

Migration of Blue Jays in eastern North America

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Introduction

Blue Jays (*Cyanocitta cristata*) in eastern North America have long been known to be partly migratory. Taverner and Swales (1907) noted migratory movements of these birds as they took off on southward flights over Lake Erie. More recently, the migrations of Blue Jays have been confirmed with recoveries of banded birds (Whittle 1928, Stoner 1936, Gill 1941, Bent 1946). Still more recently, Middleton (1974) published results of more than 50 years of banding at his banding station in Pennsylvania, showing the distribution of recoveries of his banded Blue Jays from Maine to South Carolina. Based on recoveries of banded birds, Smith (1979) has reported on the migratory movements of Blue Jays in North America west of the 100th meridian. With use of banding and recovery records, it is my purpose in preparing this paper to make a fuller analysis than has previously been made of the movements of Blue Jays in eastern North America and to make comparisons of the movements of these birds in eastern North America with those west of the 100th meridian.

Methods

From the Bird Banding Laboratory, U.S. Fish and Wildlife Service, I obtained a print-out of banding and recapture records of Blue Jays banded in the Atlantic Flyway of the eastern United States and the Canadian provinces east of and including Ontario. For my analysis, Florida, Massachusetts, New Jersey, and New York were chosen as states with the largest numbers of records and representing different parts of the Blue Jay's range. The print-out sheets were hand-searched for records addressing obvious questions and for information to develop new questions which could be addressed. Based chiefly on information gleaned from the

banding and recapture records, the records were classified according to the time the birds could be expected to be on their breeding grounds, on their wintering grounds, or in migration between these two locations.

Records of previously banded birds that were captured and released at the same place by the original banders (Banding Laboratory code 99) were separated from those otherwise recaptured, to avoid exaggeration of the number of birds shown not moving. It must be noted also that records of birds banded as locals (birds too young to be capable of sustained flight) define the end of the nesting period for the birds involved, and backward adjustment by the appropriate amount must be made to determine other stages of nesting activity. A word of caution must also be introduced here to warn the reader to remember that, because of differences in sizes of states, the numbers of birds recovered in different states represent different values. I think, however, that these values are exact enough that their comparison can be expected to reveal existing patterns in migratory behavior and thus to justify mapping the recoveries by states.

Results

This analysis made use of data from 8,002 recaptures from 101,903 banded Blue Jays. Of the 8,002 recaptures, 4,861 were of birds recaptured and released by the banders, leaving 3,141 birds recovered other than by the original banders, with a recovery rate of 3.1% (Table 1).

A tabulation for banding of locals by months showed Blue Jays in New Jersey near their hatching places from May to September, with peak numbers in June and July (Table 2). In New York, birds were banded as locals from May to August — peak numbers also

Table 1. Number of Blue Jays banded and number recaptured

Where banded	Number banded	Number recaptured	Number recaptured other than being captured & released	Percent recaptured of birds not captured & released
Florida	13,259	1,057	642	4.8
Massachusetts	23,986	2,277	783	3.3
New Jersey	36,944	3,107	1,094	3.0
New York	27,714	1,561	622	2.2
Total/average	101,903	8,002	3,141	3.1

Table 2. Number of Blue Jays banded as locals by months.

Where banded	April	May	June	July	August	September	Total
Florida	5	12	13	7	3		40
New Jersey		6	26	21	8	2	63
New York		11	35	21	5		72
Totals	5	29	74	49	16	2	175

during June and July. With peak numbers banded in both states during June and July, this time period was defined as the time when Blue Jays could be expected to be on their breeding grounds south at least to New Jersey. In Florida, Blue Jays were banded as locals from April to August, showing the breeding season in Florida starting about one month earlier than in New Jersey and northward. Peak numbers were banded in Florida during May and June.

With the banding records for locals showing the birds to be on their breeding grounds chiefly during June and July, the time for possible movements away from their breeding grounds north of Florida was defined as starting in August. However, one Blue Jay was recovered on 30 July 1976 in Connecticut after being banded about 320 km southwestward in New Jersey on 5 June 1976, showing movement northeastward during the period defined as the breeding season. The bird was banded as an AHY (adult) bird and, with its date of recovery being in late July, it must be assumed to have traveled after its breeding season.

