J. Field Ornithol., 68(1):56–63

FIELD TECHNIQUES FOR STUDYING BREEDING YELLOW RAILS

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Abstract.—From 1993–1995, we captured Yellow Rails (*Coturnicops noveboracensis*) and searched for their nests in southern Quebec. All rails were caught at night, when males call constantly, by attracting birds with imitated calls (waiting) or by approaching birds and immobilizing them with a powerful beam of light (approaching). We were successful 183 times, capturing and recapturing 111 individuals. Most captures (66.6%) were made by waiting, 9.3% by approaching, and 24.0% by approaching after an unsuccessful attempt by waiting. Capture success was higher when we combined waiting and approaching than when we used either waiting or approaching alone. In 1994–1995, capture success was 24% higher when we used the combination technique, compared to attempts made with the waiting technique alone. We captured 81.6% of rails in those years and up to seven in a single night. The combination of waiting and approaching was more effective in 1994–1995 than in 1993 ($\chi^2 = 7.20$; $P < 0.01$), possibly owing to experience acquired in 1993 and to a larger net being used the last two years. In 1994–1995, waiting was more effective on rails captured for the first time than on rails previously captured ($\chi^2 = 7.66$; $P < 0.01$), probably because birds previously caught are warier. We searched for nests with the help of a German short-haired pointer and a French pointer. In 1994, they searched for 18.5 and 7.8 h, respectively, and in 1995 the German short-haired searched for 8.8 h. Only the German short-haired pointer found nests, three in 3 h in 1994 and two in 2.5 h in 1995. We believe the effectiveness of this type of search depends on the dog's abilities and training, the dog's handler, and probably weather conditions.

TÉCNICAS DE CAMPO PARA ESTUDIAR A INDIVIDUOS REPRODUCTIVOS DE *COTURNICOPS NOVEBORACENSIS*

Sinopsis.—Entre 1993 y 1995 en el sur de Quebec atrapamos individuos de *Coturnicops noeboracensis* y buscamos sus nidos. Todas las aves se capturaron de noche, cuando los machos cantan constantemente, atrayéndolas al imitar las llamadas (en espera) o al acercarnos a ellas inmovilizándolas con un rayo de luz potente. Tuvimos éxito 183 veces, capturando y recapturando 111 individuos. La mayoría de las capturas (66.6%) se produjeron al esperar, 9.3% al acercarse, y 24.0% al acercarse tras una espera infructuosa. El éxito de captura fue mayor cuando combinamos la espera y el acercarse que cuando solamente esperamos o nos acercamos. Entre 1994 y 1995, el éxito en captura fue 24% mayor (18–30% Intérvalo de Confianza, $P = 0.05$) cuando usamos la técnica combinada, al comparar ésta con los intentos hechos con la técnica de esperar solamente. Capturamos 81.6% de las aves en esos años y hasta siete en una sola noche. La combinación de esperar y acercarse fue más efectiva en 1994–1995 que en 1993 ($\chi^2 = 7.20$; $P < 0.01$), posiblemente por la experiencia adquirida en 1993 y a que en los últimos dos años se usó una red más grande. En el 1994–95, la espera fue más efectiva en aves capturadas por primera vez que en aves previamente capturadas ($\chi^2 = 7.66$; $P < 0.001$), probablemente porque las aves ya capturadas son más cautelosas. Utilizamos dos perros para buscar nidos. Uno buscó nidos por 18.5 horas (h) y el otro por 7.8 en 1994 mientras que en 1995 uno de ellos laboró por 8.8 h. Sólo uno de ellos encontró nidos, tres en 3h. en 1994 y dos en 2.5 h. en 1995. Creemos que la efectividad de este tipo de búsqueda depende de la habilidad del perro y de su entrenamiento en la búsqueda de nidos o aves, de el manejador del perro, y probablemente de las condiciones meteorológicas.

