grass, looking from side-to-side as five crows quickly joined the first three. Two crows briefly assumed agonistic postures with bills lowered and feathers of head and neck raised. After a few moments, the crows started to leave and the hawk flew off with the fish head.

While walking near the water hole on 2 February I saw a crow flying toward its nest, then being built, with a black lump in its bill, pursued by a Red-shouldered Hawk. Ten min later I noted two crows pulling up pieces of sod which they wadded in their bills. They had just left to fly back to the nest when the hawk attacked as before and pursued them over the water. Within 15 min one of the crows took a piece of sod, larger than the others, to the branch of a tree. Here, with the sod held in its feet, it delivered blows with its bill. The hawk swooped a third time, nearly hitting the crow and again with no effect. Although Florida Red-shouldered Hawks use "clumps of grass roots" in their nests (Nicolson, Wilson Bull. 42:32–35, 1930), the hawks I watched did not start to build their nest until 2.5 weeks later. I wondered if the hawk, on seeing the crows handle the sods, thought that they had some kind of prey.

I have encountered no previous accounts of Red-shouldered Hawks robbing or attempting to rob American Crows. Brockman and Barnard (Anim. Behav. 27:487–514, 1979), in their review of kleptoparasitism, give no mention of *B. lineatus* in a list that includes many raptors.—LAWRENCE KILHAM, *Dept. Microbiology, Dartmouth Medical School, Hanover, New Hampshire 03755.* *Accepted 15 Mar. 1982.*

Wilson Bull., 94(4), 1982, pp. 567–569

Feeding behaviors and efficiencies of Common and Forster's terns.—Aerial feeding, either by plunge-diving or hover feeding, has been described for Common Terns (*Sterna hirundo*) (LeCroy, Wilson Bull. 84:201–202, 1972; Dunn, Nature 244:520–521, 1973; Erwin, Ecology 58:389–397, 1977), Sandwich Terns (*S. sandvicensis*) (Dunn 1973; Rodgers, Wilson Bull. 87:420, 1975), Royal Terns (*S. maximus*) (Rodgers 1975, Erwin 1977), Forster's Terns (*S. forsteri*) (Salt and Willard, Ecology 52:989–998, 1971; Rodgers 1975), and Crested Terns (*S. bergii*) (Feare, Condor 77:368–370, 1975). Herein we describe a previously unreported feeding strategy for Forster's Terns, and compare its efficiency to that of aerial feeding by both Forster's and Common terns.

Data were collected from 4–23 August 1980 and involved 6 h 34 min of actual observation time. Study sites were northern and southern beaches of Wallops Island, Accomack Co., Virginia and a bridge over a causeway leading from the mainland to Chincoteague Island, Virginia, (Accomack County; 75.5°W, 38°N). The first two sites hosted only Common Terns, while the third was used almost exclusively by Forster's Terns.

We made 81 and 82 individual observations of Common and Forster's terns, respectively, predominately between 06:00 and 11:00. We recorded species of each bird, total number of dives, number of successful dives, number of foraging dives while in flight, and use of a technique previously unreported for Forster's Terns—diving for food directly from a perch on the bridge, approx. 5 m above the surface of the water. In this latter technique a tern stood on the edge of the railing with head lowered to the level of its feet, and tail extending directly along the longitudinal axis of the body. Searching was done by turning the head from side to side, scanning, with the bill oriented downward. When a prey item was spotted, the tern opened its wings slightly, then quickly closed them, and then dropped from its perch to the water. During the dive, the wings unfolded enough to facilitate slight changes in course. Up to six individuals simultaneously fed in this manner.

At the bridge site Forster's Terns were feeding both aerially and from perches. The aerial feeders were feeding within 3 m of the bridge, presumably taking the same prey resources

TABLE 1
COMPARISON OF NUMBERS OF ATTEMPTS AND SUCCESSES PER MIN FOR PREY BY COMMON AND FORSTER'S TERNS

	df	Attempts/min		Successes/min	
		$\bar{x}$	t_{calc}	$\bar{x}$	t_{calc}
Common Terns	158	1.955	3.350**	0.648	0.207
Forster's Terns		1.373		0.666	
Common Terns	109	1.955	3.206*	0.648	2.626*
Forster's Terns (aerial-feeders)		1.323		0.429	
Forster's Terns (perchers)	78	1.399	0.621	0.810	4.595**
Forster's Terns (aerial-feeders)		1.323		0.429	

* $P \leq 0.01$, ** $P \leq 0.001$.

as were the perching feeders. The area in which the Common Terns fed lacked perches. Feeding efficiencies (successful dives/attempts) were compared using contingency χ^2 tests: (1) between species, (2) between perched and non-perched Forster's Terns, and (3) between Common Terns and aerially feeding Forster's Terns. Using the Student's *t*-test, the above groups were tested for differences in numbers of attempts and successes per minute.

Forster's Terns (46% efficiency) fed more efficiently than Common Terns (32% efficiency) ($\chi^2 = 10.11$, df = 1, $P \leq 0.005$). Among Forster's Terns alone, aerial feeders had a 37% feeding efficiency, whereas perching individuals had a 51% efficiency ($\chi^2 = 12.41$, df = 1, $P \leq 0.005$). No significant difference in efficiency was found between aerially feeding Forster's and Common terns ($\chi^2 = 0.09$, df = 1, $P > 0.05$).

