

THE NORTHWARD EXPANSION OF THE TUFTED TITMOUSE IN MAINE

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ABSTRACT - The tufted titmouse (*Baeolophus bicolor*) was a vagrant in Maine until the 1970s. The steady increase over the last 25 years in tufted titmouse in Maine is shown using Christmas Bird Count data (1976-1996) and Breeding Bird Survey data (1966-1996). Foraging data are presented on a titmouse that wintered near Flagstaff Lake (45° 14' N, 70° 17' W), the northernmost overwintering record of the species in Maine.

The tufted titmouse (*Baeolophus bicolor*) has been dramatically expanding its range northward over the past 20 years (Kricher 1981). In Maine, the species was quite rare until the 1970s. A single specimen collected in 1890 near Orono is the only record of the species in Maine before 1950 (Knight 1908, Palmer 1949).

This note was instigated by a tufted titmouse that spent the winter of 1995-1996 in undeveloped coniferous forest at the north end of Flagstaff Lake at one of the feeding stations I maintained to study the impacts of winter food supplementation on overwintering birds. This particular titmouse apparently represents the northern limit, and the climatic extreme, of the wintering range in northern New England. In this contribution, I review the status of the tufted titmouse in Maine over the period 1966-1996 and then present details of the wintering of the titmouse near Flagstaff Lake.

Data on wintering populations of the tufted titmouse are available from the Christmas Bird Count (CBC) data. These CBCs, organized by the National Audubon Society, are standardized censuses. Each count is done within a circle of 7.5 miles with a fixed center. On one day between the middle of December and early January, participants divide the count circle into portions and all birds seen and heard in a 24-hour period are counted. Counts done over a period of years provide valuable data on the population dynamics of wintering birds. As a means of controlling for differences in observer effort from year to year, the number of party-hours spent searching for birds is provided in the CBC data summaries.

Figure 1 shows the change in tufted titmouse/100 party-hours for selected CBC circles in Maine; the location of all of the count circles can be seen in Fig. 2. In the York County circle, the southernmost count

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circle in Maine, the number of tufted titmice over the past 20 years has increased by an order of magnitude (Fig. 1A). These changes are mirrored in other southern sites: Biddeford and Portland (Fig. 1A). Proceeding northward, the titmouse population in Lewiston has been consistently rising since 1988 (Fig. 1B). Two coastal sites, Bath and Thomaston, show less obvious patterns (Fig. 1B). The Bath population has vacillated since 1980 while titmice have only occurred on four counts in Thomaston since 1976. A southwestern count in Sweden has shown great variability in titmice populations although some birds have been present since 1987 (Fig. 1C). Augusta and Waterville have had increasing titmice populations since 1987 (Fig. 1C). A wintering population in Farmington in the 1980s crashed after 1986 except for 1991 (Fig. 1D). Bangor has had occasional occurrences over the past 20 years with a dramatic increase in the past two counts (Fig. 1D). Orono showed an early appearance of titmice in 1982 and 1983. These subsequently disappeared until 1991 (Fig. 1D). Tufted titmice are quite rare in