The Yellow Rail (*Coturnicops noveboracensis*) is one of North America's

least-studied birds. The species' patchy, localized distribution is partially responsible, but the primary factor is its ability to hide and maneuver through dense marsh vegetation which makes it difficult to detect. Most of what is known dates from the first half of this century (e.g., Maltby 1915, Peabody 1922, Terrill 1943, Walkinshaw 1939) and from two recent theses (Stalheim 1974, Stenzel 1982) and subsequent publications (Bart et al. 1984, Bookhout and Stenzel 1987, Stalheim 1975). Although these works provided much information on the biology of the species, they did not discuss capture techniques or the effectiveness of the techniques they used which, for a bird like the Yellow Rail, would affect efficiency of data collection. Similarly, the utility of dogs in finding Yellow Rail nests is casually mentioned in the literature, but few details of the technique are available.

In Quebec, the Yellow Rail is classified as a vulnerable species because of its local distribution and the scarcity of good breeding habitat (Robert 1989, 1996). As part of our ongoing investigations of threatened birds in Quebec, we had to capture and band Yellow Rails, as well as locate nests, at a number of locations in the southern part of the province. In this paper, we discuss the techniques used and compare their effectiveness.

STUDY AREA AND METHODS

From 1993–1995 we caught and banded Yellow Rails in marshes along the St. Lawrence River, the Saguenay River, and Lake St. John, in southern Quebec. From west to east along the St. Lawrence corridor, we worked in the Lake St. Francis (45°02′N, 74°32′W) and Cap Tourmente (47°03′N, 70°49′W) National Wildlife Areas, at Île aux Grues (47°04′N, 70°33′W), La Pocatière (47°22′N, 70°02′W), Cacouna (47°56′N, 69°31′W), Pointe-aux-Outardes (49°03′N, 68°26′W), Coin-du-Banc (48°34′N, 64°18′W), and Gaspé Bay (48°50′N, 64°29′W). Along the Saguenay River and Lake St. John, we worked at St. Fulgence (48°27′N, 70°54′W) and St. Gédéon (48°30′N, 71°46′W), respectively. The salinity of the St. Lawrence River varies depending on location; the water is fresh in Lake St. Francis, brackish at Cap Tourmente, Île aux Grues, and La Pocatière, and salty at the other sites. The water is brackish at St. Fulgence and fresh at St. Gédéon. The vegetation of these marshes is generally low herbaceous graminoids (<1 m high), chiefly sedges (Cyperaceae), rushes (Juncaceae), and true grasses (Gramineae).

Capturing birds.—All rails were caught between nightfall and dawn, generally between 2230 h and 0330 h, when the males usually call constantly. The capture period extended from 14 Jun.–25 Aug. 1993, 16 May–25 Aug. 1994, and 16 May–20 Aug. 1995. All capture attempts were made by one or two people using one of two techniques: waiting or approaching. In both methods, we first slowly approached a calling rail, stopping whenever it stopped calling and waiting for it to start again. We continued in this manner until we were within about 15 m of the bird or it stopped calling.

In the waiting technique, we flattened about 2 m^2 of vegetation in front

of us and used stones to imitate the clicking call given by territorial males (Stalheim 1974). Most birds then stopped calling but we continued to imitate their call until the rail approached, either flying or walking, and entered the flattened area. We next shone a Petzl 4.5-V halogen headlamp on it and tried to capture it with a hand net, being careful not to move the net between the light and the bird so as not to frighten it. The headlamp stayed on while the rail approached. When two people were involved, which was the case in about half the capture attempts, one continued to imitate the rail's call while the other netted the bird.

In the approaching technique, we located the rail by its call and attempted to illuminate the bird and immobilize it with a 750,000 candle power lamp with a rechargeable 12-V Booster Pac power supply (Canadian Trade Corp., Mississauga, Ontario) that we carried in a backpack. Once we had located the rail and trained the light on it, we approached it quickly without making any sudden movements, while continuing to imitate its call. We then attempted to capture it with a hand net, keeping the light on the bird. The rails did not always freeze in the light, and it was sometimes necessary to pursue them on the ground. In most cases two persons were involved; one shone the light on the bird and made the approach, while the other stayed nearby, imitating the call.

