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THE DYNAMICS OF RED-WINGED BLACKBIRD POPULATIONS AT FOUR LATE SUMMER ROOSTS IN QUEBEC

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Serious damage to cereal crops by granivorous birds occurs when those birds become highly gregarious (Wiens and Johnston 1977) as exemplified by losses suffered by North American corn growers to Red-winged Blackbirds (*Agelaius phoeniceus*). Corn damage studies have shown that almost all fields sustaining serious damage (>5%) are located within 16 km of blackbird roosts (Dyer 1967, Dolbeer 1980). While blackbird roosting behavior contributes to the corn damage problem, it also provides some potential for solutions. By concentrating in large numbers in predictable locations, blackbirds are vulnerable to large scale population management strategies. At present, population reduction through surfactant spraying (Lefebvre and Seubert 1970, Weatherhead et al. 1980) is the only population management technique developed which takes advantage of roosting behavior, though other techniques may become available.

Because roost-oriented management could have a major impact on blackbird populations, care must be taken in ensuring that it is justified (Robertson et al. 1978). If control is warranted, it is necessary that we can predict the effect of the proposed management technique. The aim of this study was to examine Red-winged Blackbird roosting behavior in southern Quebec during late summer to determine if both the representation of Red-winged Blackbirds in mixed-species roosts and their age and sex composition changed in a predictable fashion. Were this the case, present and future management decisions would be greatly facilitated by incorporating this information into simulation models of the population (Dolbeer et al. 1976) and thereby improving their predictive ability.

METHODS

The study was conducted in the St. Lawrence Valley of Quebec from mid-June until mid-September, 1979. Roosts used in this study were located near Beauharnois, Farnham, Granby, and St. Jean (Fig. 1). Roost population size was estimated by stationing observers around the roost and counting birds in flight lines during the dawn departure. The number of observers ranged from 6 at Beauharnois to 2 at Granby, with the number dictated by the size of the roost and the number of flight lines.

Red-winged Blackbirds often roost communally with Common Grackles (*Quiscalus quiscula*), Brown-headed Cowbirds (*Molothrus ater*) and Starlings (*Sturnus vulgaris*). To determine the proportion of the roosting populations made up of Red-winged Blackbirds, observers stationed under flight lines randomly selected birds in the flight lines, and using binoculars, identified them to species and recorded them as Red-winged Blackbird or "other." Age class and sex composition for Red-winged

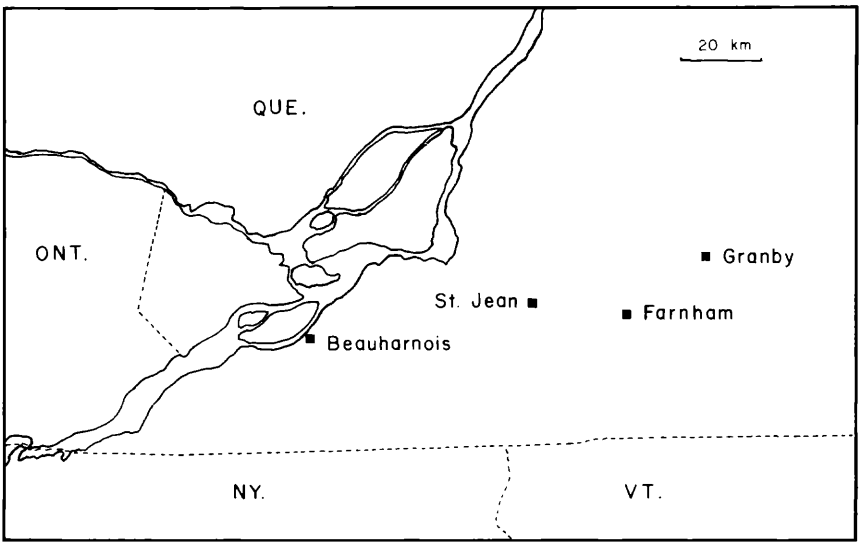

FIGURE 1. Map of roost locations.

