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Western Kingbird (Tyrannus verticalis): Recently Established Breeding Bird in Arkansas

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The Western Kingbird (*Tyrannus verticalis*): A Recently Established Breeding Bird in Arkansas

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Abstract

The Western Kingbird (*Tyrannus verticalis*) has nested for six consecutive years in Arkansas since 1998. Eleven nests of this species were observed in the summer of 2003 in urban areas of Fort Smith (Sebastian Co.) and Van Buren (Crawford Co.). All nests were on human-made structures. Of the 11, seven (64%) were located on power stations and the remaining four (36%) were on light posts. Mean nest height was 7.92 m (n = 11 nests) and the mean width of nest poles was 31.18 cm (n = 4). Nest building lasted 12 to 13 days (mean = 12.5 days, n = 2 nests). The attentive period of female parents (time spent on nest at a stretch during incubation) and their inattentive period were highly variable and averaged 11.97 minutes and 4.08 minutes respectively. The male stayed in close proximity of the nest throughout the nest building and incubation phases. Incubation period was estimated to be 17 days (n = 2 nests). Nesting success (percentage of nests that fledged young) was 72.7% (n = 11 nests). The average number of young fledged per successful nest was 3.37 (n = 8) and the average number fledged over all nests was 2.45 (n = 11). In all nests, only the female participated in nest-building and incubation. Fledging occurred 13 to 14 days after hatching (mean = 13.5 days, n = 2 nests).

Introduction

The Western Kingbird (*Tyrannus verticalis*) is widespread in its breeding range which encompasses most of the western part of North America, extending as far east as the western three-fourths of Oklahoma (Gamble and Bergin, 1996). The breeding range has been expanding steadily eastward since at least the late nineteenth century (Bent, 1942; Baumgartner and Baumgartner, 1992). In Oklahoma, the species was reported only from the extreme western part of the state in 1901, but by 1924 it was considered regular in the western half of the state (Nice, 1924). As early as 1942, A.C. Bent wrote prophetically of this species (which was then known as the Arkansas Kingbird, perhaps owing to its first being reported from the Arkansas River drainage): "If this kingbird continues to advance, it may yet reach Arkansas and its name may be justified" (Bent, 1942). This eastward expansion trend is apparently continuing and has been attributed to erection of human-made structures and changes in land use patterns, for example, clearing of mesquite (*Prosopis glandulosa*) woodlands and irrigation for crops (Oberholser, 1974; Gamble and Bergin, 1996).

The first confirmed instance of nesting in Arkansas was during 1973 in Lonoke (Lonoke County), but this attempt was unsuccessful (James and Neal, 1986). Successful nesting was first reported in the state from Little River County in 1999, and nesting occurred in this location for at least three consecutive years. Additional nesting reports have come from Pulaski and Miller counties (Arkansas Audubon Society, 2003). In 2002, anecdotal observations revealed 17 nesting attempts from Fort Smith (Sebastian County) and Van Buren (Crawford County), from which eight nests yielded 28 fledglings; the fate of six nests with 15 nestlings near fledging stage was undetermined (Bill Beall, pers. comm.).

The present study, conducted in 2003, had two objectives: 1. to compile all known nesting attempts in the state and determine current status of the species, and 2. to evaluate nesting success in the apparently new breeding range of the species. Information regarding various other aspects of the breeding biology was also gathered in the process. All breeding observations herein were conducted in the sites discovered and observed in 2002 by Bill Beall.

Study Area and Methods

We compiled all known nesting reports in the state by conducting a correspondence survey of bird watchers statewide. Since only one (the very first attempt) of the reports has been published (James and Neal, 1986), we also surveyed records reported in the Arkansas Audubon Society's web page (Arkansas Audubon Society, 2003). Nesting observations were conducted in the urban areas of Fort Smith and Van Buren, Arkansas. Utility poles and electric substations that were used the previous year (2002) were monitored from early May for nesting activity. Two of the sites were chosen for intensive observations: a wooden utility light pole and a fenced-in electric substation (owned by Oklahoma Gas & Electric). The two sites were within three blocks of each other. The remaining nine locations were on six other power stations and three utility poles.

