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PATTERN OF COLONIZATION BY THE NORTHERN MOCKINGBIRD IN QUEBEC

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Abstract.—The Northern Mockingbird (*Mimus polyglottos*) first nested in the province of Quebec in 1960. Analysis of all sightings in Quebec since then shows that: (1) the Northern Mockingbird colonized suitable areas throughout the St. Lawrence Valley simultaneously, sparsely, and evenly; (2) the species rarely occupied a breeding site for more than two years; (3) on a monthly basis, the species was equally abundant in northern and southern sectors of the Valley from 1960–1972, but not from 1973–1984; (4) the breeding population has increased very slowly; (5) successful overwintering was very rare. Our data indicate that the species is still expanding its breeding range in northeastern North America, but, because of the hardship of winter, Quebec birds appear to migrate.

PATRÓN DE COLONIZACIÓN DE *MIMUS POLYGLOTTOS* EN QUEBEC

Sinopsis.—*Mimus polyglottos* fue informado anidando por primera vez en Quebec en el 1960. El análisis de avistamientos desde entonces ha demostrado que: (1) el ave ha colonizado de forma uniforme y simultánea áreas con hábitat apropiado en el valle de St. Lawrence; (2) la especie raras veces utiliza por más de dos años una misma localidad para reproducirse; (3) el ave fue igualmente abundante en los sectores norte y sur del valle entre 1960–1972, aunque no así entre 1973–1984, basado esto en informes mensuales; (4) la población residente ha venido aumentando lentamente; (5) en contadas ocasiones las aves tienen éxito en sobrevivir un invierno en el área de estudio. Los datos indican, que la especie esta aún expandiendo sus áreas reproductivas hacia el noreste de Norte America. No obstante, debido al rigor del invierno, las aves de Quebec parecen estar migrando.

The Northern Mockingbird (*Mimus polyglottos*) has expanded its range recently in northeastern North America (Beddall 1963, Bull 1974, Curry 1987, Stiles 1982). This expansion is generally described as having proceeded gradually from south to north in conjunction with increasing