In 1993, we initially used the approaching technique but later switched to waiting. We used waiting in 1994 and 1995, but usually switched to approaching when waiting failed to work. We considered failure to capture a rail using the waiting technique then catching it using the approaching technique to be two attempts. In 1993, all attempted captures involved the use of a cloth net 30-cm in diameter with a 1.58-m handle. In 1994 and 1995, we used a 47-cm net on all occasions except once, when we used a 65-cm diameter. Nearly all net manipulations were done by the same person (MR).

We used χ^2 tests to compare the proportion of rails caught by the two techniques in each year, as well as the proportion caught in different years with the same technique. Similarly, we compared the proportion of rails caught in 1994 and 1995 using the two techniques, taking into account whether the bird was being captured for the first time or not. We calculated confidence intervals (Agresti 1990:76) to compare the proportion of rails captured by the waiting technique alone with the waiting and approaching techniques combined because of the non-independent data.

Searching for nests.—In 1994 and 1995, we searched for nests with the help of two pointers and their handlers. A German short-haired pointer and a French pointer (*braque français*), trained to hunt American Woodcock (*Scolopax minor*), separately helped us search for nests. The dogs were trained to locate a caged Yellow Rail before they searched for nests. We placed a rail in a small (28 × 23 × 14 cm) cage made with mosquito net and set the cage on the ground in a marsh similar to those used by nesting Yellow Rails. The dogs' handlers then had them search in the direction of the cage and praised them when they pointed the rail. The cage was then moved for another training exercise. The rails and cages

TABLE 1. Effectiveness of various techniques used for capturing Yellow Rails in southern Quebec, 1993–1995.

Technique	1993 (n = 86)[a]			1994–1995 (n = 244)[a]			All years (n = 330)[a]		
	+[b]	−[b]	success (%)	+[b]	−[b]	success (%)	+[b]	−[b]	success (%)
Waiting	19	14	57.8	103	76	57.5	122	90	57.5
Approaching	17	27	38.6	—	—	—	17	27	38.6
Waiting and Approaching	20	13	60.6	146	33	81.6	166	46	78.3
Total captures[c]	37			146			183		

[a] The total number of attempted captures cannot be calculated on the basis of the figures in this table. It does not correspond to the number of rails we attempted to capture, either, because some birds were caught more than once. We considered failure to capture a rail by the waiting technique then catching it by the approaching technique to be two attempts.

[b] + = successful attempt; − = failed attempt.

[c] Captures (approaching) + captures (waiting + approaching).

were handled with rubber gloves so that the dogs would not be disturbed by the scent of humans.

While searching for nests, the dog was directed by the handler to parts of the marsh where rails had been heard calling several times. The dog wore a bell around its neck so we could follow its movements and know when it was pointing and its handler always had it facing into the wind as it searched for nests. As a reminder of the bird's scent, the dog was frequently allowed to sniff a cloth bag in which Yellow Rails were held during banding.

In 1994, the German short-haired pointer searched for nests at Île aux Grues and Cacouna. At Île aux Grues, it hunted on 24 and 25 June for 6 h. At Cacouna, the searches took place on 5, 6, and 11 July for 12.5 h. The French pointer searched for nests at Lake St. Francis on 1 and 2 July for 7.8 h. In 1995, only the German short-haired pointer was used, at Île aux Grues on 14, 15, 21, and 22 June for 8.8 h. Because weather conditions can affect the dogs' effectiveness, we noted temperature, wind direction and speed, and relative humidity during each nest-hunting session.

RESULTS

Capturing birds.—We made 330 attempts to capture rails, 183 (55.5%) of which were successful. All but one rail were males. We captured 66.7% of the birds by waiting, 9.3% by approaching, and 24.0% by approaching after waiting had been unsuccessful. In 1993, the capture success of the approaching technique was lower than that of the waiting technique, but not significantly so ($\chi^2 = 2.72$; $P = 0.10$). In 1994 and 1995, we did not attempt to capture any birds by initially approaching them (Table 1). Capture success did not vary significantly from 1994 to 1995 for any technique (Waiting, $\chi^2 = 0.88$; $P = 0.35$; Waiting and Approaching, $\chi^2 = 1.06$;

TABLE 2. Effectiveness of techniques for capturing Yellow Rails in southern Quebec for first, second, third, and fourth captures, 1994–1995.

