

TABLE 1. Use of three feeding substrates and techniques by Mockingbirds on two Texas study areas. Chi-square values in text were calculated from the raw data.

Category	% of observations	
	Seadrift	Welder
Substrates	(N = 146)	(N = 52)
Ground-herb	93	64
Shrub	4	23
Air	3	13
Ground-herb techniques	(N = 136)	(N = 33)
Glean	87	18
Ground-hawk	13	82
Hawking techniques	(N = 146)	(N = 52)
Aerial-hawk	9	23
Ground-hawk	12	54

nests were lost, the adults left the area so that only 3 brief observations of birds were made in 31 h on 9 days in June and July. This decline in activity coincided with the seasonal growth pulse of the grass-forb layer. At Seadrift, in contrast, where no notable change in herbaceous cover occurred, there was no decline, and many re-nests occurred all summer. At least half of the birds were still territorial on 10 July when I found nine new nests. I conclude that the higher fledgling output at Seadrift was due simply to more birds trying harder through re-nestings.

In summary, the consequence of too much grass for the Mockingbirds that attempted to settle at Welder was no reproduction (at least on that 11-ha area) due to their failure to stay on territory and re-nest. I suggest a reason for territorial abandonment to be a poor cost-benefit ratio for the adults forced to feed predominantly in alternate styles. While I believe competition is an important shaper of foraging styles and community structure, in this particular case the shift in foraging seems to have been strictly a consequence of vegetation. No obvious competitor was present at Welder. If my interpretations are accurate, this case demonstrates one way that the ability to recognize proximate cues to optimal breeding habitat could evolve.

Although these data concern a single species, the results are relevant to community ecology because community characteristics are only evolutionary and ecological consequences of many individuals (con-specific and otherwise) responding to one another and to the rest of their environment. First, the results show how subtle a vegetative feature can be and still have an important effect on local populations and hence on community structure. That point also may explain why avian communities in the same locality and in what seem to be similar habitats often differ in structure (e.g. Roth 1976, *Ecology* 57: 773-782; 1977). Finally, ecologists seeking to fit species into certain guilds for community analyses (e.g. Willson, Karr, and Roth 1975, *Wilson Bull.* 87: 32-44) based on data from one habitat should do so with care.

I thank the Welder Wildlife Foundation and Department of Zoology, University of Illinois, for support of my doctoral research during which these data were collected. The Department of Entomology and Applied Ecology, University of Delaware, where the manuscript was written, provided secretarial assistance. Wesley Vivion kindly arranged for me to work on the Jay Welder ranch at Seadrift. E. P. Catts, J. T. Linehan, and a reviewer provided helpful comments on the manuscript. This is Miscellaneous Publication No. 846 of the Delaware Agricultural Experiment Station, Publication No. 477 of the University of Delaware Department of Entomology, and Welder Wildlife Contribution No. 233.—Received 14 September 1978, accepted 26 November 1978.

The Incubation Period of the Yellow Rail

R. D. ELLIOT¹ AND R. I. G. MORRISON²

¹ University of Aberdeen, Culterty Field Station, Newburgh, Ellon, Aberdeenshire, Scotland AB4 0AA

² Canadian Wildlife Service, 1725 Woodward Drive, Ottawa, Ontario, Canada K1G 3Z7

On 12 June 1976, we discovered a nest of the Yellow Rail (*Coturnicops noveboracensis*) 0.5 km south of North Point, Ontario (51°29'N, 80°27'W), on the southwest coast of James Bay. Yellow Rails are locally common at North Point and in other areas of the south and west coasts of James Bay and Hudson

