

# The Dynamics of Black-capped Chickadees at Bird Feeders

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Bird feeders have become a predictable part of the landscape in populated portions of North America. Feeding stations obviously accomplish the intended purpose of bringing birds within our view. The food we provide has positive influences on birds (see Wilson 1996 for a review). The physiological status and survivorship of birds is improved by supplemental feeding (Brittingham and Temple 1988, 1992a,b, Desrochers et al. 1988, Szekeley et al. 1989, Grubb and Cimprich 1990, Egan and Brittingham 1994).

The Black-capped Chickadee (*Poecile atricapilla*) has been the best-studied species in relation to supplemental feeding. This species is widely distributed in North America and is mostly sedentary. We have ample evidence of increased winter survivorship of Black-capped Chickadees when they are given supplemental food. However, researchers presume that each chickadee uses the supplemental food to the same degree. In this paper, I will report on research I conducted to examine individual variability in feeder use.

The winter social structure of Black-capped Chickadees is well known (Odum 1941, 1942, Glase 1973, Smith 1976, 1991, 1994). A winter flock consists of a resident pair of birds, which extend their breeding territory of around five acres to a winter territory of around twenty-five acres. In the winter, the resident pair is joined by ten or more first-winter birds, none of which is the offspring of the resident pair. The flock defends its winter territory from incursions by neighboring flocks (Desrochers and Hannon 1989).

The large territory size of chickadee winter flocks poses problems for studies of food supplementation. In regions with even modest human population density, controlling the amount of supplemental food that chickadees get is difficult with so many people maintaining feeding stations of their own within a chickadee flock's territory.

To circumvent this problem, I chose a remote area of central Maine to conduct a food supplementation study. The study area was along Long Falls Dam Road on the eastern shore of Flagstaff Lake (45° 10' N, 70° 01' W) at an altitude of 1200 feet. Two feeding stations were established on Maine Reserved Land, protected second growth forest. There were no human dwellings along this portion of the road and the closest bird feeders were ten miles distant. The forest was dominated by conifers: red spruce (*Picea rubens*), balsam fir (*Abies balsamea*), eastern white cedar (*Thuja occidentalis*), eastern hemlock (*Tsuga canadensis*), and eastern white pine (*Pinus strobus*).

I established feeding stations in early October 1995 at two sites (called Site 1 and Site 12 to conform to the terminology used in Wilson [2001]). Two cylindrical

Magnum™ feeders were hung on cable strung between two trees at a height of six feet. The two feeders were located within fifteen feet of each other to facilitate simultaneous observation.

Between the middle of October and the middle of November, I captured Black-capped Chickadees at the feeders with mist-nets. Captured birds were aged (either adult or first-winter birds (Pyle 1997)) and fitted with unique combinations of color-bands along with a numbered aluminum band provided by the Bird Banding Laboratory. Twenty-three chickadees were color-banded at Site 1, all but one of which were seen on the last day of the study. Fourteen chickadees were color-banded at Site 12, nine of which were present at the end of the study.