Technique	1st (n = 90) n (%)	2nd (n = 37) n (%)	3rd (n = 16) n (%)	4th (n = 3) n (%)	All recaptures (n = 53) n (%)
Waiting	72 (80.0)	24 (64.9)	7 (43.7)	0 (0)	31 (58.5)
Waiting and Approaching	18 (20.0)	13 (35.1)	9 (56.3)	3 (100)	22 (41.5)

[a] In 1994 and 1995, but not in 1993, all attempts to capture birds were first made with the waiting technique then continued with the approaching technique, when necessary.

P = 0.30). Because of this, and because we followed exactly the same capture procedure and used the same material both years, the results from 1994 and 1995 were combined.

Capture success was higher when we combined waiting and approaching. In 1993, use of the combined technique had a higher capture success than use of the approaching technique alone (χ^2 = 3.65; P = 0.056). In 1994–1995, the combined technique increased the proportion of birds captured by 24% (95% confidence interval = 18–30%), compared to the waiting technique. Combining the waiting and approaching techniques was more effective in 1994–1995 than in 1993 (χ^2 = 7.20; $P < 0.01$), when a smaller net was used. In 1994–1995, we almost always combined the two techniques. Overall, we caught 81.6% of the rails that we attempted to capture, up to seven rails in a single night (Table 1). In 1994–1995, combining techniques was significantly more effective when two persons were involved than when only one person was involved (χ^2 = 5.46; $P < 0.05$).

In 1994–1995, waiting was significantly more effective when birds were being captured for the first time than in recapturing them (χ^2 = 7.66; $P < 0.01$). Thus, recaptured rails were more often caught by a combination of the waiting and approaching techniques than by the waiting technique alone, compared to rails caught only once (Table 2).

Searching for nests.—Only one of the dogs, the German short-haired pointer, found Yellow Rail nests, five in a total search of 27.3 h (approximately 1 per 5.5 h). Three nests were found on the morning of 25 Jun. 1994 (in 3 h), when humidity was high (73–83%), winds were strong (28 km/h with peaks at 39 km/h) and temperatures 17–18 C. The dog pointed two incubating females and flushed a third from her nest. A fourth nest was discovered that same morning without the help of the dog, by two observers who accidentally flushed a female from her nest. In 1995, the same dog pointed two incubating females on the afternoon of 15 June (in 2.5 h), when humidity was moderate (28–46%), winds were low (2–9 km/h) and temperatures 21–23 C.

Although no other nests were found, the German short-haired pointer managed to flush a Yellow Rail on four other occasions. The French point-

er found no nests in 7.8 h and was unable to flush any rails, even though males were heard in the areas being searched.

DISCUSSION

Capturing birds.—In the few published studies where Yellow Rails were captured, little information on the methods used or of their effectiveness is given. Walkinshaw (1939) and Stalheim (1974) caught rails with the help of dogs, which pointed or flushed the birds. Stalheim (1974) caught 33 rails this way (up to four per hour), mainly at night, using a 160,000 candle power lamp to immobilize the birds. Stenzel (1982) caught a dozen males using a technique similar to our waiting technique. In his case, two people sometimes waited for the birds, each of them with a hand net, while a third imitated the rail's call. Unlike us, however, Stenzel (1982) used a dog to locate rails that did not approach. He also caught four female rails with the help of a dog, but did not go into detail as to exactly how. In his view, looking for rails with dogs worked better at night than during the day. He also pointed out that no females could have been caught without a dog. In the field, we saw females on two occasions, both incidentally as we were approaching a nearby male. We managed to capture one of the two. Contrary to Bookhout (1995), powerful lamps are not needed when attempting to get a Yellow Rail to approach (waiting technique), although they are needed when using the approach technique.