Table 3. Recoveries of Blue Jays showing southward migration.

Where banded	Date banded	Where recovered	Date recovered
Massachusetts	10 September 1939	North Carolina	10 October 1939
Massachusetts	8 October 1954	Maryland	26 October 1954
Massachusetts	28 August 1961	South Carolina	14 October 1961
Massachusetts	17 September 1968	South Carolina	30 October 1968
Massachusetts	2 August 1969	Georgia	21 October 1969
New York	6 October 1979	North Carolina	30 October 1979

Based on the dates that birds were recovered, after being banded during the same year at more northern locations, southward migration was indicated during the period 10-30 October (Table 3). The banding recovery most precisely establishing the time of southward migration and illustrating the speed of movement was of a Blue Jay banded in Massachusetts on 8 October 1954 and recovered in Maryland on 26 October 1954, a maximum of 18 days. At least some Blue Jays reached the southern limit of the northern population's winter range in late October, suggesting the first of November as the starting time for these birds to be on their wintering grounds. The time for possible movements away from the breeding grounds was thus defined as August through October.

With fall migration defined as complete by the end of October, Blue Jays are considered to be on their wintering grounds starting in November. Banding recovery records indicate Blue Jays starting their northward migrations on 4 May (Table 4), thus ending the time spent on wintering grounds. To allow for imprecision resulting from use of banding recoveries for determining the time of migration, spring migration was considered to start in April. Blue Jays are thus considered to be on their wintering grounds from November through March.

With spring migration defined as starting in April, and with the time for the birds to be on their breeding grounds defined as starting in June, the time for spring migration was therefore defined as the period April through May. Data furnished me by John S. Weske (pers. comm.) show relatively high numbers of Blue Jays captured at his banding station in Maryland during the period of 29 April — 7 May, indicating northward movement to be accomplished chiefly in late April and early May. In a consideration of the entire north-south range of Blue Jays, the northward migration can be assumed to cover a longer period of time. In our data the time of northward migration was most precisely shown by a record of a Blue Jay banded in New Jersey on 4 May 1968 and recovered in Maine on 23 May 1968, a travel time of 19 days.

The recapture records clearly show the Blue Jay population to consist of two segments, a sedentary and a migratory one. The sedentary segment, as defined by birds not leaving the states where they were banded during the nesting season, is by far the largest, consisting of 89.1% of the population (Table 5). The proportion remaining to be recovered in the states where they were banded during the nesting season varied from

Table 4. Recoveries of Blue Jays showing northward migration.

Where banded	Date banded	Where recovered	Date recovered
Massachusetts	15 June 1967	New Hampshire	16 November 1967
Massachusetts	24 May 1970	Nova Scotia	24 November 1970
New Jersey	8 May 1955	Massachusetts	28 May 1955
New Jersey	4 May 1968	Maine	23 May 1968

Table 5. Number of Blue Jays banded during nesting season and recaptured other than by the banders inside and outside of states where banded.

Where banded	Number recaptured inside states	Number leaving states	Percent leaving states
Florida	153	1	0.7
Massachusetts	146	10	6.3
New Jersey	220	49	18.2
New York	87	14	13.8
Total/average	606	74	10.9

81.8% in New Jersey to 99.3% in Florida, with an average of 89.1%. A bird recovered in Illinois on 4 June 1975 — banded in Florida on 24 April 1974 during the nominal nesting season — was almost certainly a migrant lingering on its wintering ground, not a member of Florida's breeding population. Aside from this one record, the data indicate that those Blue Jays which are in Florida during the nesting season remain there throughout the year.

Of the many Blue Jays recovered in the same states where they were banded during the nesting season, all moved relatively short distances. Thus, of 83 Blue Jays banded during the nesting season in New York and recovered other than by the banders, 75 were recovered in the same latitude-longitude block where they were banded, and 8 were recovered in adjacent blocks. The only birds moving farther than to adjacent latitude-longitude blocks were the 14 birds leaving the state.

The 17 direct recoveries of Blue Jays banded in Massachusetts and recovered elsewhere indicated that the birds wintered in states as far south and west as Alabama (Fig. 1). The birds recovered in the states closest

to Massachusetts may have been enroute to more distant wintering grounds, but all were recovered in October or later. The one bird recovered in Georgia after being banded on 2 August 1969 in Massachusetts was recovered on 21 October 1969, indicating that at least some of the birds reach their most distant wintering grounds by late October. The recoveries in the Atlantic coastal states were generally scattered over most states from Massachusetts south to and including Georgia. The 2 birds recovered in Alabama were the only ones leaving the Atlantic Flyway.