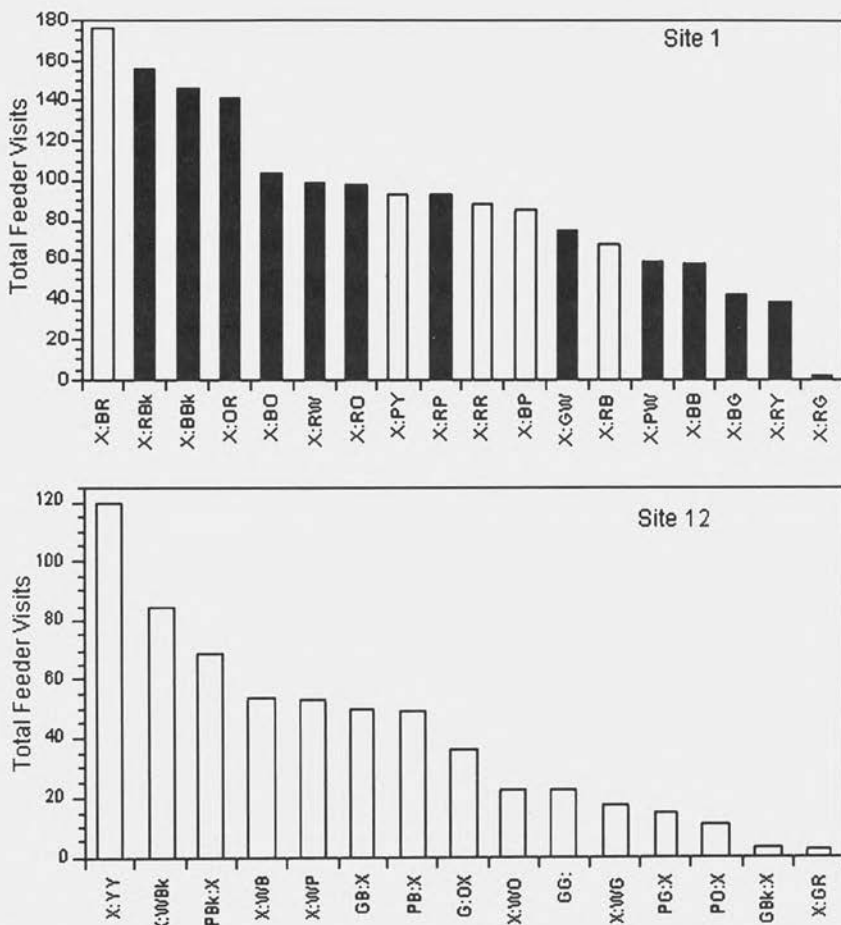
Beginning on November 29, 1995, I made weekly two-day visits to the area until the week of March 12, 1996, with the exception of a hiatus between December 19 and January 5. During each weekly visit, I made at least four thirty-minute observations at each site. I chose a vantage point about twenty feet away from each feeder. Using Zeiss 7x42 binoculars and a hand-held tape recorder, I recorded each visit (requiring the removal of a seed) of chickadees to the feeders. A bird frightened away or displaced before feeding was not counted as a visitor.

Individual Black-capped Chickadees were identified with various degrees of precision. Some birds that came to the feeders did not afford a sufficient view to determine whether bands were present; these chickadees were recorded as C (chickadee). I recorded unbanded birds that visited a feeder as uC (unbanded chickadee). Other birds were obviously banded, but viewing angles prevented me from seeing all three bands; these birds were recorded as bC (banded chickadee). Finally, some birds that came to the feeder could be identified by their unique combination of color bands.

Bird feeders were filled during each visit. Generally, half of the food in each feeder was removed each week. To ensure that neither site was ever without sunflower seed, I put up an additional feeder for the seventeen-day period in late December and early January when I was away. A modicum of food was still present at each site on January 5. The chickadees at both sites therefore always had access to sunflower seeds throughout the course of the study.

Figure 1 shows the total number of feeder visits by the color-banded chickadees at the two sites. The results show strikingly variable use of the bird feeders. At Site 1, the average number of feeder visits over the fifty-one hours of observation was 85.4 visits with one bird visiting 176 times and one only twice. At Site 12, the average number of feeder visits over the forty-six hours of observation was 38.6, with individual use ranging from 120 visits to two visits.

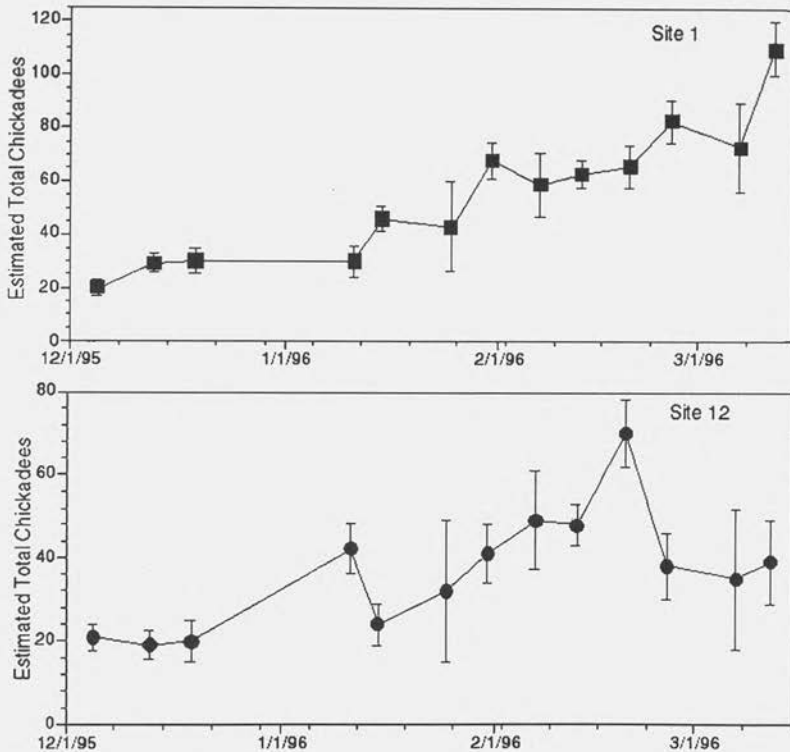
Should age of the birds influence the rate of feeder visitation? On the one hand, adult birds are the dominant birds in the flock (Smith 1976) and therefore should have access to the best foraging sites, including a perch at a bird feeder. On the other hand, adult birds have lived through at least one winter and may be more proficient at finding food than naïve first-winter birds. First-winter birds may therefore be more likely to rely on the dependable sunflower seeds. At Site 1, only five of the