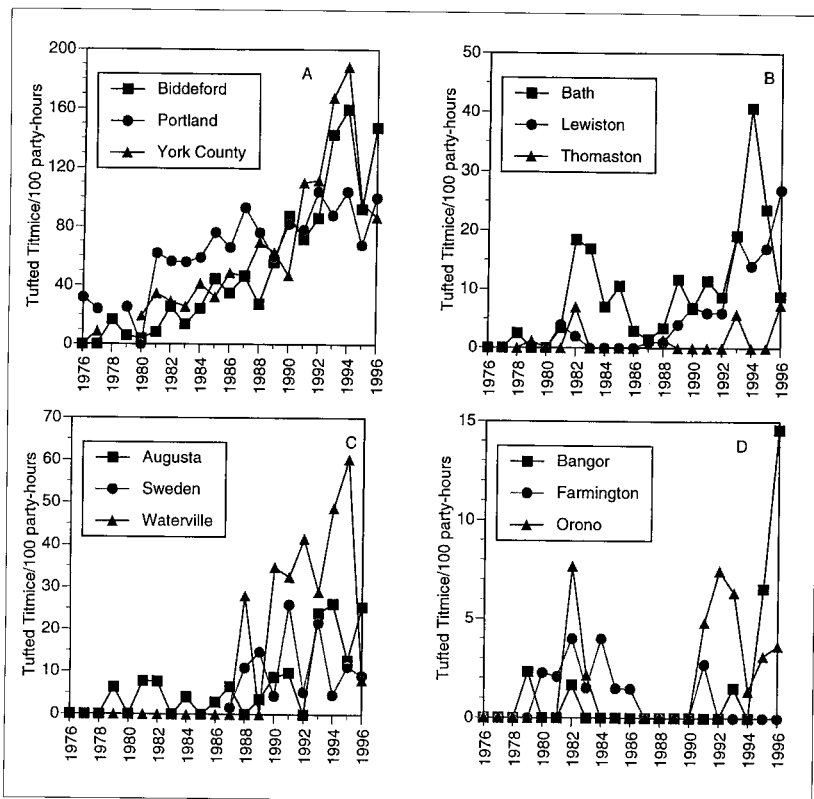


Figure 1. Numbers of tufted titmice (expressed as number/100 party-hours) on Christmas Bird Counts in southern and central Maine.

downeastern counts such as Calais, Mount Desert Island, Schoodic Peninsula, and Eastport. None has been reported on the Misery Township count near the Forks. One titmouse in 1995 was the only one seen on the Dover-Foxcroft count. The species has never been found on the Presque Isle Count, the northernmost count in Maine.

Data on the distribution of breeding tufted titmice are available from the Breeding Bird Survey (BBS), a program administered by the National Biological Service (formerly a branch of the U.S. Fish and Wild-

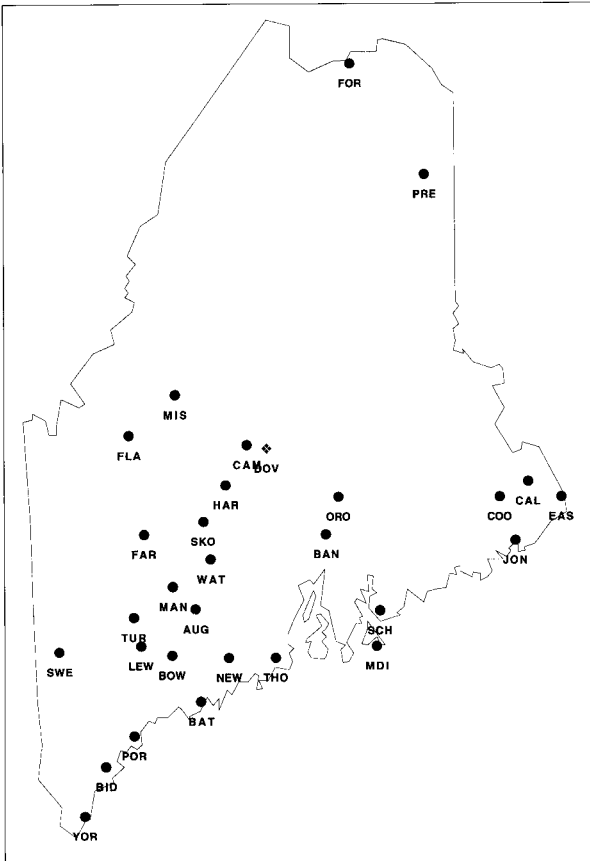


Figure 2. Map of Maine showing locations of Christmas Bird Count circles, Breeding Bird Survey routes and other sites cited in the text. AUG - Augusta; BAN - Bangor; BAT - Bath; BID - Biddeford; BOW - Bowdoinham; CAL - Calais; CAM - Cambrige and Dover-Foxcroft; COO - Cooper; EAS - Eastport; FAR - Farmington; FLA - Flagstaff Lake; FOR - Fort Kent; HAR - Harmony; JON - Jonesport; LEW - Lewiston; MAN - Manchester; MIS - Misery Township; MDI - Mt. Desert Island; NEW - Newcastle; ORO - Orono; POR - Portland, Cape Elizabeth and Westbrook; PRE - Presque Isle; SCH - Schoodic; SKO - Skowhegan; SWE - Sweden; THO - Thomaston; TUR - Turner; WAT - Waterville; YOR - York and Kittery.

life Service). Data for this study are gathered by skilled volunteers who census a 24.5-mile section of roads in Maine in June or early July. Every 0.5 mile, the observer stops her/his car and records all birds heard or seen within 0.25 mile of the stop over a period of three minutes. The observer then drives to the next stop and continues the survey. The surveys begin shortly before dawn and normally take about four hours to conduct. Observers conduct a BBS count once a year, stopping at precisely the same points each year.