New York is immediately west of Massachusetts, and the 17 recoveries of Blue Jays banded in New York show the birds leaving there to spend the winter in states farther west than those from Massachusetts (Fig. 2). Therefore — in addition to Alabama — Kentucky, Tennessee, and West Virginia are included in the winter range of Blue Jays breeding in New York, as compared with those breeding in Massachusetts. The westward extension in the winter range of the Blue Jays banded in New York indicate that these birds migrate in a somewhat southwestwardly direction, the same direction followed by birds from Massachusetts where

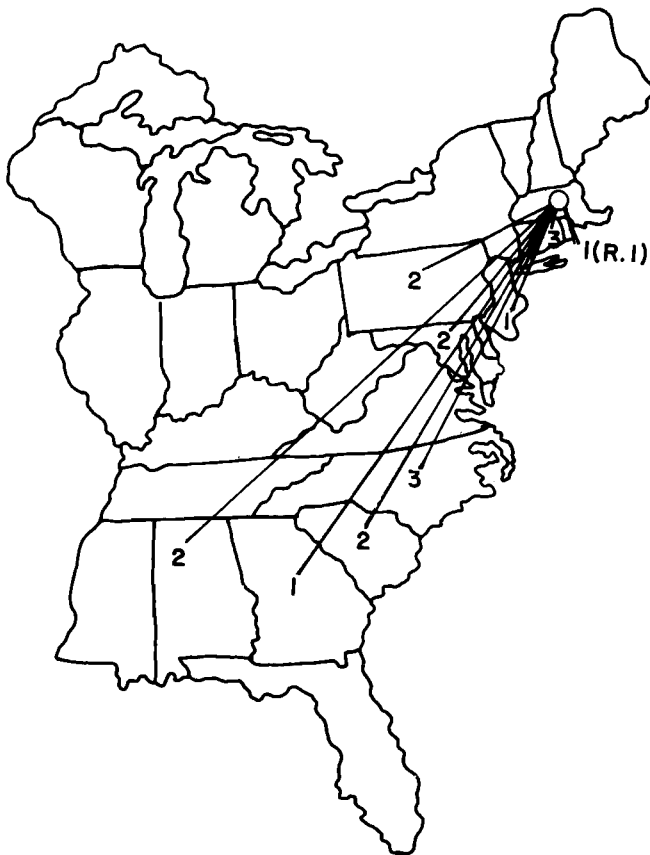


Figure 1. Direct recoveries of Blue Jays banded in Massachusetts.

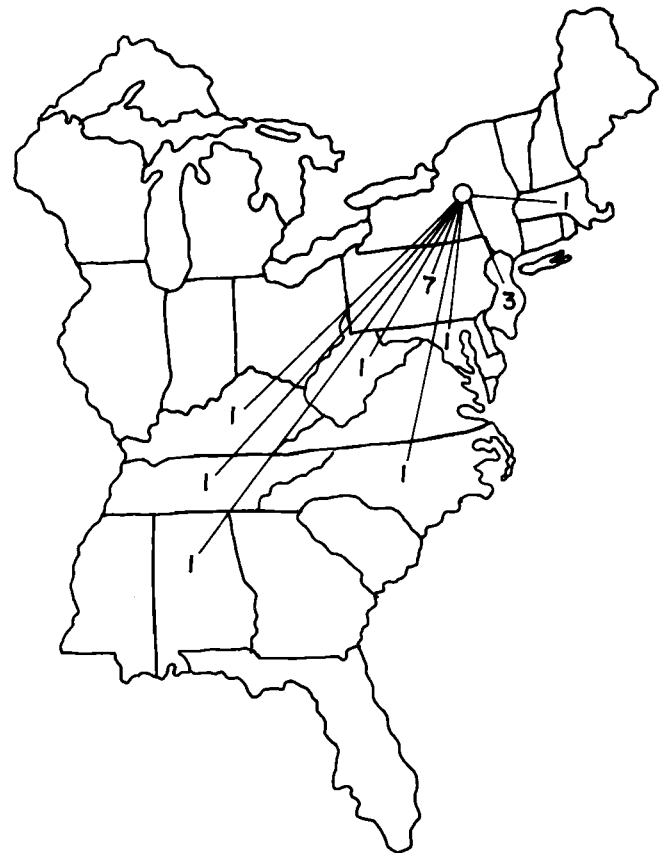


Figure 2. Direct recoveries of Blue Jays banded in New York.