**Figure 1.** Total number of feeder visitations by banded birds at Site 1 (total of 51 hours of observations) and Site 12 (46 hours of observations). The abbreviations give the color-band combination (left leg: right leg). Abbreviations: X – aluminum band; B – blue; Bk – black; G – green; O – orange; P – purple; R – red; W – white; Y – yellow.

chickadees banded were first-winter birds (indicated by light barring in Figure 1). Although the most frequent visitor was a first-winter bird, the other young birds visited the feeder at rates close to the average. I conclude therefore that age cannot be used to predict feeder use at Site 1. At Site 12, all fourteen birds banded were first-winter birds so no age comparison is possible.

By recording both the number of unbanded birds and banded birds coming to the feeder, I could perform a mark-recapture analysis to estimate the total population size. The principle of such analyses is straightforward. One captures and then marks a few individuals in a population (color-banding in this case). These individuals are released. Then the investigator captures additional animals, noting if they are marked or not. If a prevalence of unmarked animals is captured, then the population must be



**Figure 2.** NOREMARK estimates of total Black-capped Chickadees visiting each feeding station over a two-day period throughout the study. Error bars represent 95% confidence intervals. Figure first appeared in Wilson (2001).

significantly larger than the marked individuals initially captured. On the other hand, if the captured animals are mostly marked, then one must have already marked most of the population.


A number of mark-recapture algorithms are available to estimate total population sizes from resighting data. I chose the software NOREMARK (White 1996) for my analysis. This software is able to use counts of marked but imperfectly identified individuals (the bc chickadees in my case).

The results of the mark-recapture analysis are eye-popping (Figure 2). At Site 1, NOREMARK indicates that the number of chickadees visiting the feeder at the beginning of the study (November 29-30) was about 24. Early on, most of the visits to the feeders were made by banded birds. As the study proceeded, increasing numbers of unbanded birds visited the feeders. At the end of the study (March 11-12), NOREMARK estimates that 110 different chickadees ( $\pm 10$  chickadees) visited the feeders over the two-day period when I was making observations!

Similar results are seen at Site 12 (Figure 2). NOREMARK estimates that a maximum of seventy birds visited the feeder on February 26-27, declining over the next two weeks. However, the general pattern is for the total chickadees using the feeder to increase from the beginning of the study.

There seems to be a contradiction between the large number of chickadees using the feeders and the territorial social structure of Black-capped Chickadees. The flock in whose territory the feeder is located apparently fails to defend its territory. However, breakdown of territorial behavior is not surprising in the presence of an abundant resource, sunflower seeds in this case. Because the feeders never became empty, the chickadees achieve no benefit and significant cost by defending the bird feeding stations. As can be seen in Figure 1, such incursions by neighboring flocks were occurring early in the study. Thirteen of the birds banded were adult birds; only two would be expected from the flock whose territory included the feeding station.

Although Black-capped Chickadees are largely sedentary, occasional irruptions into New England occur (Palmer 1949). Susan Smith, my former colleague at Mount Holyoke College in South Hadley, Massachusetts, reported significant irruptive chickadees at her study site in western Massachusetts during the winter of 1995/1996. The large number of chickadees using the feeders at Flagstaff Lake might not be quite so large in other years.

These results have implications for anyone maintaining a feeding station. Although a surprisingly large number of chickadees used both of my feeding stations at Flagstaff Lake by the end of the study, I never saw more than a dozen chickadees near a feeding station at one time. The turnover of birds at a feeder is obviously high over the course of a day. The chickadees you see at your feeder at 9 a.m. are likely not the same ones you see later in the day. Without color-banding the birds, this turnover is not appreciated by most birders. 

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