80.5 | 43 | 19.5 | 23 | 4 | 2 | 8 | 1 | 2 | 3 | | |
| 88-89 | 118 | 71.1 | 48 | 28.9 | 31 | 5 | 3 | 2 | 3 | 1 | 1 | 2 | |
| 89-90 | 116 | 60.7 | 75 | 39.3 | 29 | 28 | 8 | 2 | 1 | 6 | | | 1 |
| 90-91 | 268 | 79.1 | 71 | 20.9 | 28 | 15 | 17 | 8 | | | 3 | | |
| 91-92 | 90 | 73.8 | 32 | 26.2 | 10 | 8 | 8 | 5 | 1 | | | | |
| 92-93 | 34 | 47.9 | 37 | 52.1 | 23 | 4 | 4 | 5 | 1 | | | | |
| 93-94 | 191 | 82.7 | 40 | 17.3 | 11 | 15 | 7 | 4 | 2 | | 1 | | |
| 94-95 | 30 | 83.3 | 6 | 16.7 | 2 | 1 | 1 | | | 2 | | | |
| 95-96 | 119 | 70.8 | 49 | 29.2 | 17 | 19 | 3 | 6 | 2 | 1 | 1 | | |
| 96-97 | 55 | 88.7 | 7 | 11.3 | 4 | 1 | | | 1 | | | 1 | |
| 97-98 | 121 | 71.2 | 49 | 28.8 | 16 | 22 | 2 | 4 | 1 | 3 | | 1 | |
| 98-99 | 53 | 61.6 | 33 | 38.4 | 19 | 9 | 1 | 1 | | | 2 | | |
| 99-00 | 165 | 63.5 | 95 | 36.5 | 28 | 37 | 8 | 15 | 4 | 2 | 1 | | |
| 00-01 | 15 | 93.8 | 1 | 6.2 | | | 1 | | | | | | |
| 01-02 | 99 | 81.1 | 23 | 18.9 | 5 | 11 | 2 | 3 | 2 | | | | |
| 02-03 | 48 | 75.0 | 16 | 25.0 | 12 | 1 | 1 | | 1 | 1 | | | |
| 03-04 | 132 | 86.8 | 20 | 13.2 | 10 | 8 | 1 | 1 | | | | | |
| 04-05 | 139 | 72.8 | 52 | 27.2 | 35 | 8 | 7 | 1 | 1 | | | | |
| 05-06 | 175 | 68.6 | 80 | 31.4 | 49 | 19 | 3 | 7 | 1 | 1 | | | |
| 06-07 | 46 | 66.7 | 23 | 33.3 | 16 | 1 | 3 | 1 | 2 | | | | |
| 07-08 | 127 | 64.1 | 71 | 35.9 | 17 | 30 | 14 | 5 | 1 | 3 | | 1 | |
| 08-09 | 281 | 81.0 | 66 | 19.0 | 40 | 6 | 10 | 5 | 3 | | 1 | 1 | |
| 09-10 | 15 | 71.4 | 6 | 28.6 | 4 | | 2 | | | | | | |
| 10-11 | 126 | 64.3 | 70 | 35.7 | 3 | 43 | 15 | 3 | 2 | 3 | 1 | | |
| 11-12 | 16 | 69.6 | 7 | 30.4 | 3 | 1 | 2 | 1 | | | | | |
| 12-13 | 63 | 54.3 | 53 | 45.7 | 11 | 22 | 1 | 12 | 5 | 1 | | 1 | |
| Total | 4496 | 72.1 | 1738 | 27.9 | 713 | 501 | 232 | 72 | 65 | 43 | 21 | 9 | 2 |

Table 6. Age Ratios of Black-capped Chickadees Banded and Returned at Jenny Lake, New York, for the Years 1983-2013.