Bay (Todd 1943, Manning 1952, Godfrey 1966). The nest (7 cm internal diameter) was in a damp marsh with a fairly heavy cover of grasses and sedges (predominantly *Carex*, *Juncus*, and *Scirpus* spp.). It was concealed by the previous year's growth of overhanging grass and was supported 5 cm above water that was 5–10 cm deep. The nest contained nine cold eggs, although an adult rail was flushed very close to the nest. No rails were seen when the nest was next visited on 20 June, although it then contained 10 warm eggs. When checked at 1950 on 30 June, one egg was pipping, and the others were warm but unbroken. At 1645 on 1 July, the last chick had just emerged from its egg, which still lay in the nest. Hatching thus occurred within 21 h. Assuming that the last egg was laid on 13 June and that incubation began immediately, the incubation period from the laying of the last egg to the hatching of the last egg was about 18 days. The average weight of the nine eggs decreased from 6.9 g (range 6.4–7.4, SD = 0.36) on 12 June, just prior to incubation, to 5.6 g (range 5.3–6.1, SD = 0.22) on 30 June, just prior to hatching.

Ripley (1977), Harrison (1975), and other authors give the incubation period of the Yellow Rail as "unknown." Lane (1962) reported the incubation period of a clutch of nine eggs near Brandon, Manitoba as "13 days, plus a few extra hours in the case of the final egg," which differs markedly from the period of 18 days that we recorded. Lane's methods appear similar to our own, and the difference is not readily explainable. Stalheim (1975) reported an incubation period of about 17 days for captive Yellow Rails. The wide variation in incubation periods reported for other North American rails, such as the Virginia Rail (*Rallus limicola*) and Sora (*Porzana carolina*) (e.g. Godfrey 1966, Zimmerman 1977), appears to be questionable (see Nice 1954).

Terrill (1943) observed the hatching of a clutch of eight Yellow Rail eggs within 20 h near Gaspé, Quebec and suggested that incubation commenced after the last egg was laid. Terrill's suggestion is confirmed by the present study, where the eggs were cold prior to completion of the clutch, the entire clutch hatched within a 21-h period, and the last egg observed to hatch was not the last one known to be laid.

We wish to thank Vicki L. Sinclair for her patient assistance with the fieldwork. We also thank S. G. Curtis, W. E. Godfrey, J. A. Hagar, P. C. Smith, and two reviewers for their helpful comments on this paper.

LITERATURE CITED

- GODFREY, W. E. 1966. The birds of Canada. Natl. Mus. Can. Bull. 203.
- HARRISON, H. H. 1975. A field guide to bird's nests. Boston, Massachusetts, Houghton Mifflin Co.
- LANE, J. 1962. Nesting of the Yellow Rail in Southwestern Manitoba. Can. Field-Naturalist 76: 189–191.
- MANNING, T. H. 1952. Birds of the west James Bay and southern Hudson Bay coasts. Natl. Mus. Can. Bull. 125.
- NICE, M. M. 1954. Problems of incubation in North American birds. Condor 56: 173–197.
- RIPLEY, S. D. 1977. Rails of the world. Toronto, Ontario, M. H. Feheley Inc.
- STALHEIM, S. 1975. Breeding and behavior of captive Yellow Rails. Avicult. Mag. 81: 133–141.
- TERRILL, L. M. 1943. Nesting habits of the Yellow Rail in Gaspé County, Quebec. Auk 60: 171–180.
- TODD, W. E. C. 1943. The western element in the James Bay avifauna. Can. Field-Naturalist 57: 79–80.
- ZIMMERMAN, J. L. 1977. Virginia Rail. Pp. 46–56 in Management of migratory shore and upland game birds in North America (G. C. Sanderson, Ed.). Washington, D. C., Intl. Assoc. Fish and Wildl. Agencies.

Received 3 April 1978, accepted 29 November 1978.

Geographic Variation in the Bell Calls of the Blue Jay (*Cyanocitta cristata*)

HOWARD G. KRAMER AND NICHOLAS S. THOMPSON

Departments of Biology and Psychology, Clark University, Worcester, Massachusetts 01610 USA

Preliminary field observations suggested to us that one class of Blue Jay (*Cyanocitta cristata*) vocalizations, the bell calls (Bent, A. C. 1946, U. S. Natl. Mus. Bull. 191: 32–52; Hardy, J. W. 1961, Kansas Sci. Bull. 42), consisted of several discrete types, each of which was limited in its geographical distri-