

### Foraging Behavior of Mockingbirds: the Effect of Too Much Grass

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This note demonstrates how different conditions of the herbaceous layer on two sites affected foraging strategies, settling behavior, and reproductive output of Mockingbirds (*Mimus polyglottos*). I collected the data on two brush-grassland areas 65 km apart in south Texas. The areas, chosen for their similarity in vegetation structure, were near Seadrift, Calhoun County, and on the Welder Wildlife Foundation Refuge near Sinton, San Patricio County, and were 12 and 11 ha in size, respectively. The vegetation cover profiles were very similar in the shrub layer (<0.9 m). Below that level, Welder had a tall, dense layer of grass and forbs (99 and 37% cover at 0 and 0.6 m above ground, respectively). At Seadrift, the herbaceous layer was very short and sparse (81 and 14% cover at 0 and 0.3 m). Heights of shrubs averaged 2.4 m and 2.3 m, respectively. A more complete description of the areas is given in Roth (1977, Condor 79: 417-425).

I quantified feeding behavior by recording the substrate and the technique used by the bird in each feeding attempt (evidenced by pecking or hawking) that I observed. I did not distinguish successful from unsuccessful attempts. An observation was recorded when a bird was first seen feeding. Because this method can be biased toward birds feeding in conspicuous sites, I followed individuals for as long as possible (5 min maximum) and recorded as many attempts as possible. The substrates were air, ground, herb, and shrub. Ground and herb sites were combined because it was often impossible to distinguish between feeding from the ground surface and from short grass or forbs. The three foraging techniques were: (1) aerial-hawk—the typical flycatcher-like sally to capture airborne prey; (2) ground-hawk—watching for prey from an elevated perch and flying to the ground to take it; and (3) glean—picking objects from a substrate. Gleaning was used for both shrubs and ground-herb substrates. For the latter, gleaning usually involved standing quietly (sometimes with wing-flashing) on the ground to detect prey and then running or lunging to take it. The observations were made during censuses and other field work in which nesting and feeding data were collected on other species as well. The observations were scattered throughout the daylight hours of about 3 days every 2 weeks during April-June 1969 (Roth 1977). I spent about 110 h on each area.

The foraging styles differed between the areas in three ways (Table 1). First, Mockingbirds at Welder fed significantly more often in shrubs and in the air than they did at Seadrift and less often from ground-herb sites ( $P < .001$ ,  $\chi^2 = 27.16$ ). This pattern was related to foraging technique, and both, in turn, were affected by the structure of the herbaceous vegetation. Second, at Welder the birds gleaned significantly less often when feeding from ground-herb sites than did those at Seadrift ( $P < .001$ ,  $\chi^2 = 62.05$ ). This is logical, as it should have been easier to glean at Seadrift where the short, sparse ground cover provided better visibility and a better running surface. The final difference lay in the use of ground and aerial hawking techniques. Those two tactics, both of which involved use of an elevated perch for sighting prey, comprised 77% of all feeding at Welder but only 21% at Seadrift. Apparently the tall, dense grass and forb layer caused the Mockingbirds at Welder to use aerial perches and above-ground substrates instead of gleaning from ground-herb substrates.

Two results suggest that the vegetational differences and the feeding changes that they forced were important to the birds. First, only about one-fourth as many birds settled at Welder as at Seadrift (13 vs. 50 ♂♂/40 ha, respectively). Second, there were considerable differences in nesting activity and production of young by those that settled on each area. At Welder, no young were fledged from five nests. In contrast, at Seadrift 7 (perhaps 12) of 53 nests fledged at least one young. At first glance one might associate these differences with differential nest predation or ability of the adults to provide sufficient food to the young. Nevertheless, predation, mostly in the egg stage, was the major cause of nest failure on both areas. All 3 of the nests at Welder for which the fate could be determined were preyed on (2 in the egg stage, 1 in the nestling stage). At Seadrift 19 nests ended in the egg stage, 4 in the nestling stage, and the terminal stage of 7 was undetermined. Of those 30 documented nest failures, 25 were predatory losses; the causes of 5 losses were undetermined. I believe the difference in fledgling production lay instead in the differential persistence of adults in renesting after the loss of nests. Nesting activity began in mid-April on both areas but by mid-May was declining rapidly at Welder. When first

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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.

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### The Incubation Period of the Yellow Rail

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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