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NUMBERS AND MOVEMENTS OF YELLOW RAILS ALONG THE ST. LAWRENCE RIVER, QUEBEC[1]

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Abstract. From 1993–1996, we surveyed, banded, and radio-tracked Yellow Rails (*Coturnicops noveboracensis*) along the St. Lawrence River, in southern Quebec. We conducted night surveys at Ile aux Grues (IAG), and banded 130 individuals at several localities. We recaptured individuals 82 times, 7 of which were returns (same site, different years), 5 were displacements (same year, different sites), and 1 was a recovery (different site and year). Up to 20 calling males were surveyed at IAG during a given night, and each year the number of rails heard calling increased from mid-June until the first days of August, and then decreased through late August until calling was no longer heard. We argue the increase in rails heard on IAG in July and early August occurred because birds moved to the island, whereas the decrease in rails heard in late August occurred because birds stopped calling and began molting; indeed, all displacements were from rails recaptured at IAG and three rails were recaptured at IAG during their complete prebasic molt. Some Yellow Rails may move from other areas along the St. Lawrence River to IAG in order to molt, probably because IAG harbors the largest high-marshes along the river and is free from terrestrial predators. Although they may not be indicative of a genuine molt migration, our results are suggestive of a molt migration similar in some ways to that known to occur in waterfowl and coots.

Key words: agriculture, banding, Coturnicops noveboracensis, *molt migration, radiotelemetry, Yellow Rail.*

The life history and status of the Yellow Rail (*Coturnicops noveboracensis*) are poorly known. This secretive bird inhabits densely vegetated marshes and its breeding distribution is patchy and localized, being chiefly restricted to few known sites in northern North America (Bookhout 1995). The Yellow Rail is a species of management concern in the United States (USFWS 1995), as well as in Canada (Dunn 1997), where most of its breeding range is located. Although research has been conducted in the northern United States, notably in the Great Lakes (Walkinshaw 1939, Stenzel 1982) and the Great Plains (Maltby 1915, Peabody 1922, Stalheim 1974), only basic information such as its status and distribution has been collected in the northeastern United States and eastern Canada (Gibbs et al. 1991, Erskine 1992). Priorities for future research should concentrate on habitats and include systematic surveys across the breeding range as well as marking studies to document migration routes and male fidelity to breeding sites (Bookhout 1995).

In order to help document the status and distribution of the species in eastern Canada, we surveyed, banded, and radio-tracked Yellow Rails along the St. Lawrence River and its Saguenay-Lake-Saint-Jean tributary, in southern Quebec. In this paper, we: (1) present the numbers of Yellow Rails surveyed at Ile aux Grues, a wetland complex of the St. Lawrence corridor, (2) present results of our banding effort, in particular long-distance movements of Yellow Rails along the St. Lawrence corridor, as determined by recaptures of banded individuals, (3) document, with the help of radio-telemetry, the complete prebasic molt that adults undergo at the end of each summer, and (4) discuss all these results in relation to habitat characteristics and different aspects of the species' biology, in particular the possibility that the Yellow Rails inhabiting the St. Lawrence corridor may undergo a "molt migration" similar in some ways to the one documented for many waterfowl.

METHODS

Field work was conducted along the St. Lawrence River, the Saguenay River, and Lake Saint-Jean, in southern Quebec (Fig. 1). Most of the fieldwork was conducted at Ile aux Grues (IAG), a 20.4-km^2 island in the Upper St. Lawrence River Estuary, where the narrowing of the river induces a vertical tidal range greater than 6 m (St. Lawrence Centre 1996). IAG harbors 530 ha of high-marshes (wet meadows) that are potential habitat for Yellow Rails. All other localities we visited (Fig. 1) also had marshes dominated by fairly low fine-stemmed emergent plants, chiefly sedges (Cyperaceae), rushes (Juncaceae), and/or true grasses (Gramineae), in which shallow or no measurable standing water is usually present, but in which the substrate always remains water-saturated (see Robert and Laporte 1996 for details on habitat characteristics).