| Year | Banded (B) | | | | Returned (Rt) | Total B + Rt | Total B + Rt | |
|--------------|-------------|-------------|-------------|-------------|---------------|--------------|--------------|-------------|
| | HY/SY | AHY/ASY | Total | AHY/ASY% | AHY/ASY | AHY/ASY | AHY/ASY, % | |
| 83-84 | 73 | 30 | 103 | 29.1 | 94 | 124 | 197* | 62.9 |
| 84-85 | 22 | 1 | 23 | 4.3 | 10 | 11 | 33 | 33.3 |
| 85-86 | 56 | 36 | 92 | 39.1 | 36 | 72 | 128* | 56.3 |
| 86-87 | 115 | 8 | 123 | 6.5 | 47 | 55 | 170* | 32.4 |
| 87-88 | 163 | 12 | 175 | 6.9 | 43 | 55 | 218* | 25.2 |
| 88-89 | 108 | 10 | 118 | 8.5 | 48 | 58 | 166 | 34.9 |
| 89-90 | 96 | 20 | 116 | 17.2 | 75 | 95 | 191 | 49.7 |
| 90-91 | 124 | 138 | 262 | 52.7 | 71 | 209 | 333* | 62.8 |
| 91-92 | 78 | 11 | 89 | 12.4 | 32 | 43 | 121* | 35.5 |
| 92-93 | 21 | 12 | 33 | 36.4 | 37 | 49 | 70* | 70.0 |
| 93-94 | 89 | 101 | 190 | 53.2 | 40 | 141 | 230* | 61.3 |
| 94-95 | 27 | 3 | 30 | 10.0 | 6 | 9 | 36 | 25.0 |
| 95-96 | 51 | 68 | 119 | 57.1 | 49 | 117 | 168 | 69.6 |
| 96-97 | 54 | 1 | 55 | 1.8 | 7 | 8 | 62 | 12.9 |
| 97-98 | 54 | 67 | 121 | 55.4 | 49 | 116 | 170 | 68.2 |
| 98-99 | 47 | 6 | 53 | 11.3 | 33 | 39 | 86 | 45.3 |
| 99-00 | 30 | 135 | 165 | 81.8 | 95 | 230 | 260 | 88.5 |
| 00-01 | 15 | 0 | 15 | 0.0 | 1 | 1 | 16 | 6.3 |
| 01-02 | 40 | 59 | 99 | 59.6 | 23 | 82 | 122 | 67.2 |
| 02-03 | 44 | 4 | 48 | 8.3 | 16 | 20 | 64 | 31.3 |
| 03-04 | 115 | 17 | 132 | 12.9 | 20 | 37 | 152 | 24.3 |
| 04-05 | 106 | 31 | 137 | 22.6 | 52 | 83 | 189* | 43.9 |
| 05-06 | 134 | 41 | 175 | 23.4 | 80 | 121 | 255 | 47.5 |
| 06-07 | 43 | 2 | 45 | 4.4 | 23 | 25 | 68* | 36.8 |
| 07-08 | 33 | 94 | 127 | 74.0 | 71 | 165 | 198 | 83.3 |
| 08-09 | 252 | 29 | 281 | 10.3 | 66 | 95 | 347 | 27.4 |
| 09-10 | 14 | 1 | 15 | 6.7 | 6 | 7 | 21 | 33.3 |
| 10-11 | 63 | 63 | 126 | 50.0 | 70 | 133 | 196 | 67.9 |
| 11-12 | 14 | 2 | 16 | 12.5 | 7 | 9 | 23 | 39.1 |
| 12-13 | 33 | 28 | 63 | 44.4 | 53 | 81 | 116 | 69.8 |
| Total | 2114 | 1030 | 3144 | 32.8 | 1260 | 2290 | 4404 | 52.0 |

* Totals marked with an asterisk do not match the yearly totals in Tables 2 and 5 due to some few birds in the years marked with an asterisk that were either of questionable rectrix shape or had wet rectrices which did not allow reliable separation into the HY/SY or AHY/ASY age classes.

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