Nestling Diet and Prey-delivery Rates of Loggerhead Shrikes (*Lanius ludovicianus*) in North-central South Carolina

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ABSTRACT

In a region of declining Loggerhead Shrike (*Lanius ludovicianus*) populations in north-central South Carolina, a pair of shrikes delivered both invertebrate (96%) and vertebrate (4%) prey to their nestlings (N = 924 deliveries). The male and female shrike contributed equal numbers of prey during 80 hours of observation on 7 days. Delivery rates, which ranged between 3 and 17 prey per hour, were higher in the morning than in the afternoon. Unfortunately, comparative delivery-rate data for stable and increasing populations of shrikes are not available.

Loggerhead Shrikes (*Lanius ludovicianus*) are known to kill and consume a variety of vertebrate and invertebrate prey (Beal and McAtee 1912, Miller 1931, Bent 1950). Much of the information on shrike diets, however, is anecdotal, pertaining either to the consumption of aberrant prey items or to the bird's unusual habit of impaling its larger prey (Stoner 1939, Bent 1950, Balda 1965, Loftin 1970, Chapman and Castro 1972, Anderson 1976, Hayes and Baker 1987).

Many shrike populations, particularly those in the central and southeastern states, are experiencing significant declines (Arbib 1972, Bystrak and Robbins 1977, Bystrak 1981, Geissler and Noon 1981, Morrison 1981, Robbins et al. 1986), which several researchers have linked to losses of feeding habitat, both within (Graber et al. 1973, Kridelbaugh 1983, Luukkonen 1987, Brooks and Temple 1990a), and outside of the breeding season (Brooks and Temple 1990b). Although Graber et al. (1973) documented the prey taken by shrikes in a declining population in Illinois, aside from a brief reference in Applegate (1977), there are no published data on prey-delivery rates at shrike nests. Here, we report on nestling diet and prey-delivery rates for a pair of Loggerhead Shrikes in South Carolina within a region of declining populations.

In April and May of 1987 in York County, South Carolina, we observed a shrike nest containing 5 nestlings during 5 full-day (dawn to dark) and 2 half-day (one morning and one afternoon) periods. For a complete description of the area see Gawlik and Bildstein (1990). The nest was 4.3 m above the ground in an exposed red cedar (*Juniperus virginianus*). Both Adults and the five nestlings were banded with U. S. Fish and Wildlife Service aluminum bands, and unique combinations of three plastic colored bands. We observed birds at this nest from 6 to 18 days after hatching (at which time the birds fledged), from a blind 8 m from the nest-tree and 4 m above the ground. Each time food was brought to the nest, we recorded the sex of the adult shrike (determined by the presence or absence of a brood patch during color-banding), time of day, and type of prey.

During the 804 prey deliveries in which the parent bird was identified, the male shrike brought prey to the nest 406 (50.5%) times, while the female brought prey to the nest 398 (49.5%) times. Similarly, Miller (1931) reported that a female made "about half" of the prey deliveries at a nest in California. Kridelbaugh (1983) reported that males delivered the majority of prey items to nests in Missouri. Although the male and female in our study delivered approximately equal numbers of prey items to the nestlings, some of the items brought by the female were taken from a honey locust (*Gleditsia triacanthos*) 18 m from the nest-tree, where the male had impaled them previously. Similarly, Applegate (1977) reported that a female shrike in Illinois often removed prey items previously impaled by the male, and delivered them to nestlings.

We were able to identify visually 155 of 924 (17%) prey items delivered to the nest. Invertebrates comprised 96% of the identified prey items, and vertebrates made up 4%. Fifty-nine percent of all identified prey items were Orthopterans; 15% Lepidopterans; 10% Coleopterans; 8% were arthropod larvae; 4% were mammals, reptiles and amphibians; and 3% were unidentified arthropods. Orthopterans, Lepidopterans, and Coleopterans accounted for the majority of prey items in other studies as well (Beal and McAtee 1912, Graber et al. 1973).

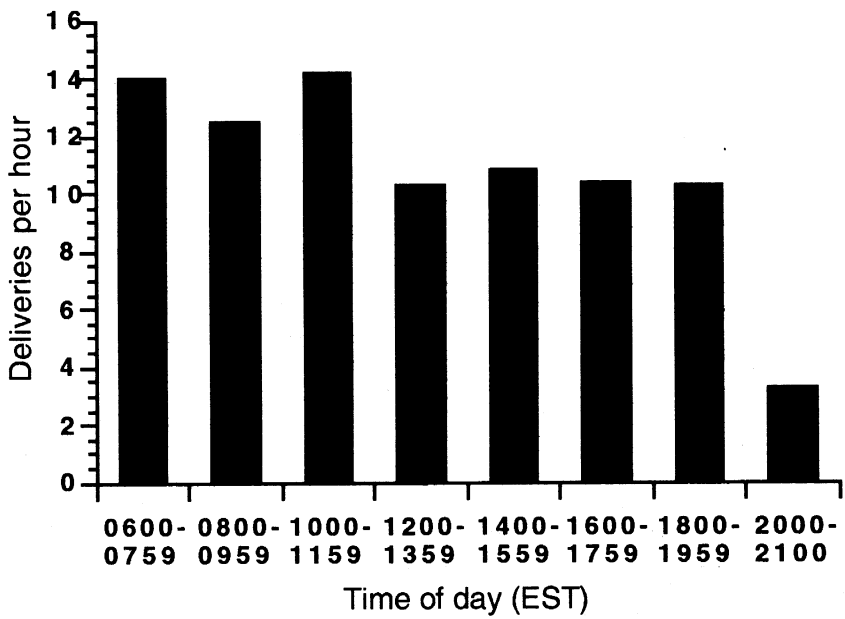

Figure 1. Time-of-day changes in the rates of prey-delivery to five nestling Loggerhead Shrikes (N = 79.8 hours) at a nest in York County, South Carolina. All times given are Eastern Standard Time.