All nests were assigned a number, and all observations were conducted during the morning between 0700 and 1200 hours using 10x50 binoculars and a 15-40x zoom spotting

Table 1. Summary of Western Kingbird breeding attempts in Arkansas (1973-2003)

Year	County	Number of nests	Nest site	Reported status or outcome	Source
1973	Lonoke	1	Pecan tree	Unsuccessful	James and Neal 1986
1998	Pulaski	1	Pine tree	Seen at incubation	Arkansas Audubon Society 2003
1999	Little River	1	Electric substation	Successful; at least 1 young fledged	Charles Mills, pers. comm., Arkansas Audubon Society 2003
1999	Miller	1	Utility pole	Unsuccessful	"
2000	Little River	1	Electric substation	Seen at incubation	"
2000	Little River	1	Electric substation	4 young fledged	Charles Mills, pers. comm.; Arkansas Audubon Society 2003
2001	Little River	1	Electric substation	4 nestlings seen in nest; all fledged eventually	"
2002	Little River	1	Electric substation	4 young fledged	"
2002	Sebastian	19	Utility poles & electric substations	At least 21 fledglings	Bill Beall, pers. comm.
2002	Crawford	4	3 on utility poles, one unknown	At least 7 fledged	Bill Beall, pers. comm.
2003	Sebastian	10	Utility poles & electric substations	23 fledglings	Present study
2003	Crawford	1	Utility poles	4 fledglings	Present study

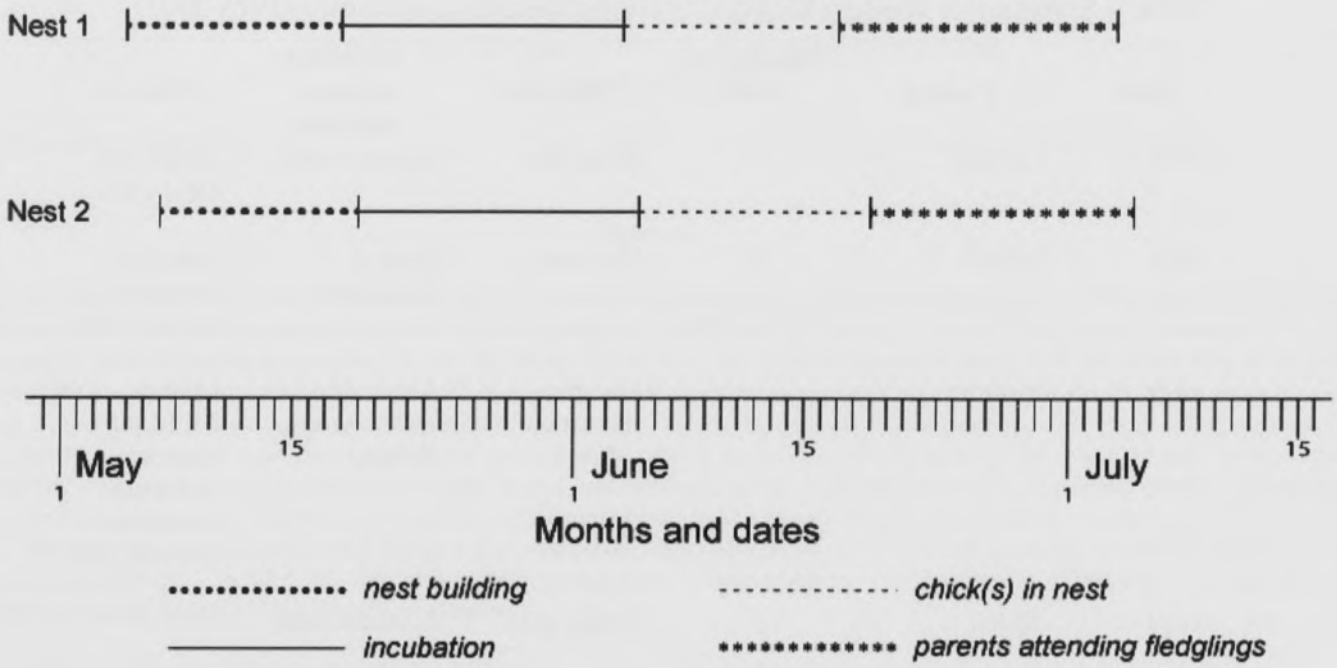

Fig. 1. Nesting phenology of two Western Kingbird nests observed in 2003.

scope. Field observations were conducted between 1 May and 31 July 2003. Two of the nests (nests 1 and 2) were chosen for intense observations. For these nests, time and duration of nest visitations by parents was recorded both during incubation and during nestling stages. Daily observations ranged 1-2.5 hours per nest. Nest contents could not be examined due to their inaccessibility. After fledging, the distance moved per day by fledglings was approximated by pacing. The remaining nine nests were monitored to obtain information on nest success. General notes were also maintained on behavior. All nest heights were measured using a clinometer, and diameter at breast height (1.2 m) of nest poles was measured by a DBH tape. Statistical analyses were performed using Microsoft Excel and SPSS software (Norusis, 1990).