SURVEYS AT ILE AUX GRUES

From late May or early June to late August 1993–1996, we surveyed IAG systematically to count calling Yellow Rails. Surveys were conducted when the winds were low (15 km hr^{-1} or less) during complete darkness (between 22:30 and 03:30), when the males call with little interruption (Bookhout 1995). Surveys were

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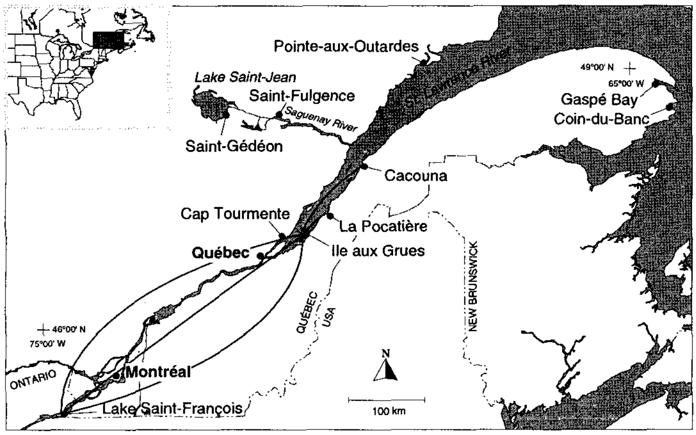

FIGURE 1. Map of the St. Lawrence River, showing localities where Yellow Rails were surveyed and/or banded from 1993 to 1996, and displacements (same year, different sites; $n = 5$) of Yellow Rails towards Ile aux Grues as determined by recaptures of banded individuals.

conducted along 16 km of gravel roads that crossed all the potential Yellow Rail habitats on the island. The Yellow Rail's call can be heard from up to 1 km away (Bart et al. 1984), but it is usually audible from no more than 500 m. Because of this, and because there was interference from calling amphibians and Orthoptera, and buzzing mosquitoes, we stopped at 400 m intervals. At each stop, we listened for 2 min and interspaced listening periods with imitations of the species' call by knocking two stones together (Bart et al. 1984, Robert and Laporte 1997). A large portion (ca. 40%) of the high-marshes of IAG is subject to burning each spring for agriculture, before the arrival of Yellow Rails (Robert and Laporte 1996). This agricultural area is not covered by the senescent vegetation canopy that is characteristic of Yellow Rail nesting habitat (Bookhout 1995, Robert and Laporte 1996), and we calculated for all surveys the proportion of individuals heard in this part of the island.

BANDING AND RECAPTURES

Yellow Rails were captured at night using techniques described elsewhere (Robert and Laporte 1997). Birds were banded at a total of 10 sites (Fig. 1), although banding efforts were concentrated at IAG, Cacouna, and Lake Saint-François because preliminary results indicated that these three sites had the largest populations. Most banding was done at IAG, on which each year from 1993 to 1996, we systematically (weekly) attempted to capture all "new" Yellow Rails, i.e., all individuals that were found in an area of the island where no birds had been heard earlier during the season. We classified all recaptured birds as "repeats" (same site, same year), "returns" (same site, different years), "displacements" (same year, different sites), or "recoveries" (different site and year).

RADIO-TELEMETRY

In order to verify presence at IAG after the end of the calling season, small radio-transmitters were glued on the back of three rails in 1994 (22–23 August) and three in 1995 (9, 10, and 20 August). They were all males (yellowish bill), were calling at the time of capture, and had a complete plumage when fitted. We cut the intrascapular feathers and glued the transmitters directly to the skin and feather stubs with cyanoacrylic glue (Perry et al. 1981, Johnson et al. 1991). The radio-transmitters we used were from Holohil Systems Inc. (Model BD-2G), Ottawa, Canada, weighed 1.45 g, and corresponded to 2.7% or less of the body weight of individuals. The six rails thus fitted were tracked using a TRX-1000S receiver (Wildlife Materials Inc., Carbondale, Illinois) and a hand-held three-element Yagi antenna. We located the rails by tracking them directly in the field.