The BBS was begun in 1966. In Maine, the first tufted titmice were recorded on BBS routes in 1983 in southern Maine. Figure 3 shows the number of titmice for the four southernmost routes in Maine. The locations of the routes are shown in Figure 2. All four sites shown a clear indication of an increase in tufted titmouse numbers. Tufted titmice are found sporadically but increasingly often on more northern BBS routes. One titmouse on the 1979 Cooper route (see Fig. 2 for locations of the various BBS routes described herein) remains the only record for that route. Single birds were found in the 1992 and 1995 on the Turner route. Three birds were found in 1994 and two in 1996 on the Manchester/Rome route. In Newcastle, two titmice were recorded in 1992, one in 1995, and two in 1996. Bowdoin Center had one bird in 1989, two in 1994, and one in 1995. Otisfield Green had one titmouse in 1986 and two in both 1992 and 1994. The northernmost records of singing males come from Harmony with one in 1996 and Cambridge with one in 1996.

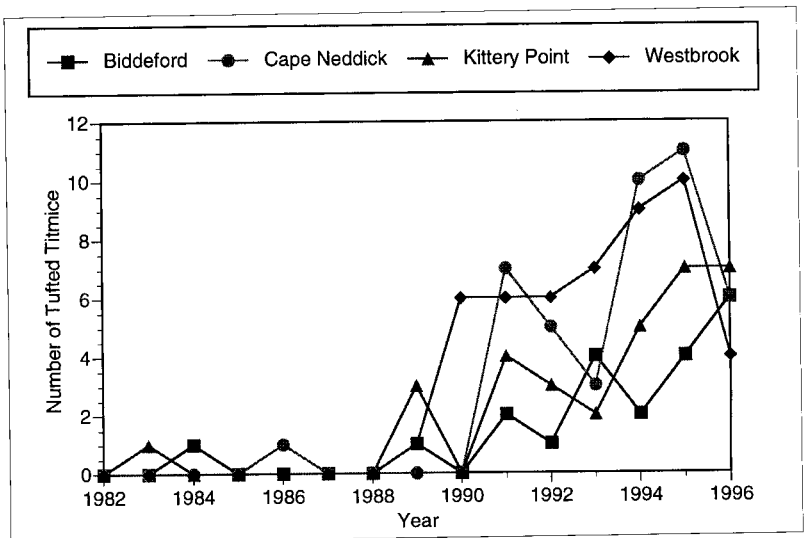


Figure 3. Number of tufted titmice recorded on the four southernmost Breeding Bird Survey routes in Maine.

Additional distributional data come from Maine Bird Notes (MBN). Records published in MBN include those that report occurrences in unexpected places or unexpected times; such data are ideal for the study of an invading species. Sporadic occurrences of titmice in Skowhegan (Fig. 2) have been reported. There was one sighting of a titmouse in Fort Kent (Fig. 2) in extreme northern Maine on August 30, 1995 that was not subsequently reported.

The general pattern in Maine is an invasion of the tufted titmouse that began in the early 1980s. Breeding populations have apparently become well established in southern Maine as far north as Waterville (Fig. 2). Sporadic occurrences north and east of Waterville suggest that the species is advancing northward but has yet to establish new populations.

On 19 December 1995, I was monitoring a population of color-banded black-capped chickadees and red-breasted nuthatches at two experimental feeders at the north end of Flagstaff Lake (Fig. 2) when a tufted titmouse came to one of the feeders and removed a sunflower seed. I was recording the number of visits to the feeder made by each of the color-banded chickadees and nuthatches so I did the same for the titmouse on all my subsequent visits. The titmouse was found on my visits to the area until 12 March 1996 when the study was discontinued.