Observations

Nesting Status in Arkansas.--All known nesting attempts in the state, including those observed in the present study, are summarized in Table 1. There have been at least 42 nesting attempts in the state through 2003, from the following six counties: Crawford, Little River, Lonoke, Miller, Pulaski, and Sebastian. After the unsuccessful attempt in 1973, there was a 25-year lull in nesting reports from anywhere in the state. However, the species has nested in Arkansas every year since 1998. In counties other than Crawford and Sebastian, only one to two nests were reported for each year in the 5-year period from 1998 to 2002 (Table 1).

Phenology.--Phenology of two of the nests (nests 1 and 2) from which we were able to obtain detailed information is shown in Fig. 1.

Nest Site and Nest Building.--The "Nest-site showing display" as described by Gamble and Bergin (1986) was not observed. All of the nests in this study summarized in Table 2 and those observed in 2003 (Bill Beall, pers. comm.) were constructed on human-made structures. One of the nests was a reused structure from the pervious year, but it failed. Of the 11 nests in this study, seven (64%) were built on power stations, and the remaining four (36%) were on light poles. Mean nest height was 7.92±2.86 (3.5-12.19, 11) m (mean, SD, range, n), and the mean diameter of nest poles was 31.18±5.46 (25.7-38, 4) cm (Table 2). Eight of the 11 nests (73%) were built on metal braces that connect the vertical poles to the perpendicular structure that holds the transformers or lamps. Copulation or similar behavior was observed on 15 May and 17 May near nest 1 and on 26 May and 3 June near nest 2. The male mounted the female for brief periods not lasting more than two seconds. "Tumble flight" (Gamble and Bergin, 1996) was performed by males on many occasions throughout the nest construction process near both nest sites. Males were often observed to flutter while on a nearby perch upon the arrival or departure of the

Table 2. Summary of nests observed in the present study.

Nest No.	County	Nest Location	Nest Height (m)	Diameter of Pole (cm)	No. of fledglings
1	Sebastian	electric substation	3.5		4
2	"	utility pole	10.36	38	4
3	"	electric substation	9.14		3
4	"	electric substation	3.5		0
5	"	electric substation	12.19		0
6	"	utility pole	10.06	33	3
7	"	electric substation	7.31		4
8	"	electric substation	10.06		2
9	"	utility pole	8.23	25.75	0
10	"	electric substation	5.18		3
11	Crawford	utility pole	7.62	28	4

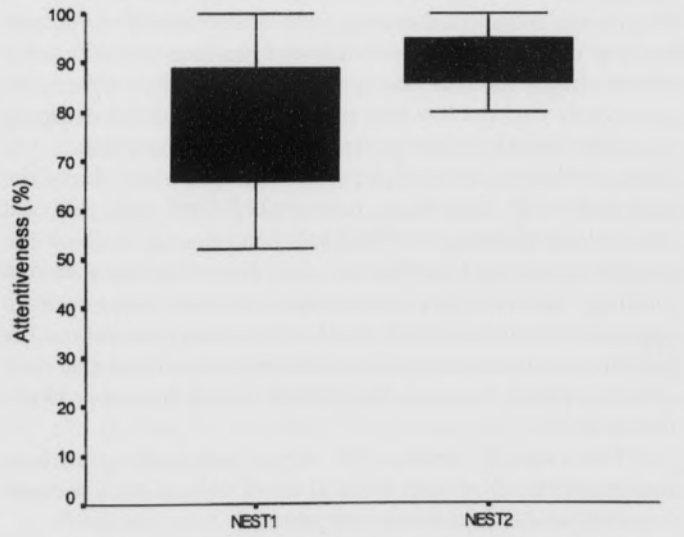

Fig. 2. Comparison of attentiveness (%) between nests 1 and 2. The dark bar represents the middle half of the data; the top and bottom end of the extensions represent the maximum and minimum values, respectively.

female to the nest site. It was not possible to tell the sexes apart. We could not see the brood patch that some authors have used to identify females (Davis 1941; Smith, 1966). We observed that on two occasions (different nests) both the parents brought in nest material. Most of the time, however, only one of the parents, presumably the female, constructed the nest while the other perched nearby.

