

**WILLOW FLYCATCHER NEST SUCCESS, HABITAT CHARACTERISTICS,
AND BROOD PARASITISM IN SOUTHEASTERN OKLAHOMA**

DOUGLAS R. WOOD AND ROSS G. ANDERSON

*Southeastern Oklahoma State University, PMB 4068, 1405 N. 4th Ave.,
Durant, OK 74701; E-mail: dwood@se.edu*

Abstract—Little is known about Willow Flycatcher (*Empidonax traillii*) nest success in Oklahoma. In 2009–2010, we opportunistically searched for and monitored Willow Flycatcher nests at Red Slough Wildlife Management Area in McCurtain County, Oklahoma. We also recorded brood parasitism and cause-specific nest loss. We recorded habitat characteristics at each nest site. We monitored one nest in 2009 and 7 nests in 2010. Mean Willow Flycatcher clutch size was 2.7 eggs (range 1–4). Brown-headed Cowbirds (*Molothrus ater*) parasitized 87.5% of Willow Flycatcher nests with a mean of 1.3 cowbird eggs/nest (range 1–3). The only un-parasitized nest fledged two Willow Flycatchers. Four nests fledged only cowbirds and three nests were lost to predation. Willow Flycatchers nested in mature sweetgum trees within 5 m of habitat edges. Nest sites were characterized by moderate canopy cover (58%), dense to moderately dense understory vegetation composed of grasses and forbs, and canopy height <12 m. We speculate that Red Slough Wildlife Management Area is a population sink with low Willow Flycatcher nest success due to cowbird parasitism and predation.

The Willow Flycatcher (*Empidonax traillii*) is a Nearctic-Neotropical migrant that has been recorded nesting in Craig, Ottawa, and Tulsa counties in northeastern Oklahoma and in McCurtain county in southeastern Oklahoma (Reinking 2004, Oklahoma Bird Records Committee 2009). David Arbour (pers. comm.) found the first Willow Flycatcher nest at Red Slough Wildlife Management Area (WMA) in 2001. Oklahoma Willow Flycatcher nest records are distinctly south of the main nesting range for this species with most range maps showing southeastern Missouri as the closest nesting population of Willow Flycatchers to eastern Oklahoma (Sedgwick 2000). Breeding Bird Survey data from 1966–2009 indicate Willow Flycatchers are experiencing 0.5%/year and 1.3%/year population increases in the Eastern and Central regions of the United States respectively; however, they exhibit a -2.1%/year population decline in the Western regions of the United States (Sauer et al. 2008).

Willow Flycatchers nest from mid-May to mid-July and are typically single brooded (Sedgwick 2000). Willow Flycatchers nest in shrubby, wet riparian corridors with standing or flowing water nearby, using a variety of tree species for nesting at low to medium heights (Sedgwick 2000). Clutches typically contain 3–4 eggs, but 5-egg clutches have been documented (Sedgwick 2000). Incubation length is 13–15 d and fledging occurs at 12–13 d (Sedgwick 2000). Brown-headed Cowbird (*Molothrus ater*)

brood parasitism is well documented for this species. Friedmann (1963) listed Willow Flycatcher as one of the 17 most parasitized songbirds in the eastern United States.

Our overall objective was to monitor Willow Flycatcher nests in the species' disjunct occurrence in southeastern Oklahoma. Specifically, we sought to document nest success or failure, document Brown-headed Cowbird parasitism and outcomes, and describe habitat characteristics around nest sites.

Methods

We searched opportunistically for Willow Flycatcher nests at Red Slough WMA (33° 44.905'N, 94° 38.481'W) in a variety of wet, shrubby, riparian habitats from May to July 2009–2010. David Arbour, technician with the Oklahoma Department of Wildlife Conservation, assisted in locating Willow Flycatcher nests in both years. Once a nest was found, we documented nest parameters including: clutch size, number of eggs hatched, and number of young fledged/nest. We defined nest success as fledging at least one Willow Flycatcher young. We also documented cowbird parasitism and outcomes of parasitized nests. We documented cause-specific nest mortality when appropriate. We recorded tree species selected for nest placement, mean nest height and mean nest tree dbh (diameter at breast height). We measured the following microhabitat variables within a 10-m radius of each nest: understory, midstory, and overstory canopy heights, distance to nearest edge, percent overstory canopy cover using a densiometer, horizontal vegetation density using a modified Nudds board (0–150 cm in 30 cm increments), and percent ground cover types including grass/forbs, standing water, woody, bare ground, and miscellaneous debris (Nudds 1977).