Blackbirds were obtained from birds captured by mist nets placed in the Beauharnois roost. Net locations were the same as those used by Weatherhead and Greenwood (1981) and for the reasons they discussed, were assumed to provide a random sample of the population.

RESULTS

In each of the 4 roosts studied, there was a rapid increase in the roosting population following the breeding season with the roosts that became larger beginning to increase sooner (Fig. 2). While the rate of population increase varied considerably among roosts, within roosts the rates were very consistent as indicated by the high correlation coefficients obtained by linear regression (Fig. 2). These results suggest that the date at which a roost population begins to grow may have some value for predicting the rate at which the roost will increase and thus the size it will obtain. Also, with relatively few observations of roost size one can predict the rate of increase during the late summer period.

The proportion of Red-winged Blackbirds in all 4 roosts was initially very small, but increased steadily until Red-winged Blackbirds became the dominant species in each (Fig. 2). The other species using the roosts were common Grackles, Starlings, and Brown-headed Cowbirds, but the proportions of each were not recorded. From the regression lines for percentage Red-winged Blackbirds in Fig. 2, it can be determined that the estimated day on which Red-winged Blackbirds comprised 50% of the roosting population occurred in a period of only 10 days over the

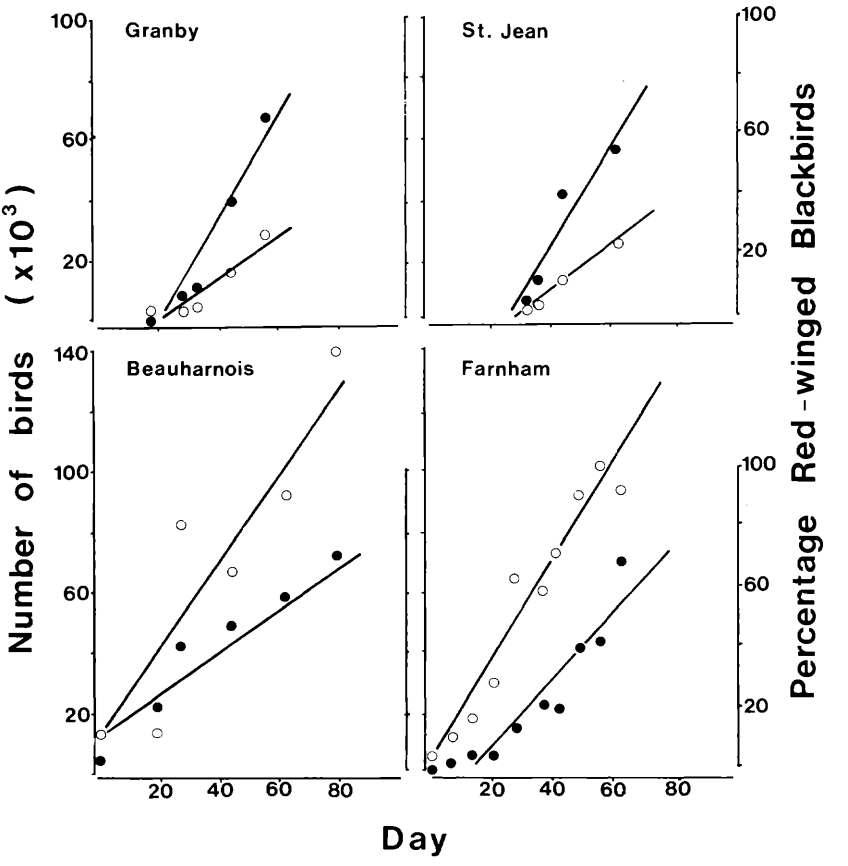

FIGURE 2. Total roost size (open circles) and percentage Red-winged Blackbirds (closed circles) in roosts. Day 1 is 26 June. For all regressions $r > 0.92$.