Table 6. Data on Blue Jays at different latitudes in different winters

Where banded	Date banded	Where recovered	Date recovered
Massachusetts	13 January 1972	South Carolina	12 February 1973
New Jersey	21 January 1961	North Carolina	14 February 1962
New York	25 February 1966	Mississippi	2 January 1969
New York	13 January 1967	Maryland	2 December 1967
New York	7 December 1968	South Carolina	3 March 1974
Ontario	3 January 1956	Tennessee	18 December 1957

the direction of travel is undoubtedly influenced in part by the Atlantic Coast. Seven recoveries were made in Pennsylvania of Blue Jays banded in New York, with the migrating birds thus indicating a tendency to travel only short distances from their home states. Recoveries showed the birds sparsely scattered over the part of their range south and southwest from New York.

In addition to the fact that some Blue Jays migrate southward each year while others remain during the winter on their nesting grounds, individual Blue Jays migrate southward in some years but remain on their nesting grounds throughout other years. This includes even those birds making relatively long distance flights, as was shown by a bird banded in New York on 25 February 1966 and recovered in Mississippi on 2 January 1969. Successive winters may also be involved, as was shown by 3 birds (Table 6).

Individual Blue Jays may be found in different localities in different nesting seasons, some of them long distances apart. Two encounters illustrate this fact. The bird found in the most widely separated locations in different nesting seasons was one banded in New Jersey on 5 July 1967 and recovered in Georgia on 16 June 1970 — a distance of about 1,225 km. Another Blue Jay, banded in New Jersey on 1 June 1964, was recovered in Connecticut on 20 July 1967 — a distance of about 130 km. The bird recovered in Georgia was banded as an AHY bird; the bird recovered in Connecticut had not been aged.

Because migratory movements involve only a part of the Blue Jay population, the possibility exists that migratory movements are related to specific ages of the birds. However, of 23 Blue Jays recovered in other states after being banded in Massachusetts and New York during the nesting season, 10 were recovered at times showing them to have traveled as HY (immature) birds and 13 (56.5%) were recovered at times showing them to have traveled as AHY birds — indicating roughly the same amount of movement among both age groups.

Independent of age, different Blue Jays in the same population can be either sedentary or migratory, suggesting that the tendency to migrate is entirely an individual matter. However, 2 Blue Jays banded at the

same site on the same date were recovered at adjacent distant sites on approximately the same date, indicating that these birds sometimes travel long distances with associates. These 2 Blue Jays, banded as locals in New York on 28 July 1955, were recovered in North Carolina on or about 29 October 1956.

Discussion

With the banding of 2 Blue Jays as locals in New Jersey during September, and with a bird banded in New Jersey on 5 June 1976 and recovered in Connecticut on 30 July 1976, the time of movement from the nesting grounds can be seen to overlap with the nesting season. Also, the available banding recoveries show southward migration of Blue Jays during 10-30 October; whereas, based on field observations, Brown (1941) reported migration of Blue Jays through an area in Pennsylvania during 30 September — 6 October. Thus, the banding recovery records are not precise enough to define the exact time of migratory movements because of the improbability that birds will be banded immediately before their departure and recovered immediately upon their arrival in new areas. With allowance for the overlap time spent on the breeding grounds and movement to or from the breeding grounds — and for lack of precision in defining the time of migrations by use of banding data — I believe that the banding recovery records can be made to yield reliable information on movements of Blue Jays.

Recapture records of banded Blue Jays show many of these birds remaining on their nesting grounds throughout the year, including most or all of the birds in Florida during the nesting season. North of Florida, the proportion of banded Blue Jays leaving states where they were banded during the nesting season varied from 6.3% in Massachusetts to 18.2% in New Jersey. Since Blue Jays which are in Florida during the nesting season may well remain there all year, the higher proportion leaving New Jersey than Massachusetts presents a situation opposite that which would be expected. A possible explanation for this condition, for which supporting evidence is not available, is the operation of more winter feeding stations for birds in Massachusetts than in New Jersey.