RESULTS

The maximum number of Yellow Rails heard calling at IAG during a given night was 15 (1993), 20 (1994), 14 (1995), and 14 (1996). Each year, the number of individuals heard calling on the island usually increased gradually from mid-June until the first days of August. Afterward it decreased rapidly until the last week of August, when calling was no longer heard (Fig. 2a). Individual birds usually stopped calling gradually. For example, seven were heard on 18 August 1994; two of them called with little interruption, whereas the five others called for only a few seconds. From their arrival at IAG in the second half of May (Robert and Laporte 1996) until mid-June, all rails were found in non-agricultural areas. After mid-June the proportion of birds heard in agricultural areas increased greatly (Fig. 2b).

Overall, we banded 130 Yellow Rails, most of them in 1994 and 1995, and all but 1 were males. Most birds were banded at IAG ($n = 75$), Cacouna ($n = 21$), or Lake Saint-François ($n = 20$), and others were banded at Pointe-aux-Outardes (3 in 1995), Saint-Fulgence (3 in 1995), Gaspé Bay (3 in 1994), Saint-Gédéon (2 in 1995), Cap Tourmente (1 in 1994), La Pocatière (1 in 1995), and Coin-du-Banc (1 in 1994). Our banding effort showed that IAG was inhabited by more rails

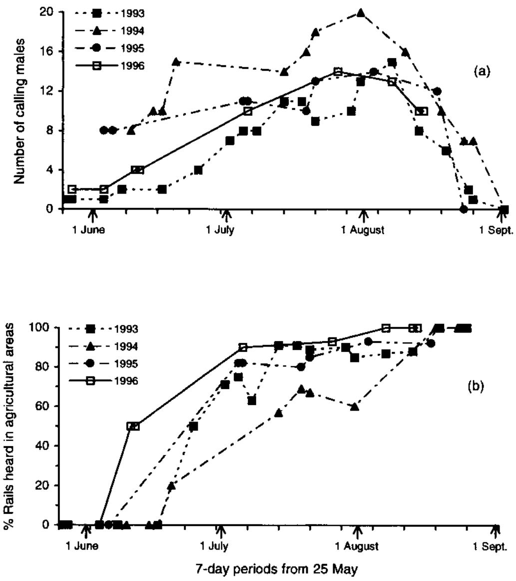

FIGURE 2. Number of Yellow Rails heard calling during a given night at Ile aux Grues, Quebec, from 1993 to 1996, as represented by (a) the total number of individuals heard and (b) the proportion of individuals heard in high-marshes burned in spring.

than the maximum number heard during any given night; for example, although we surveyed up to 20 and 14 individuals in 1994 and 1995, respectively, we captured 25 and 31, respectively. We recaptured banded individuals on 82 occasions, of which 7 were returns, 5 were displacements, 1 was a recovery, and 69 were repeats. We obtained at least one return for each locality where a particular banding effort was made (5 at IAG, 1 at Cacouna, and 1 at Lake Saint-François) and all seven returns were from individuals that had been banded no more than one year before the recapture. Other recaptures, i.e., displacements and recoveries, were from rails that had moved from one site to another. The only recovery was from a rail banded (22 June) and first recaptured (1 August) at Cacouna in 1994, then recaptured at IAG (ca. 125 km SW from Cacouna) on 26 May 1995. All other recaptures were displacements (Fig. 1): in 1993, we banded (17 June) and first recaptured (7 July) a rail at Cacouna, and then recaptured it again at IAG on 20 July. In 1995, a rail banded at La Pocatière on 12 June was recaptured on IAG (ca. 50 km SW from La Pocatière) on two occasions, on 21 July and on 9 August. Finally, three rails banded at Lake Saint-François were recaptured at IAG (ca. 400 km NE from Lake Saint-François): two in 1994 and one in 1996. In 1994, the first individual was banded on 25 May and was recaptured twice on IAG, on 15 June and 21 July. The second rail was banded on 30 June and was recaptured on IAG on 22 August. In 1996, we banded the third individual on 5 June and recaptured it twice on IAG, on 26 July and 6 August.