Incubation.--The incubation period for both nests was approximately 17 days (Fig. 1). This estimation was based on parental behavior (sitting still on the nest for prolonged periods indicated incubation; regurgitation behavior indicated that at least one chick has hatched) (Wheelock, 1904; Myers, 1910). At least one of the eggs was considered hatched when a parent regurgitated something into nest 1 on 4 June, and shortly thereafter both parents fed nestling(s). Chicks could be seen from the ground on 14 June in nest 1 and 10 June in nest 2; four young were observed in each nest. The incubating parent was not fed by the other parent.

For nest 1 the incubating parent's attentive period (time spent sitting on egg(s) at a stretch) averaged 10.8±0.26 (0.12-41.7, 87) minutes (mean, SD, range, n); the inattentive period for this nest was 5.88±9.84 (0.12-64, 70) minutes. For nest 2, the attentive period averaged 12.78±11.76 (0.18-

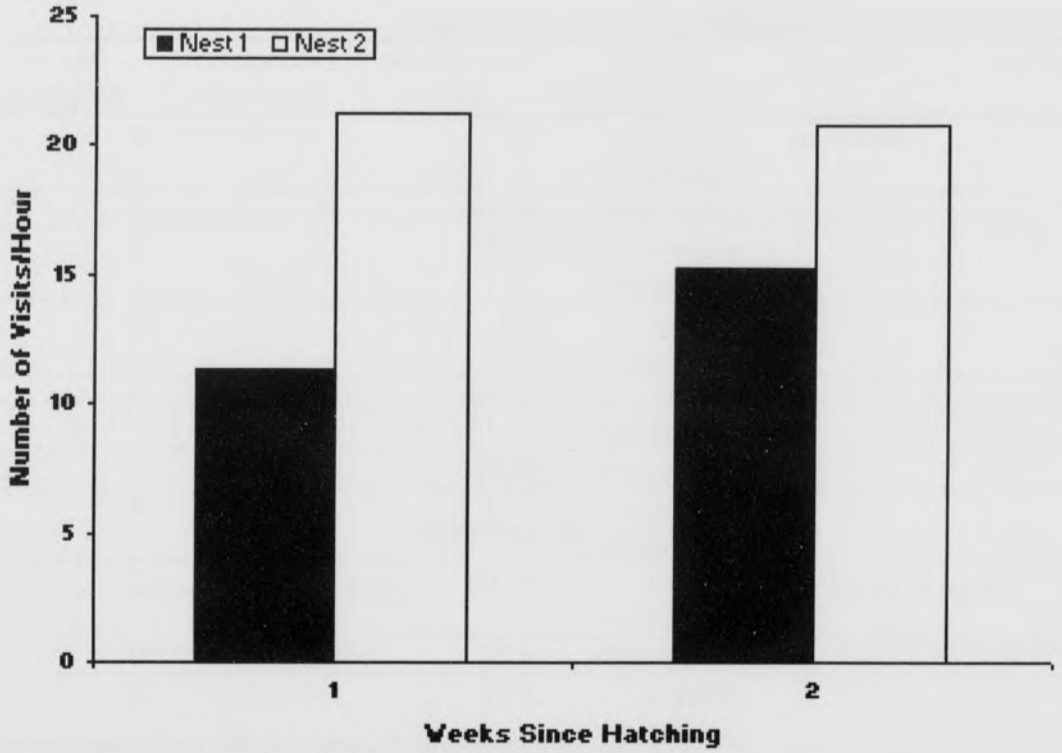

Fig. 3. Feeding visitation rate by both parents to nestlings in nests 1 and 2.

61.92, 58) minutes; inattentive period was 2.28±1.8 (0.06-6.84, 41) minutes. Therefore, the overall (averaging both nests 1 and 2) attentive period was 11.97±11.01 (0.15-51.66, 73) minutes; inattentive period was 4.08±5.82 (0.09-35.52, 56) minutes.