Graber et al. (1973) reported that invertebrates never comprised less than 94% of the stomach contents of shrikes throughout the year in a declining

shrike population in Illinois, and that they comprised 95% of the stomach contents collected in April (coinciding with our observation period). Much earlier in this century, stomach contents of shrikes in the eastern United States (averaged over an entire year) contained 72% invertebrates and 28% vertebrates (Beal and McAtee 1912). In western states, where insects were reportedly available throughout the year, shrikes took up to 88% invertebrates and 12% vertebrates (Beal and McAtee 1912). Although, prey composition of shrikes varies with season and region (Beal and McAtee 1912, Miller 1931, Graber et al. 1973), these data suggest that vertebrates comprised a larger portion of the diet earlier in this century. Whether this apparent dietary shift has played a role in recent declines in shrike populations is unclear.

The shrikes we watched occasionally brought "runs" of similar prey to the nest within the same day (e.g., 78% of all Lepidopterans were delivered in one day and 45% of all grasshoppers were delivered in one day). Insects often emerge synchronously, and our observations support the notion that shrikes feed opportunistically on the most available prey (Miller 1931). For example, when we placed a clear plastic tray containing about 24 crickets within 20 m of the nest, the female shrike repeatedly captured and delivered crickets to the nest until she exhausted the supply.

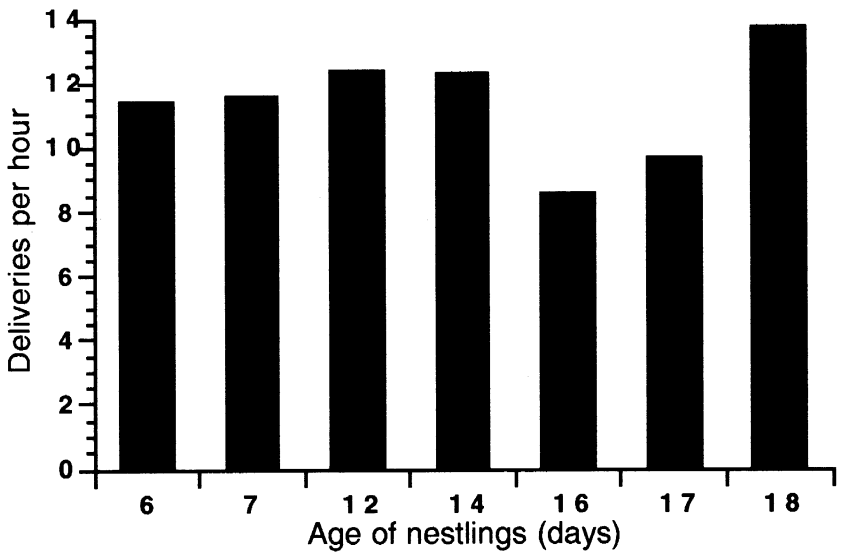

Figure 2. Daily changes in the rates of prey-delivery to five nestling Loggerhead Shrikes (N = 79.8 hours) at a nest in York County, South Carolina.

Shrikes delivered between 3 and 17 prey per hour, with the delivery rate decreasing somewhat over the day (r = -0.34, P = 0.002), although much of the decline can be attributed to a drop in prey delivery after 20:00 hours EST (Figure 1). (Note: Consult Sokal and Rohlf [1969] for an explanation of the statistical tests used in this paper.) Pre- and post-noon prey-delivery rates at the nest were not significantly different (t-test, $P > 0.05$) from those recorded at

a second nest 5.4 km away with five 15-day old young, which we watched during an additional day of observation (first nest: pre-noon $\bar{x} = 13.6 \pm 6.0$, N = 35 hrs., and post-noon $\bar{x} = 9.9 \pm 4.8$, N = 47 hrs., vs. second nest: $\bar{x} = 12.3 \pm 4.5$, N = 6 hrs. and $\bar{x} = 10.6 \pm 5.8$, N = 9 hrs, respectively).

The rate of prey-delivery increased from day 6 to 12 and then decreased between day 12 and 16. the highest rate of prey-delivery, however, occurred on day 18 as the young fledged (Figure 2). O'Connor (1984) reports that increases in feeding rates with age are typical of most species of birds.

All 10 of the young at the two nests we watched fledged, as did 144 of 163 (88%) nestlings at 34 nests during a 2-year study of reproductive success (Gawlik and Bildstein 1990) at the site. Although our observations of reproductive success do not suggest that parental shrikes were having difficulty finding sufficient prey for their young, similar data for shrikes in stable and increasing populations are not available for comparison.

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NOTICE

ELOISE F. POTTER was named Editor *emeritus* of *The Chat* by the Executive Committee of the Carolina Bird Club during the 1990 Fall meeting in Asheville, NC, on 22 September 1990. This honor is in recognition of her many years of service to the Carolina Bird Club, and especially her skillful editorship of *The Chat* from 1962 to 1987.