4 roosts. Thus, in spite of the divergent roost sizes the rate of increase of the proportion of Red-winged Blackbirds in the roosting population showed considerable consistency among roosts. Simple linear regression using combined data from all 4 roosts yielded the equation:

% Red-winged Blackbirds = $-8.60 + 1.0$ (day), where 26 June is day 1 ($r = 0.865$, $P < 0.001$), indicating that on average, the proportion of Red-winged Blackbirds in roosting populations increased by 1% per day beginning approximately 4 July.

The sample sizes and number of samples of mist-netted birds obtained were quite small (Table 1) and serve only to indicate several general trends. In July there was a similar representation of all 4 age/sex cohorts in the Beauharnois roost. In the August and September samples very few after hatching year (AHY) females were caught and the number of

TABLE 1. Age and sex composition of Red-winged Blackbirds mist-netted in the Beauharnois roost.

Sampling period	Sample size	% composition*			
		AHY ♂	HY ♂	AHY ♀	HY ♀
17–24 July	80	28.8	23.8	18.8	28.8
7–14 Aug.	45	26.7	33.3	2.2	37.8
26–30 Aug.	57	61.4	21.1	5.3	12.3
12 Sept.	62	22.6	64.5	3.2	9.7

* AHY = after hatching year, HY = hatching year.

hatching year (HY) females also decreased in the last 2 samples. The trend of fewer females using the roost later in the roosting period is consistent with samples collected later in the fall at this roost in 1980 in which females always made up less than 12% of the Red-winged Blackbirds captured (H. Greenwood and P. J. Weatherhead, unpublished data). Thus, when most corn damage occurs in this region during the latter half of August and early September, the roosting Red-winged Blackbird population is predominantly (>80%) male.

DISCUSSION

The results of this study have implications for both the management of Red-winged Blackbirds at roosts as well as for the ecology of roosting behavior. Considering management first, the obvious time to reduce the pest population is prior to the damage period. The results of this study indicate that the closer to that time that population control is carried out, the greater its impact would be, since both proportionately and numerically Red-winged Blackbirds steadily increase in the roosting population up to and during the damage period. While some roosts continue to increase until late in the fall (Meanley 1965, Weatherhead and Bider 1979), population reduction at that time aimed at lowering populations the following year has less likelihood of success because of the possibility of reduced winter mortality and increased reproduction the following spring compensating for the smaller fall population.

Control efforts just prior to damage would also be most effective against males, the segment of the population responsible for the majority of damage (McNicol et al. 1979). Unless control efforts were quite intense, the ramifications of an early fall control program for the Red-winged Blackbird population would appear not to be great because males would be disproportionately affected. This conclusion stems from there being a surplus of males in the breeding population as a consequence of the species' polygynous mating system (Orians 1961).

The low initial representation of Red-winged Blackbirds in the 4 roosts studied suggests that they are attracted to roost sites already occupied by other species. Also, the data suggest the possibility that the

ecological factors which determine Red-winged Blackbird numbers in a roost are the same as, or covary with, the factors determining the number of cowbirds, grackles, and Starlings that can be supported. This suggestion derives from the fairly consistent change in proportional representation of Red-winged Blackbirds over time among roosts differing substantially in the size of their total populations. This possibility may be reasonable if all species are relying on agriculturally derived foods, even if their specific diets are quite different.

It is appropriate to conclude on a note of caution. The data presented herein are only from 4 roosts and from a small portion of the range of Red-winged Blackbirds. The interpretation of these data is offered only to indicate how predictable patterns of roosting behavior might be used in formulating management programs. It remains for a much more substantive data base from a broader geographical area to be accumulated however, before sound management programs based on these principles can be formulated.

SUMMARY

Within 4 late summer roosts in southern Quebec both the total roosting populations and the proportion of those totals comprised of Red-winged Blackbirds increased in a linear fashion. The rates of increase in the proportion of Red-winged Blackbirds were also quite similar among roosts in spite of total roost sizes being substantially different. Samples collected by mist net in the Beauharnois roost indicated that both hatching year and after hatching year males and females were similarly represented early in the roosting period with females becoming proportionately less abundant by late August. The implications of these results both for blackbird management and for roosting behavior are discussed, as is the need for further research.

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