

Nest-Site Selection by Loggerhead Shrikes in Southwestern Oklahoma

Jack D. Tyler

Department of Biology, Cameron University, Lawton, OK 73505

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From 1985 to 1988, 133 shrike nests in 23 species of woody plants were located in southwestern Oklahoma. Twenty species were trees, two vines and one a bush. Osage orange (*Maclura pomifera*) supported almost a third of all nests, hackberry (*Celtis reticulata*) 13% and Chinese elm (*Ulmus pumila*) 11%. Red cedar (*Juniperus virginiana*), the favored tree for nesting in several eastern states, held only 9% of nests. Additional species used were mulberry (*Morus* sp.), American elm (*U. americana*), chittamwood (*Bumelia lanuginosa*), black willow (*Salix nigra*), black locust (*Robinia pseudo-acacia*), hawthorne (*Crataegus* sp.), cottonwood (*Populus deltoides*) and twelve others. Average nest height was 2.97 ± 0.16 m.

INTRODUCTION

Various aspects of the reproductive ecology of the Loggerhead Shrike (*Lanius ludovicianus*) have been studied in several parts of the United States, notably California (1), Colorado (2), Missouri (3), Illinois (4), Alabama (5), South Carolina (6), and Virginia (7). However, this species has been little studied in the southern Great Plains.

METHODS

During the 1985-1988 nesting seasons (early March to late June), I studied the reproductive biology of shrikes in Comanche County, southwestern Oklahoma. In late winter, when birds began to pair, I visited former breeding territories and other sites where paired shrikes were located. These places were revisited until either abandoned or nest construction was begun. Visits were made at three to six-day intervals except at hatching or fledging times, when they were more frequent. I identified nest trees and measured nest heights from ground level to the bottom of each nest. A count-survey of the species and numbers of all trees and shrubs within 100 m of 24 nests, each proximate to several woody species, provided an index of nest site availability.

RESULTS

I found 133 shrike nests in 23 species of woody plants (Table 1). The most commonly used species was Osage orange (*Maclura pomifera*), which contained 30.8% of the nests built during the five-year observation period. Hackberry (*Celtis reticulata*) was second, holding 12.8% of the nests. Supporting 11% of all nests, Chinese elm (*Ulmus pumila*) was third. Nine percent of the nests were built in eastern red cedar (*Juniperus virginiana*). Mulberry (*Morus* sp.), was fifth in importance, with 6.0% of the shrike nests. Although only about a third as many nests were placed in native American elm trees (*U. americana*) as in Chinese elms, when considered together, this genus ranked second. Of lesser importance were chittamwood (*Bumelia lanuginosa*), black willow (*Salix nigra*), black locust (*Robinia pseudoacacia*), hawthorne (*Crataegus* sp.), and cottonwood (*Populus deltoides*). Twelve additional species (Table 1) were selected as sites for single nests (one Arizona cypress tree [*Cupressus arizonica*] was used two years in succession). These included a rosebush (*Rosa* sp.), two vines (*Vitis* sp. and *Smilax* sp.), and a mesquite (*Prosopis juliflora*).

Though present within 100 m of only 14 (58%) of the 24 survey nests, Osage orange was used as the nest tree in 11 (79%) of these. Likewise, chittamwood contained nests at all survey sites where it occurred, but grew at only 12% of the 24 sites. Two of the four locations surveyed with hawthornes held nests, though that species appeared at only 15% of all sites. Even though junipers grew within 100 m of only 21% of the locations surveyed, nests were built in 40% of them. By contrast, hackberry was present at 17 (71%) of the 24 survey sites, but nests had been constructed in only two (8%) of them.