In order to determine if attentiveness varied through time as incubation progressed, we modeled the data with linear regression. For both nests, there was no significant increase or decline in attentiveness through time (r^2 = 0.0295 and 0.0753 respectively). The proportion of time spent attentive (%) during incubation (time sitting on eggs/total time observed) averaged 79%±16.35 (52-100, 17) (mean, SD, range, n) for nest 1 and 90%±6.56 (80-100, 17) for nest 2. A side-by-side box plot comparison (Fig. 2) revealed that attentiveness was variable in both nests, with nest 1 incubating parent showing more variability than the nest 2 parent.

Nesting Success.--The nesting success (proportion of nests that fledged young) was 72.7% (n = 11 nests). The average number of young fledged per successful nest (nest in which at least one young fledged) was 3.37 (n = 8), and the average for successful plus unsuccessful nests (unsuccessful nests being those from which no young fledged) was 2.45±1.69 (0-4, 11) (mean, SD, range, n).

Parental Care of Nestlings.--The young remained in the nest for 13 and 14 days for nests 1 and 2, respectively (Fig. 1). Both the male and the female participated in obtaining food for the nestlings, often taking turns while the other remained at the nest. Food was initially offered by regurgitation. Dragonflies and grasshoppers were among the insects recognized during field observations of parents feeding nestlings. A seven day-old nestling was offered a whole dragonfly that was consumed entirely. Often, an apparently sticky saliva-like substance was noticed dripping from the mouth of the parent as it fed the nestling. On three occasions for nest 1, a parent was seen to fly above the nest and drop something, presumably food, into the nest which had nestlings. Fluttering behavior of one of the parents, presumed to be the male (see *Nest Site and Nest building*, above) was often seen as the other parent approached the nest with food. On many occasions the parents were also seen removing fecal sacs from the nest, often dropping them on the ground as they flew away from the nest.

The average weekly rate of parental feeding visits to nestlings (Fig. 3) ranged from 11 to 15 visits / hour for nest 1 and 20 to 21 visits / hour for nest 2.

Fledging and Initial Dispersal of Fledglings from Nest Site.--At the onset of fledging, some nestlings perched on the rim of the nest and flapped their wings rapidly for short periods of time. The other nestlings remained inside the nest awaiting food. As the nestlings fledged, the parents

Fig. 4. Initial dispersal of fledglings from nests 1 and 2.

became more protective staying in the proximity of the nest more often than before. For nest 1 all nestlings fledged within three days and for nest 2 within two days. At both nest sites, fledglings first flew to a nearby power line. The fledglings often followed the parents in flight begging for food. The parents continued to feed the fledglings for more than two weeks for both the nest broods, after which we lost track of them.

Since no information was available on initial dispersal from nest site, we monitored fledglings on a daily basis for 20 days after they fledged from nests (Fig. 4). Fledglings were often among the foliage of small trees, but were also found perched on wires or in similar exposed situations. Both groups of four fledglings each (from nests 1 and 2) dispersed as a group away from their nests in a strikingly similar pattern, with gradual increments in distance the first 15-18 days and then a final "leap" on days 19 and 20 (Fig. 4). On the last day in which they could be tracked, nest 1 and nest 2 fledglings were 787 m and 373 m from their respective nests. We lost track of the birds shortly thereafter.

Predation and Interspecific Association.--One instance of predation by a Common Grackle (*Quiscalus quiscula*) was observed in which the grackle was seen entering a nest and pecking at the contents (assumed to be eggs based on the date observed--29 May). The parents chased away the grackle, but afterwards that nest was abandoned.

The following species of birds nested in close proximity to the Western Kingbirds (in the same substation or in the same enclosed area): Rock Pigeon (*Columba livia*), Eurasian Collared-Dove (*Streptopelia decaocto*), Mourning Dove (*Zenaida macroura*), Common Nighthawk (*Chordeiles minor*), American Robin (*Turdus migratorius*), Northern Mockingbird (*Mimus polyglottos*), Common Grackle (*Quiscalus quiscula*), House Finch (*Carpodacus mexicanus*), and House Sparrow (*Passer domesticus*).