We found the best way to capture male Yellow Rails was by using a combination of waiting and approaching. More rails were caught through a combination of waiting and approaching than through either of the techniques used alone, although the two proved roughly comparable in effectiveness. We believe that two people should be involved in any attempt at capturing rails, using the technique employed in 1994 and 1995. Using two people is critical for the approaching technique, because it is difficult to approach and capture a bird while imitating its call. In our experience, some rails eluded capture because only one person was trying to capture them.

We believe the 47-cm net (and perhaps the experience we acquired in 1993) was largely responsible for the higher capture success obtained with the combination technique in 1994 and 1995. In approaching, more so than in waiting, it is easy to miss the rail, because it would be alerted by the observer's noise and movements. One is also often trying to net the bird when moving or off-balance. A large net allows for a wider margin of error than a small one, although the 65-cm net may be too large as it was difficult to handle and to press down on the ground in trying to keep the rail from escaping.

We caught more rails using the waiting technique in 1994–1995 than in 1993, because in these years we always began our attempts using this technique. In 1993, we made several attempts at capturing rails using the approaching technique first, which explains why just as many birds were captured with this technique as by waiting. Lastly, the different percentage

of birds caught with the two techniques, depending on whether it was a first capture or a recapture, can probably be explained by the behavior of the species. Yellow Rails seem to be warier once they have been captured and are less likely to approach an imitation of their call.

Searching for nests.—Yellow Rail nests are difficult to find, because they are well hidden and the female almost always slips away through the vegetation when someone approaches, rather than flushing (Maltby 1915, Peabody 1922). Meredith (1935), Walkinshaw (1939), Stalheim (1974) and Stenzel (1982) all mentioned how helpful a dog can be in searching for Yellow Rails or their nests. A pointer may be extremely effective, since our German short-haired pointer found five nests in 27.3 h, including three nests in 3 h in 1994 and two in 2.5 h in 1995. The dog Stenzel used (1982: 59) managed to find only four nests in > 100 h of searching.

We believe that a number of factors influence the effectiveness of dogs for finding nests. The most important is probably the dog itself, because not all breeds and individuals have the same sense of smell, endurance, and tracking skills (Yeatter 1948). In our experience, the German short-haired pointer was more effective than the French pointer. The dog that found the nests for Stenzel (1982:13) was also a German short-haired pointer. One year, Stenzel worked with a Brittany spaniel, but the stature of the breed proved too short for the high water conditions of that year. Breeds mentioned by other authors are the English setter, Brittany spaniel (Stalheim 1974:iii) and Springer spaniel (Walkinshaw 1939). Other factors we feel are important are the dog's experience and preparation for hunting Yellow Rails and its handler's skill.

According to our results, it is unclear if weather conditions influence a dog's efficiency in finding nests. Nevertheless, it is known that weather conditions have a effect on scent: wind, quite obviously, has a bearing on the transport of scents and humidity and temperature affect the degree of scent present and its persistance on the ground and in the air (Matthews and Knight 1963:90). As a matter of fact, many dog breeders believe that their animals are more effective at tracking in humid conditions (Wailly 1973, Yeatter 1948), which our results tend to corroborate.

ACKNOWLEDGMENTS

We thank C. Marcotte, L. Choinière, G. Morrissette, D. Henri and R. Smith for their help with fieldwork. We express our sincere appreciation to dog handlers T. Tremblay and M. Gélinas for their generous help with this study, often under difficult field conditions. We also thank N. Gagné of Île aux Grues and the Conservation Officers of the Mohawk Council of Akwesasne, for granting us permission to visit various marshes. B. Eddleman, J. Brisson, R. C. Cotter, N. Plante, L. Choinière, F. Shaffer and a anonymous reviewer made comments that improved this paper. This publication has been made possible by the financial contribution of the St. Lawrence Action Plan (Environment Canada).

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Received 12 Dec. 1995; accepted 26 Feb. 1996.