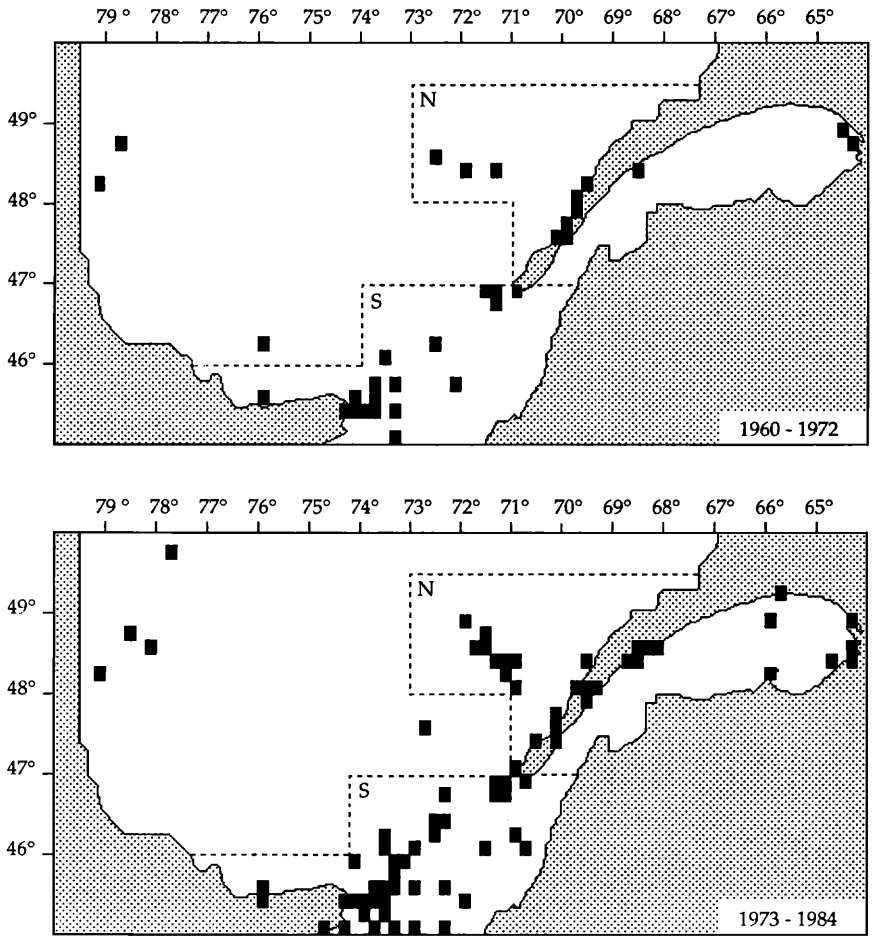

FIGURE 1. Geographic distribution of the breeding records and summer occurrences of the Northern Mockingbird for each half of the study period. The dashed lines enclose the northern and southern sectors.

resident populations. However, our field experience, strengthened by comments of other observers, led us to believe that mockingbirds had a different expansion pattern in the St. Lawrence Valley. Using all available distribution data, we offer a description of the range expansion and present status of the species in the province of Quebec, Canada.

MATERIALS AND METHODS

We studied all available reports of the Northern Mockingbird in Quebec, including those of the Quebec Nest Record Card Program, and reports published in local publications and major ornithological journals. We also used EPOQ (*Étude des populations d'oiseaux du Québec*), a computerized data bank containing all bird reports received by local bird clubs since

TABLE 1. Occurrences of the Northern Mockingbird in Quebec before breeding was confirmed.

Anticosti Island	8 Aug. 1902	Can. Field-Nat. 38: 46
Gaspé	5 Nov. 1938	Can. Field-Nat. 53: 116
Quebec City	10 Jun. 1940	*fide* Victor Gabouriault
Bonaventure Island	26–28 Jun. 1945	Auk 63: 99
Sept-Iles	4–5 Jun. 1947	Can. Field-Nat. 66: 56
Kamouraska	1 Oct. 1947	Bull. ornithol.[a] 2(3): 10
Kamouraska	13 May 1950	Bull. ornithol. 2(3): 10
Kamouraska	3 Jun. 1951	Bull. ornithol. 2(3): 10
Rougemont	Jul. ca. 1950	Nat. Can. (Que) 82: 67
Saint-Jean	17–23 May 1957	Bull. ornithol. 2(3): 10
Montreal	8 May 1957	Annu. Rep. P.Q.S.P.B.[b] 1957: 28
Tadoussac	1 Aug. 1957	Audubon Field Notes 11: 393
Ulverton	18 Oct. 1959	Annu. Rep. P.Q.S.P.B. 1959: 25
Danville	9 Nov., 4–12 Dec. 1959	Annu. Rep. P.Q.S.P.B. 1959: 26

[a] Bulletin ornithologique: published by the Club des ornithologues du Québec, Quebec City, Quebec.
[b] P.Q.S.P.B.: Province of Quebec Society for the Protection of Birds, Montreal, Quebec.

1955. The basic information units of EPOQ are daily field checklists completed by bird-watchers during outings. Collaborators are instructed to complete one checklist per day for each site they visit. EPOQ contains over 100,000 checklists. The data obtained from EPOQ covered the years 1960–1984, and were treated separately for the northern and southern sectors of the St. Lawrence Valley (limits shown in Fig. 1). These sectors were delineated in a way that provided two areas of similar size along the St. Lawrence River. Both sectors are highly deforested, and together yielded over 97% of all sightings in the province. Altogether, 67,856 checklists were processed (26,064 from the northern sector and 41,792 from the southern sector); the Northern Mockingbird was reported on 666 checklists (226 and 440 respectively for the northern and southern sectors). Using EPOQ data, monthly and annual frequencies of occurrence were calculated. These frequencies are the proportion of checklists reporting the species on the total number of checklists in the databank for the period and the area under study; these estimates are thus corrected for variation in observation effort.

Breeding records refer to observations of nests, eggs, or attended young, while *summer occurrences* refer to all sightings made between 01 Jun. and 15 Aug. Both types of records were treated together because their temporal and spatial distributions were similar. Statistical analyses followed Sokal and Rohlf (1981).

RESULTS

Before breeding was definitely established, the Northern Mockingbird was reported 14 times in Quebec (Table 1); a majority of these reports (57%) came from the northern sector. These sightings involved single birds except at Tadoussac in 1957 and Danville in 1959, when two individuals were reported.