Discussion

Range Expansion.--With 34 nesting attempts producing at least 55 fledglings in Sebastian and Crawford Counties over two successive years (2002 and 2003) and with reports of nesting in several counties for six consecutive years beginning in 1998 (summarized in Table 1), the Western Kingbird seems to have established itself as a new regular breeding bird in Arkansas. It is interesting that after the first nesting attempt in 1973, 25 years lapsed before the next reported attempt in 1998. The species has nested every year since then. These observations are in concordance with the eastward expansion trend observed elsewhere (Gamble and Bergin, 1996). Future studies should investigate the effect of the recent proliferation of cell phone towers on the nesting of this species.

Nest Site and Nest Building.--None of the nests in Sebastian and Crawford Counties for 2002 and 2003 was placed in a tree, despite the profusion of trees in the area. The range expansion of the species has been attributed to the spread of utility poles and wires (Oberholser, 1974), but nests in other places have been reported more frequently in trees or shrubs than on human-made structures (Cuesta, 1974; Ohlendorf, 1974; Gamble, 1985; Bergin, 1993; Gamble and Bergin, 1996). Only a third of nests in the Trans-Pecos area of Texas were on utility poles (Ohlendorf, 1974; Gamble 1985), and in British Columbia (Canada), the proportion of nests on utility poles was 85% (R. W. Campbell, cited in Gamble and Bergin, 1996). The present study seems the only reported study where 100% of the nests were in human-made structures (Tables 1 and 2).

A review of all nesting attempts in Arkansas (Table 1) indicated that of 42 attempts, only two (4.7%) were in trees. These attempts were in 1973 and 1998. The preponderance of nesting in human-made structures (100% in the five years from 1999 to 2003) despite the heavy presence of trees in the area adds credence to the belief that the eastward expansion trend is enhanced by the proliferation of these human-made structures (Oberholser, 1974).

The propensity of Western Kingbirds in this study to nest on braces that connect the vertical pole to the perpendicular structure is also supported from studies in Texas (Gamble, 1985) and from New Mexico (Cuesta, 1974). Braces apparently offer a convenient site where the nest can be ensconced. They also afford protection from the elements (Gamble and Bergin, 1996).

Only one of the 11 nests was reused from the previous year. This nest ultimately failed. The species is reported to occasionally reuse nests from previous years (Bergin, 1997; Gamble and Bergin, 1996).

The fluttering behavior of males observed in this study (see *Observations*, above) was observed only after the male accepted the female. This is interesting because Gamble and Bergin (1996) indicated that fluttering is done only in an agonistic context. Fluttering may therefore be a more general sign of excitation that can be displayed during both agonistic and non-agonistic (pair-bonding) situations.

Incubation.--The incubation period we estimated (17 days) falls within the range of 12 to 19 days reported by several studies (Bendire, 1895; Burns, 1915; Cuesta, 1974; Gamble, 1985). The information reported here on incubation sessions and incubation recesses is the first reported for the species. The proportion of time spent attentive is related to ambient temperatures, with lower temperatures resulting in longer incubation bouts (Drent, 1975; Gill, 1994). The nest 1 parent was often disturbed by intruding grackles that nested in the same substation, and this explains why she was relatively more variable in attentiveness than the nest 2 parent (Fig. 2).

Parental Care.--The pattern of feeding regurgitated food initially and later feeding whole food that was observed in this study conforms with observations elsewhere (Wheelock, 1904; Myers, 1910; Blancher and Robertson, 1984). Parental feeding rate of nestlings in this study was much higher than the 2.7 to 10.2/hr reported by Gamble and Bergin (1996). But that may be because we could not tell the sexes apart and thus had to lump the data together. Our finding that the fledglings are fed by both parents for more than two weeks is consistent with the findings of Gamble and Bergin (1996).

Nesting Success.--The nesting success in this study (72.7%) is much higher than the 40.9% reported from the Trans-Pecos area of Texas (Gamble, 1985), the 49% reported from desert habitat in southern New Mexico (Cuesta, 1974), and the 53% from western Nebraska (Bergin, 1993). These three studies reported that nests were placed more frequently on trees or shrubs than on human-made structures. In our study, 100% of the nests were on human-made structures. Although the sample size (number of nests) is much lower in our study than from all three aforementioned studies, these figures tend to suggest that preference of human-made structures, especially fenced-in and ostensibly better protected electric substations, may vastly improve nesting success in Western Kingbirds.

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