Three of the rails radio-tracked at IAG at the end of the 1994 and 1995 calling seasons were recaptured during their complete prebasic molt; the other three individuals lost their transmitters. Two (one captured 6 September 1994 and the other 20 August 1995) had lost all of their remiges and rectrices, which had not yet begun to emerge from their follicles, as well as many body feathers. The third molting individual was captured on 28 August 1995 and had then dropped only its remiges (all but one). It was recaptured twice afterwards, on 4 September and 13 September, and its newly grown rectrices had emerged from their follicles by 2 mm and 28 mm, respectively. All molting rails had stopped calling, were more aggressive, and their bill had become much darker (less yellowish) than during the calling period.

DISCUSSION

The surveys we conducted indicate that there was a rapid change, year after year, in the number of calling Yellow Rails at Ile aux Grues (IAG): some in June, more in July and early August, then fewer and fewer until the end of August, when calling stopped. Apart from the possibility that a few birds may have been silent on certain nights (Bart et al. 1984), we believe that these variations have a biological meaning and can chiefly be explained by other results obtained during this study, namely that (1) some rails move along the St. Lawrence River from one site to another during their calling period, (2) IAG is inhabited by some rails during the entire nesting season whereas others visit the island only later in summer, and (3) although rails stop calling in late August, they remain on IAG and undergo a complete prebasic molt. Because of this, and because all displacements reported in this study were of individuals recaptured on IAG, there is every indication that the increase in the number of rails heard on IAG in July and early August was mainly because of birds moving to the island, whereas the decrease in the number heard in late August was because the birds stopped calling and began molting. Interestingly, this is corroborated by the findings of opportunistic surveys conducted at Lake Saint-François in 1994 and 1995, where there were several (up to nine) calling Yellow Rails in late May and early June, but where no rails could be heard in July and August (Robert and Laporte 1996).

The rails that moved to IAG from late June onwards were probably males that bred, failed to breed, or were unsuccessful in obtaining a mate in another area along the St. Lawrence River before moving to the island. Whether or not they attempted to breed elsewhere, our results suggest that they moved to IAG for reasons other than nesting. Indeed, all but one of the five displacements and the one recovery were of rails that were banded soon after spring arrival, i.e., during the nest-building or incubation periods (but before hatching), and were recovered in July or August, that is, after hatching. Furthermore, two of three birds recaptured during their molt were first captured on IAG on 13 July 1994 and 20 July 1995, both in an agricultural area and thus not covered by the senescent vegetation characteristic of Yellow Rail nesting habitat (Bookhout 1995, Robert and Laporte 1996). In our opinion, these results indicate that some rails may move from other areas along the St. Lawrence River corridor to IAG in order to molt, and we propose that they may do so because the island harbors the largest high-marshes along the St. Lawrence corridor and is free from terrestrial predators, Canidae and Felidae (N. Gagné, pers. comm.). Although they may not be indicative of a genuine molt migration, our results nonetheless suggest a molt migration similar in some ways to that known to occur in many waterfowl (Salomonsen 1968, Owen and Black 1990): some rails may fly to an area that is in a direction (northeast) opposite from their wintering grounds (southwest) to undergo a complete prebasic molt in an environment where they can find food and safety from predation. Interestingly, Soras (*Porzana carolina*) also show post-breeding movements consistent with molt migration (Pospichal and Marshall 1954, B. Eddleman, pers. comm.), and the Common (*Fulica atra*) and American (*F. americana*) Coots are known to have developed specific molt migrations (Cramp and Simmons 1980, del Hoyo et al. 1996). To our knowledge, this study presents the first evidence that other rail species make northward long-distance movements to a staging area where molting occurs.