Common Terns made more attempts/min for food than did the Forster's Terns ($P \leq 0.001$), but they were no more successful ($P \geq 0.05$) (Table 1). Compared to Common Terns, aerially-feeding Forster's Terns made more attempts for food/min and were more successful ($P \leq 0.01$). No difference in the number of attempts/min was found between the aerial and perching Forster's Terns ($P \geq 0.05$); however, the perch strategists had more success/min ($P \leq 0.001$). Perch-feeding terns, therefore, expended less energy searching for food than did aerial feeders, and procured more food per unit of time.

Salt and Willard (1971) recorded 22–29% capture efficiency by Forster's Terns during the summer, which is lower than the efficiency of our aerial feeders and considerably lower than that of our perched feeders. Efficiencies of Common Terns reported by Dunn (1973) ranged from 17–39%, overlapping our observed efficiencies. Rates of success Dunn (1973) measured were comparable (0.23–0.5 captures/min) to those we recorded (0.34 captures/min). Erwin (1977) recorded rates approximately one-half of our rates. Although the reason(s) for this difference is unknown, perhaps prey density influences rates of capture.

Forster's Terns apparently possess the behavioral plasticity to use man-made perches. Because capture efficiency was greater and energy expenditure less when foraging from perches than when flying, we expect that Forster's Terns compete for suitable perches. Such competition may have important long-term consequences for terns in coastal areas where man-made perches are available.

We would like to thank J. Barlow, G. Fox, S. Ha, D. McCracken, and L. Oring for contributions to the manuscript. This study was paid for by a grant from the Millersville State College Alumni Association.—J. MICHAEL REED, *Dept. Biology, Millersville State*

College, Millersville, Pennsylvania 17551, HERBERT E. HAYS, *Dept. Biology, Shippensburg State College, Shippensburg, Pennsylvania 17257,* AND DAVID A. ZEGERS, *Dept. Biology, Millersville State College, Millersville, Pennsylvania 17551.* (Present address JMR: *Dept. Zoology, Univ. Montana, Missoula, Montana 59812.*) *Accepted 20 Jan. 1982.*

Wilson Bull., 94(4), 1982, pp. 569–571

Clutch-size and prefledging survival in Red-winged Blackbirds at Williamstown Lake, New Brunswick.—Studies of clutch-size and survival of the Red-winged Blackbird (*Agelaius phoeniceus*) were summarized by Francis (Wilson Bull. 83:178–185, 1971; Auk 92: 815–817, 1975), Dolbeer (Auk 93:343–355, 1976), and Brown and Goertz (Wilson Bull. 90: 261–270, 1978). The Maritime Provinces of Canada represent the northeastern range limit of the species, and of its preferred habitat, cattail (*Typha latifolia*) marshes. I documented clutch-size and prefledging survival of red-wings for a dystrophic lake in New Brunswick. This lake has an intermixture of vegetation characteristic of the red-wing's preferred temperate zone cattail habitat and also ericaceous vegetation, more typical of the boreal zone. My clutch-size data were also compared to the Maritime Nest Records Scheme (MNRS) data compiled from cattail marsh and upland habitat.

Study area and methods.—Williamstown Lake, New Brunswick (46°20′N, 67°40′W) is a shallow (<7 m) man-made dystrophic lake of 370 ha adjacent to mixed forest and farmland. Nesting habitat included cattail, leatherleaf (*Chamaedaphne calyculata*), rhodora (*Rhododendron canadense*), bog rosemary (*Andromeda glaucophylla*), Labrador tea (*Ledum groenlandicum*), sedges (*Carex* spp.), and locally, wild rice (*Zizania aquatica*), all growing through a floating *Sphagnum* mat. Nests were generally found attached to dead cattail stalks and/or stems of one of the ericaceous species.

I started observing on 22 May 1976 while males were still courting females. Nests were revisited every three days to record clutch- or brood-size. Clutch-size was determined for 25 nests at Williamstown Lake and was summarized from 155 cards in the MNRS. Nest record usage was restricted to cards with a minimum of two-clutch entries, equal in size and from different days, to ensure that laying had ended.

Definitions of prefledging mortality follow Caccamise (Condor 80:290–294, 1978). Prefledging survival was calculated for 37 active nests using nest success, fledging success, and daily survival probability values.

Results and discussion.—I found only clutches of three and four eggs at Williamstown Lake (Table 1) compared to a clutch range of 2–7 eggs from the MNRS. The mean clutch-size (3.4 ± 0.5) at Williamstown Lake was significantly lower than the mean for the MNRS data for the Maritimes as a region ($\bar{x}$ = 3.7 ± 0.7, Mann-Whitney *U*-test, *U* for large samples = 1.67, $P < 0.10$), for New Brunswick ($\bar{x}$ = 3.7 ± 0.7, *U* for large samples = 1.78, $P < 0.10$), and for Nova Scotia ($\bar{x}$ = 3.7 ± 0.9, *U* for large samples = 11.52, $P < 0.001$), but did not differ significantly from the mean (3.6 ± 0.9) for the MNRS data for Prince Edward Island (*U* for large samples = 0.18, $P > 0.20$). The small mean clutch-size I found at Williamstown Lake is a consequence of the larger ratio of 3-:4-egg clutches found at Williamstown Lake (Table 1) and may suggest poorer quality nesting habitat. A larger sample for Williamstown Lake would have enabled a better comparison.

Predation accounted for the greatest loss of eggs or nestlings (Table 2) at Williamstown Lake, as has generally been found for other areas. Two nests (six eggs) were deserted following discovery for which I may have been responsible. However, evidence was inconclusive since incubation continued in similarly visited nests nearby.