TABLE 1. Woody plants used by nesting shrikes in southwestern Oklahoma.

| Species ¹ | Number and Percent of Nests in Species for Year | | | | | | | | Total for 1985-88 | |
|--|---|------|----------|------|----------|------|----------|------|----------------------|------|
| | 1985 | | 1986 | | 1987 | | 1988 | | | |
| | <i>n</i> | % | <i>n</i> | % | <i>n</i> | % | <i>n</i> | % | <i>n</i> | % |
| Osage orange (<i>Maclura pomifera</i>) | 8 | 22.0 | 7 | 22.6 | 13 | 42.0 | 13 | 36.1 | 41 | 30.8 |
| Hackberry (<i>Celtis reticulata</i>) | 6 | 17.0 | 5 | 16.0 | 3 | 9.7 | 3 | 8.3 | 17 | 12.8 |
| Chinese elm (<i>Ulmus pumila</i>) | 6 | 17.0 | 5 | 16.0 | 2 | 6.4 | 2 | 5.5 | 15 | 11.3 |
| Red cedar (<i>Juniperus virginianus</i>) | 4 | 11.0 | 2 | 6.4 | 4 | 12.9 | 2 | 5.5 | 12 | 9.0 |
| Mulberry (<i>Morus</i> sp.) | 4 | 11.0 | - | --- | -- | --- | 4 | 11.1 | 8 | 6.0 |
| American elm (<i>Ulmus americana</i>) | 1 | 2.9 | 2 | 6.4 | 2 | 6.4 | 1 | 2.8 | 6 | 4.5 |
| Chittamwood (<i>Bumelia lanuginosa</i>) | 1 | 2.8 | - | --- | 4 | 12.9 | 1 | 2.8 | 6 | 4.5 |
| Black willow (<i>Salix nigra</i>) | 3 | 8.0 | 3 | 9.7 | -- | --- | -- | --- | 6 | 4.5 |
| Black locust (<i>Robinia pseudo-acacia</i>) | - | --- | 1 | 3.2 | 1 | 2.3 | 2 | 5.5 | 4 | 3.0 |
| Hawthorne (<i>Crataegus</i> sp.) | 2 | 5.5 | 1 | 3.2 | 1 | 3.2 | -- | --- | 4 | 3.0 |
| Cottonwood (<i>Populus deltoides</i>) | - | --- | 2 | 6.4 | -- | --- | 1 | 2.8 | 3 | 2.2 |

¹ Other species included Arizona cypress (*Cupressus arizonica*), green ash (*Fraxinus pennsylvanica*), rose (*Rosa* sp.), soapberry (*Sapindus drummondii*), grape (*Vitis* sp.), mesquite (*Prosopis juliflora*), pear (*Pyrus communis*), plum (*Prunus* sp.), post oak (*Quercus stellata*), smilax (*Smilax bona-nox*), yaupon holly (*Ilex* sp.), and ailanthus (*Ailanthus altissima*).

Woody plants at the 24 nest sites were ranked in three categories of density, from greatest to least, and a Chi-square test was applied to test if preference for Osage orange was independent of tree density. The test revealed that preference for Osage orange was not dependent on tree density (the Chi-square value of 2.65 only becomes significant at the 0.27 level).

Height of 128 nests ranged from 0.98 m to 7.20 m and averaged 2.97 ± 0.16 m. Nest tree heights varied somewhat, but seldom exceeded 6 m. With regard to habitat configuration, 89% of the nests were built within 100 m of pastureland and 39% were along fencelines and hedgerows.

DISCUSSION

In Oklahoma almost one-third of nests were constructed in *Maclura*; this species was used for nesting by shrikes more than any other tree in Kansas (8), and in northern and central Illinois, where 88% of 89 nests were in *Maclura* (4). It ranked third in southern Illinois (4) and Virginia (7) and fourth in Missouri (3) and Alabama (5).

Porter et al. (2) found that 70% of 77 nests studied in Colorado were in elms, willows, cottonwoods, and Russian olive trees (*Elaeagnus angustifolia*).

In four states, Virginia (7), South Carolina (6), Missouri (3), and Alabama (5), and in the southern parts of Illinois (4), shrikes chose eastern red cedar in which to build nests more than any other plant. In Oklahoma, only 9% of shrike nests were built in red cedar. However, the survey of 24 nests in Oklahoma showed that, although junipers grew within 100 m of 21% of them, shrikes built nests in a disproportionate 40%. Gawlik and Bildstein (6) found that shrikes nesting in cedars fledged one more young per nest on average than those that nested in other trees.