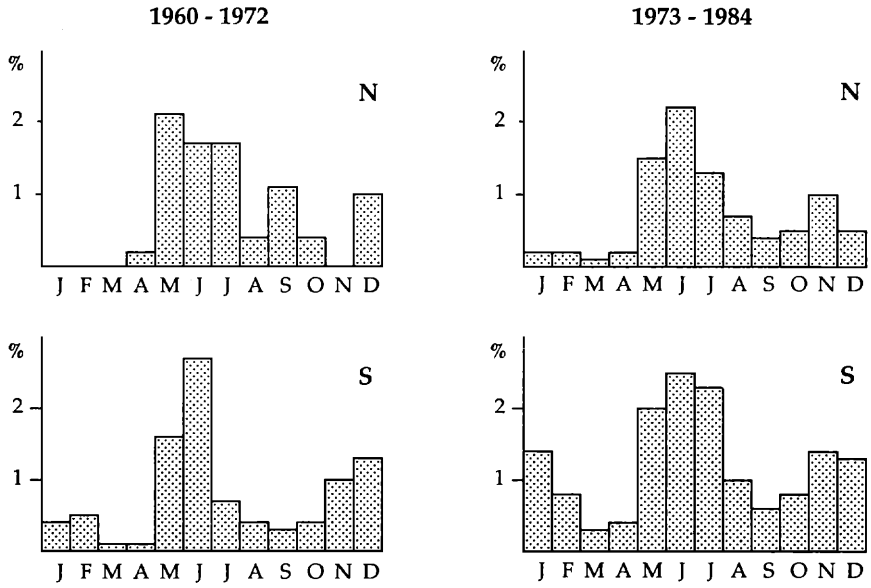

FIGURE 2. Distribution of the monthly frequencies of occurrence of the Northern Mockingbird in the northern (N) and southern (S) sectors of the St. Lawrence Valley for the 1960–1972 and the 1973–1984 periods.

Breeding was first documented in 1960 at Como (45°27′N, 74°09′W) and Tadoussac (48°09′N, 69°43′W), two localities some 500 km apart. Afterwards, breeding records or summer occurrences were reported every year except 1966 and 1970. The distribution of these records, plotted according to blocks of 12 min longitude by 10 min latitude (Fig. 1), shows that mockingbirds were present in outlying areas at the very beginning of their establishment in the province; they did not expand progressively in the St. Lawrence Valley from south to north. The higher number of records during the 1973–1984 period results in part from the dramatic increase in birdwatching activities.

During the first half of the study period (1960–1972), the Northern Mockingbird was reported on a monthly basis with almost the same frequency in the northern and southern sectors of the St. Lawrence Valley (Fig. 2; Wilcoxon signed test, $z = 0.471$, $P = 0.638$). However, during the 1973–1984 period, the species was more abundant in the southern than in the northern sector (Fig. 2; Wilcoxon signed test, $z = 3.059$, $P = 0.002$).

An analysis of the frequencies of occurrences in summer indicates that the breeding population of mockingbirds in Quebec is slowly but steadily increasing (Fig. 3; Kendall correlations; for northern sector: $\tau = 0.323$, $P = 0.023$; for southern sector: $\tau = 0.354$, $P = 0.013$). In the southern sector the pattern of increase fits a linear model which explains 23.7% of the total variance (Fig. 3B; test for significance of the slope of the linear