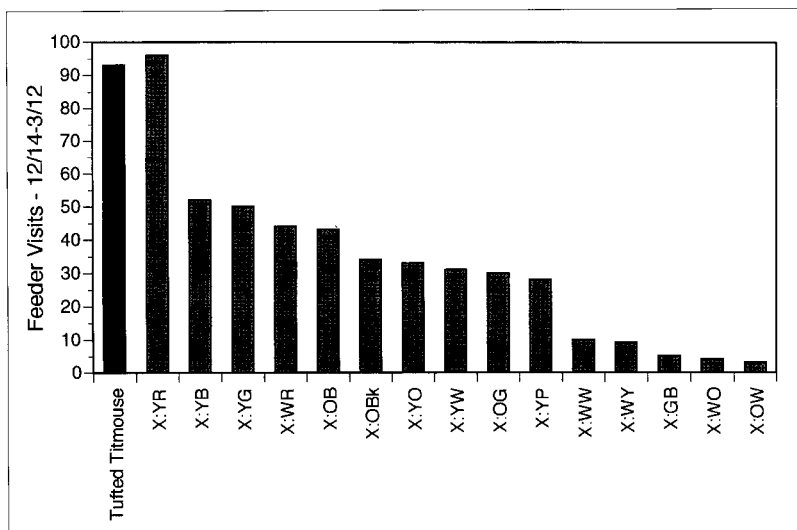


Figure 4. Number of feeder visits by a tufted titmouse and color-banded Black-capped Chickadees at Flagstaff Lake in observations between December 14, 1995 and March 12, 1996. Letters below chickadee histograms represent unique color-band combinations (X-aluminum band on left leg; black (Bk), blue (B), orange (O), purple (P), red (R), white (W) and yellow (Y) combinations on right leg).

Although I did not capture and band the titmouse, I never saw more than one titmouse and therefore make the parsimonious assumption that only one titmouse was present.

Figure 4 presents the total number of visits the tufted titmouse made over the course of my winter study along with the number of visits that color-banded black-capped chickadees made during that same time period. It is clear that the titmouse used the feeder more frequently than most of the 17 color-banded chickadees. The number of visits underestimates the number of seeds taken by the titmouse as I observed the titmouse on three occasions watching a red-breasted nuthatch cache a seed and then removing the seed from the cache soon after the nuthatch left. The tufted titmouse has an average mass of 21.6 g (Dunning 1993) compared to the 10.8 g average for a black-capped chickadee. Based on the scaling equation of passerine metabolism with mass (Walsberg 1983), one can predict that a tufted titmouse has a basal metabolic rate roughly 1.5 times higher than a black-capped chickadee. Such a comparison indicates that the tufted titmouse may in fact have depended less on the experimental feeder than the black-capped chickadees at Flagstaff Lake. If the two parids were depending equally on sunflower seeds, the titmouse should take 1.5 times as many seeds as chickadees.

The wintering record of the tufted titmouse at Flagstaff Lake is informative in two regards. First, tufted titmice can withstand colder temperatures than found in areas where they now regularly overwinter. Climatic data from the Long Falls Dam station, only 1 km from the site

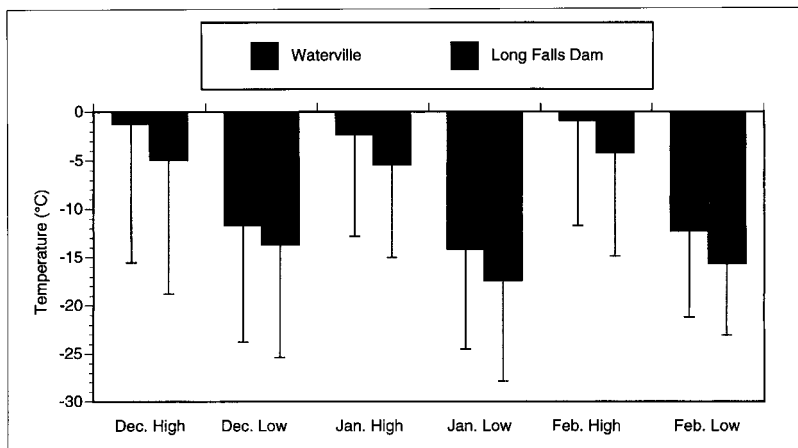


Figure 5. Mean daily high and low temperatures at Long Falls Dam on Flagstaff Lake and at Waterville for the winter months of 1995/1996. Error bars are one standard deviation. Long Fall temperatures are significantly lower than the corresponding temperature for Waterville for each of the six comparisons shown ($p < 0.001$ in all cases).

where the titmouse was found, indicate that winter temperatures were significantly lower (Student's paired t-test, $p < 0.001$ in all cases) than winter temperatures in Waterville, the nearest established population of tufted titmice in Maine (Fig. 5). Second, the titmice was found in the vicinity of a bird feeder. Kricher (1981) has argued that the proliferation of bird feeding in the past 20 years has allowed the tufted titmice to expand its range northward into Massachusetts.

The Flagstaff Lake bird overwintered in the coldest site so far reported for this species in Maine but at a continuously stocked feeder. It will be interesting to continue to monitor the expanding range of the tufted titmouse in Maine to determine if these birds can be found in winter climates as harsh as that at Flagstaff Lake without receiving supplemental food. Conversely, it will be worthwhile to note if all additional northern records of tufted titmice are in the vicinity of feeders. The Flagstaff tufted titmouse observation demonstrates that titmice can tolerate significantly colder temperatures than previous records suggest. Whether such climates can be tolerated in the absence of supplemental food is not known at this point.

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