These two solitary or hedgerow component trees exhibit very dense crown growth with sharp needles or thorns that effectively protect nests. Indeed, it seems that woody species displaying this life form are selected as breeding sites by shrikes. In Alabama, for example, 65% of all nests were constructed in hedgerows (5) as were 39% of Oklahoma nests. This agrees with findings in Illinois (4), Missouri (3), and South Carolina (6), where a majority of nests studied were placed in hedgerows or rows of trees or shrubs. And, at all three (12.5%)

of the 24 Oklahoma survey sites where it was available, nests were constructed in chittamwoods (or "wooly buckthorns"). Hawthorne also puts forth thorny, dense crowns; at two of four (50%) survey locations where it occurred in Oklahoma, it held shrike nests, even though hawthorne grew at only four (16.6%) sites.

Pastures occurred within 100 m of 82% of nests in South Carolina (6). Similarly, I found that 89% of all nests in Oklahoma were within 100 m of pastureland (including extensive bermudagrass parklands). In Virginia, 11 nests surrounded by active pastures produced twice the number of young as did those in other types of habitat (7).

Average nest height in Oklahoma ($n = 128$) was 2.97 ± 0.16 m and ranged from 0.98 to 7.20 m. This mean is very close to that given by Siegel (5) for 35 Alabama nests (2.95; range: 0.91 - 6.71 m) and to the average of 3.20 m for 60 shrike nests in Missouri (3). The lowest average height, 1.80 m ($n = 57$), was reported for Kansas, where nest heights ranged from 1.22 to 3.05 m (8), but 77 Colorado nests, built 0.92 to 7.52 m high, averaged just 2.03 m (2). Nests in South Carolina ($n = 49$) were highest on average, at 4.4 m (6). These data indicate a tendency for nest height to increase eastward, but this probably depends to some extent on the species and growth form of woody plants available.

In various parts of its range, the Loggerhead Shrike has utilized various woody plant species in which to construct nests. These range from nine species in Missouri (3) to 23 in the present study (Table 1). In Illinois, Graber et al. (4) reported that shrikes selected 20 different species for 89 nests. Gawlik and Bildstein (6) found 13 species used in South Carolina. In addition to seven trees in Alabama (5), four vines, a rosebush, and a logpile were used. In Virginia, by contrast, 84 nests were built in only 10 different species of woody plants (7).

REFERENCES

1. Miller, A.H., Systematic revision and natural history of the American shrikes (*Lanius*). *Univ. California Publ. Zool.* **38**, 11-242 (1931).
2. Porter, D. K., Strong, M.S., Giezentanner, J. B., and Ryder, R. A., Nest ecology, productivity, and growth of Loggerhead Shrike on the shortgrass prairie. *Southwest. Nat.* **19**, 429-436 (1975).
3. Kridelbaugh, A., Nesting ecology of the Loggerhead Shrike in Missouri. *Wilson Bull.* **95**, 303-308 (1983).
4. Graber, R. R., Graber, J. W., and Kirk, E. L., Illinois birds: Laniidae. *Illinois Nat. Hist. Surv. Biol. Notes* No. 83 (1973).
5. Siegel, M.S., The nesting ecology and population dynamics of the Loggerhead Shrike in the blackbelt of Alabama. M.S. thesis, Univ. Alabama, Birmingham (1980).
6. Gawlik, D.E., and Bildstein, K. L., Reproductive success and nesting habitat of Loggerhead Shrikes in north-central South Carolina. *Wilson Bull.* **102**, 37-48 (1990).
7. Luukkonen, D. R., Status and breeding ecology of the Loggerhead Shrike in Virginia. M.S. thesis, Virginia Polytechnic Inst. and State Univ., Blacksburg (1987).
8. Johnston, R. F., The breeding birds of Kansas. *Univ. Kansas Publ. Mus. Nat. Hist.* **12**, 635-636 (1964).