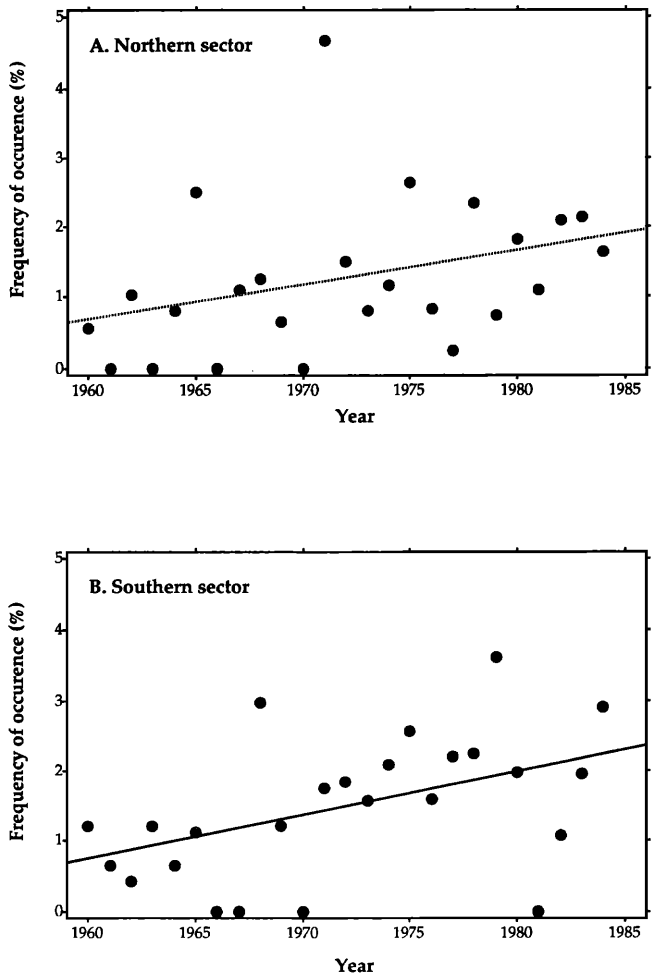

FIGURE 3. Distribution of the frequencies of occurrence of the Northern Mockingbird in summer, 1960–1984. A. Northern sector; the line represents the regression: Frequency of occurrence = 0.050 (year) − 97.549. The slope is not significant: $F = 3.112$, $P = 0.0921$; $r^2 = 0.119$. B. Southern sector; the line represents the regression: Frequency of occurrence = 0.066 (year) − 128.859. The slope is significant: $F = 7.126$, $P = 0.014$; $r^2 = 0.237$.

regression: $F = 7.126$, df = 1, 23, $P = 0.014$). In the northern sector, the pattern is more erratic and does not fit a linear model (Fig. 3A; $F = 3.112$, df = 1, 23, $P = 0.091$).

Summer occurrences and breeding records from 1960 to 1984 came from 144 different localities (Table 2). The data show a very low rate of long-term site occupancy: at 127 of the localities (88.2%), mockingbirds were recorded on only one or two years of the 25-yr period.

Mockingbirds overwinter irregularly in the St. Lawrence Valley. Avail-

TABLE 2. Number of localities where the Northern Mockingbird bred or occurred in summer, according to the number of years it was recorded from 1960 to 1984 in the northern (N) and southern (S) sectors of the St. Lawrence Valley.

Number of years	Number of localities	
	N	S
1	48	53
2	7	19
3	3	3
4	2	1
5	0	1
6	1	1
7	0	2
9	0	1
11	0	1
14	1	0

able records yielded some twenty successful overwinterings and some forty additional winter occurrences. In winter, the species was observed in only 12 of the 25 years studied and the large majority of reports originated from the southern sector. There were several ill-fated wintering attempts.

DISCUSSION

Our analysis indicates that, contrary to the pattern of range expansion of other species in Quebec, the Northern Mockingbird did not, at first, progress gradually from south to north. We offer the following explanation for this pattern and for the bird's low rate of long-term site occupancy.

East of the Mississippi, the mockingbird was restricted at the beginning of the century to areas south of Maryland, where it was a sedentary breeder (Coues 1903). Since there is no sharp ecological or geographical boundary in southern Maryland, a sharp boundary to the mockingbird range was unlikely. Indeed, sporadic breeding and overwintering occurred in southern New England (Wright 1921). Occasionally, stray birds also reached southern Ontario (Curry 1987) and Quebec (Table 1) in both spring and fall.

Dramatic changes in mockingbird populations occurred after the Second World War. Stiles (1982) demonstrated that, since 1945, the number of mockingbirds wintering in New England increased continuously. The increasing availability of planted fruit-bearing plants, especially the multiflora rose (*Rosa multiflora*), is thought to be the major factor accounting for this increase (Stiles 1982). Finding a reliable and increasing winter staple north of its original range, the species expanded as a breeder. For instance, it first nested in New York State in the early 1950s and colonized the entire State except the Catskills and the Adirondacks before 1970 (Bull 1974). Breeding of the Northern Mockingbird in Quebec since 1960 appears to be directly linked to this range expansion.