Recoveries of Blue Jays banded in Massachusetts show these birds migrating from the state in a southwestward direction, obviously influenced by the Atlantic Coast. Less easily explained is the tendency shown by birds banded in New York to migrate in a southwestward direction. Gill (1941) and Kennard (1980) also found Blue Jays migrating in a southwest-northeast direction, but they worked mostly with birds from extreme northeastern United States where the birds' direction of travel was influenced by the Atlantic Coast.

Determining the direction traveled by migrating Blue Jays in North America is further complicated by a report from Smith (1979) showing Blue Jays in North America west of the 100th meridian migrating in a southeast-northwest direction. Smith thought the birds to be following rivers and to have the direction of their travels influenced by the direction of the rivers' flow.

The direction traveled by Blue Jays in their migrations from New York appears to be influenced by the orientation of the Appalachian Mountains and the direction of flow of the rivers west of these mountains. This assumption is supported by the fact that all of the 4 Blue Jays taken as direct recoveries in the more western states after banding in New York were banded north of 43°N in or near the Appalachian Cordillera, and the 1 recovered in North Carolina was banded farther south. However, the observation of Blue Jays taking off on migratory flights over Lake Erie (Taverner and Swales 1907) shows these birds crossing instead of following water bodies — at least those interfering with their traveling in a southerly direction. More research is needed to determine what it is that influences the choice of direction taken by Blue Jays in their migratory movements. But, in the absence of more evidence to the contrary, the explanation that the direction traveled by Blue Jays in their migrations is influenced by rivers and, possibly, mountains seems reasonable.

As is the case with many species of birds (Dorst 1962), the Blue Jay population in North America consists of two segments, one being sedentary and one migratory. Gill (1941) considered migratory movements of Blue Jays to be mostly performed by first-year birds. However, I found HY and AHY Blue Jays migrating at roughly the same rate. Also, with movements away from the breeding localities being made in summer and fall when food can be expected to be abundant, the migration of Blue Jays cannot be seen as resulting from food shortages. Furthermore, with some individuals showing migratory behavior and others not showing it when in the same environment, the motivation for the behavior can be seen as coming from within the birds. The motivation would appear to be the innate tendency among birds to disperse after the nesting season. This tendency is shown by widely different species (Mayr 1942).

As dispersal involves movements in all compass directions from breeding sites, this movement can be distinguished from fall migration by the fact that it includes movements made after the nesting season in directions other than southward. Among the data on Blue Jays available to me, records showed northward movement after the nesting season — or dispersal movements. However, as is shown by differences in expression of



the tendency for dispersal by individual birds in the northern part of their range and the almost total lack of its expression in the southern part, dispersal movements among Blue Jays may be seen as a vestigial behavior pattern no longer serving the needs once served.

Two records indicating that Blue Jays may sometimes elect not to return to their breeding grounds after leaving them in migratory movements suggest a weakening in the innate tendency of these birds to return for reproduction to a location near their hatching places. The onset of reproductive readiness may be a precursor of the need to return to their hatching places and breeding grounds; the birds may not return to their hatching places only if they fail to enter into reproductive readiness or are influenced by other health impairments. But with migratory movements so short that Blue Jays do not leave their breeding range to get to wintering grounds, the need for homing behavior automatically becomes unnecessary. Homing behavior is an integral part of migratory behavior, and the homing tendency of Blue Jays may be deteriorating along with the dispersal or migratory tendency.

Summary

In the extreme southern part of their range in Florida, Blue Jays were found to be mostly or entirely sedentary. In New Jersey and farther north, an average of 10.9% of the population was found migrating from the states where the birds were banded during the nesting season. Seemingly influenced by topographical features, migration was mostly southwestward from the northern part of the Blue Jay's range. Both HY and AHY birds were involved in the migrations. The birds showed irregularities in their migratory movements, the same birds being present in widely separated locations in different winters and even in different nesting seasons. In being able to spend the winter in all parts of their breeding range, Blue Jays are in

process of losing the tendency to migrate from their breeding grounds — or to return to their original breeding grounds if they do leave them.

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