From their arrival at IAG until mid-June, rails were found in wet meadows not subject to agriculture, i.e., covered by the senescent vegetation mat characteristic of Yellow Rail nesting habitat (Bookhout 1995, Robert and Laporte 1996). Yet the proportion of birds heard in agricultural areas greatly increased once the vegetation burned in early May had grown in, and most rails were found in these areas in July and August. Interestingly, these areas were used not only by rails from elsewhere, but also by rails that bred on IAG. For example, the third molting rail we found was first captured on IAG on 25 May 1995, in the portion covered by a senescent canopy, where nests were found during the study (Robert and Laporte 1997). It was recaptured on 29 June, 19 July, and 20 August, about 1.2 km from the original area, in an area of the island not covered by a senescent mat. Furthermore, the males associated with the nests discovered at IAG in 1994 and 1995 were all recaptured away from their nesting areas after hatching, in agricultural areas not used for nesting (Robert and Laporte 1996). We do not know why agricultural areas of IAG apparently attract males outside the nesting period, although we suspect that food quantity or availability might be higher and that the absence of a senescent mat might facilitate rail movements in these areas.

The number of Yellow Rails surveyed and banded during this study is the highest ever reported east of the Great Lakes. We detected calling males at several sites distributed along most of the length of the St. Lawrence River, and although few birds were banded at most of these, IAG, Cacouna, and Lake Saint-François were found to be inhabited by small but consistent populations. This study also shows that IAG is an important area for Yellow Rails inhabiting the St. Lawrence corridor. Apart from being an important nesting area (Robert and Laporte 1997), our banding recoveries indicate that it is also a postbreeding staging area for males from elsewhere along the St. Lawrence River, sometimes many hundreds of kilometers from IAG. We suspect that Yellow Rails follow the St. Lawrence corridor during their postbreeding movements, as Virginia Rails (*Rallus limicola*) often follow rivers during migration (Conway 1995). Knowing the very good dispersal capabilities of rails in general (Remsen and Parker 1990) and the existence of postbreeding movements consistent with molt migration in some of the rare rallids studied to date, we argue that movements recorded during this study support the view that Yellow Rails may fly considerable distances along the St. Lawrence River to molt in a safe secluded place, namely IAG. Knowledge of seasonal movements in rails is at a primitive stage relative to that of other bird groups (Remsen and Parker 1990) and we speculate that similar findings would be found in other rail species if biologists were able to survey and band more effectively these secretive birds, which become flightless for a period each year.

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SEASONAL MOVEMENTS OF MARBLED MURRELETS: EVIDENCE FROM BANDED BIRDS[1]

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Abstract. Recent techniques for capturing Marbled Murrelets (*Brachyramphus marmoratus*) have created opportunities for studying them through systematic banding programs. One murrelet banded in breeding plumage during the summer of 1995 at Theodosia Inlet, on the Sunshine Coast of British Columbia, was recaptured in basic plumage in the fall of 1996 near Orcas Island in the San Juan Islands, Washington State, a distance of 220 km southeast from the original banding location. It was captured again at Theodosia Inlet in breeding plumage in the summer of 1997. This is the first evidence of long distance movement for the Marbled Murrelet. Seven color-marked individuals from the Theodosia Inlet population were located in the same geographic area outside the breeding season. Although our sample size is small, this suggests that both nonmigratory and migratory individuals occur within a single summering population.

Key words: Brachyramphus marmoratus, *Marbled Murrelet, migration, population movements.*

Marbled Murrelets (*Brachyramphus marmoratus*) are year-round residents in Washington and British Columbia (Rodway et al. 1992, Speich and Wahl 1995), but marine surveys show that they have different distribution patterns at different times of year. Campbell et al. (1990) hypothesized that some portion of the Brit-

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