The preferred breeding habitat of the mockingbird in Quebec is lawns interspersed with hedgerows, tall trees and ornamental bushes (pers. obs.);

this is also the preferred habitat in Ontario (Curry 1987) and New England (DeGraff et al. 1980). This man-made habitat, which occurs patchily in small towns, old suburbs, landscaped cemeteries and golf courses, is relatively similar wherever it occurs, and is evenly scattered in the St. Lawrence Valley. Mockingbirds, therefore, found suitable breeding sites over the whole valley and could colonize the whole area fairly simultaneously (Fig. 1).

The Northern Mockingbird is typically referred to as an essentially non-migrating species (DeGraff et al. 1980, Laughlin and Kibbe 1985, Sprunt 1948), but it appears that Quebec mockingbirds are developing migratory abilities. They are virtually absent in late winter (Feb. to April) and their number suddenly increases in May and peaks in June and July (Fig. 2). Contrary to what happened in New England, individuals were generally not able to overwinter in Quebec, probably because winter conditions are harsher, the multiflora rose is absent, and other fruit-bearing plants are eagerly sought by flocks of Pine Grosbeaks (*Pinicola enucleator*) and Bohemian Waxwings (*Bombycilla garrulus*). Curry (1987) has suggested, but not without some reservations, that mockingbirds in Ontario might be seasonal migrants too.

Quebec birds probably winter in the northeastern United States where they must compete with territorial residents (Michener and Michener 1935); under these circumstances, they are likely at a disadvantage and probably face high winter mortality. This can partly explain the low rate of long-term site occupancy in Quebec (Table 2) and the year to year irregularities in summer frequencies of occurrence (Fig. 3).

As patchy as it may be, the breeding habitat of the mockingbird in Quebec could certainly support a larger population. A continuous input of birds from more southerly areas allowed the colonization of Quebec, and undoubtedly helped in the very slow increase of the breeding population observed between 1960 and 1984 (Fig. 3). Any substantial increase of Quebec's mockingbird population should now result from an increased ability of the birds to migrate and winter successfully in more southerly areas since the species seems unable to winter successfully so far north.

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The contribution of Jacques Larivée was indispensable. He supervised the setting up of EPOQ, has managed it since 1974, and provided us with the computerized data. We thank Henri Ouellet, E. H. Burtt, Jr. and two anonymous reviewers for helpful comments on the manuscript. Henri Ouellet allowed access to the files of the Quebec Nest Record Card Program.

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NOTES AND NEWS

NOTICE: COLOR-MARKING OF ENDANGERED SPECIES IN MANITOBA

Burrowing Owls, Ferruginous Hawks, Loggerhead Shrikes and Baird's Sparrows nesting in southwestern Manitoba have been banded and color-marked from 1987–1989.

Burrowing Owls were marked with:

a) a FWS aluminum band during all years;
b) a black leg jess (1 cm wide × 1.5 cm long) during 1988;
c) red and white or blue numbered plastic bands (0.7 cm wide) and fast-drying fluorescent orange paint on primaries and/or tail feathers during 1989.

Ferruginous Hawk immatures were marked with:

a) a FWS aluminum band during all years;
b) a black anodized aluminum band with a 2-digit alpha-numeric code on the opposite leg during 1988 and 1989; and
c) fluorescent orange paint on the underside of tail and selected flight feathers during 1989.

Loggerhead Shrikes were marked with:

a) a FWS aluminum band during all years;
b) a red plastic band (0.4 cm wide) on the opposite leg during 1988;
c) a red and white plastic band on the opposite leg during 1989; and
d) larger immatures were marked with fluorescent orange on the tail and/or primaries during 1989.

Baird's Sparrows were marked with:

a) a FWS aluminum band and a colored plastic band during 1988.

Anyone observing these birds should note the location, date, color marker and band combinations and other details of the sighting. Send particulars to *Ken De Smet, Manitoba Department of Natural Resources, Box 14, 1495 St. James Street, Winnipeg, Manitoba, R3H 0W9 or phone (204-945-6301).*