Results

We monitored one Willow Flycatcher nest in 2009 and 7 nests in 2010. Mean clutch size was 2.7 eggs (range 1–4). Brown-headed Cowbirds (*Molothrus ater*) parasitized 87.5% (7/8) of nests with a mean clutch size of 1.3 cowbird eggs/nest (range 1–3). The only un-parasitized nest fledged two Willow Flycatchers in early August 2010. Four nests fledged only cowbirds. One nest was lost to raccoon (*Procyon lotor*) predation and two nests were lost to snake predation. David Arbour (pers. comm.) observed one nest predation event by a speckled kingsnake (*Lampropeltis getula*). We did not directly observe the other snake predation event, but it appeared to have occurred during the hatching stage.

All Willow Flycatcher nests were located in sweetgum (*Liquidambar styraciflua*) trees with a 42.4 cm mean dbh (range 30.4–48.2 cm). Mean nest height was 2.0 m (range 1.6–2.6 m). Mean distance to the nearest habitat edge was 5.4 m (range 0–10 m). Nest sites were characterized by mean understory height of 0.94 m (range 0.5–1.5 m), mean midstory height of 3.4 m (range 1.8–7.3 m), and mean overstory height of 8.2 m (range 4.5–12 m). Overstory canopy cover was highly variable with a mean of 58% canopy closure (range 23–85%). Understory vegetation was characterized by dense cover at 0–30 cm (= 98% coverage), 31–60 cm (= 94%), 61–90 cm (= 73%), but was sparser at greater heights e.g., 91–120 cm (= 55%) and, 121–150 cm (= 44%). Mean ground cover consisted of 85% grasses and forbs, standing water 10%, woody 4%, 0.5% bare ground and 0.5% miscellaneous debris.

Discussion

Mean Willow Flycatcher clutch size at Red Slough WMA (2.7 eggs) was smaller than reported in other parts of the flycatcher's range. Holcomb (1974) reported mean clutch size of 3.68 and McCabe (1991) reported mean clutch size of 3.59. Other studies documented smaller clutch sizes in California (2.71–3.63) and Arizona (2.92) at the southwest extent of the species' range (Sedgwick 2000). Willow Flycatcher nest success was poor (12.5%) at Red Slough WMA with only one nest fledging two young. Willow Flycatchers were more successful in other parts of the species' range. In Wisconsin, McCabe (1991) reported that 68.6% of Willow Flycatchers fledged at least one young. Similarly, Walkinshaw (1966) reported 65.2% nest success by Willow Flycatchers. Campbell et al. (1997) had moderate Willow Flycatcher nest success with 28% of nests fledging young. The only successful Willow Flycatcher nest at Red Slough WMA occurred late in the nesting season. The young fledged on August 4th. This may have been a second nest attempt after a prior nest failure. Due to the high rate of cowbird parasitism, it is possible that this Willow Flycatcher pair was successful due to the cessation of cowbird egg production late in the summer.

Brown-headed Cowbirds parasitized 7 of 8 flycatcher nests at Red Slough and 4 of these nests fledged only cowbird young. Willow Flycatchers at Red Slough appeared to accept cowbird eggs and attempted to incubate and raise cowbirds. Brood parasitism rates at Red Slough are higher than rates published in the literature. In Nebraska and Ohio, Holcomb (1972) recorded only 8% nest parasitism and Berger (1967) documented a 10% parasitism rate in Michigan. However, Sedgwick and Knopf (1988) reported 40.7% of Willow Flycatcher nests in Colorado had cowbird eggs. Our observed parasitism rate was closest to Whitfield et al. (1999) that reported a 63% parasitism rate in southern California. No study in the literature documented as high a parasitism rate as 87.5% observed at Red Slough WMA. Our sample size (8) is considerably smaller than in other studies, therefore we are cautious about generalizing our results over a broader area. Sedgwick and Iko (1999) documented high parasitism rates among first year Willow Flycatchers, but better anti-parasitism strategies among older flycatchers. We did not capture Willow Flycatchers and age the adults, but it is possible that these were young birds nesting at the southern extent of the species' range, which resulted in the high success rate of cowbirds in flycatcher nests at Red Slough WMA.

One nest was lost to raccoon predation in 2010. Raccoons are common at Red Slough WMA and are well documented nest predators. Although this nest was the lowest (1.6 m), other nests were similar in height but not depredated. One nest was lost to speckled kingsnake predation in 2010. Sedgwick (2000) lists speckled kingsnake as a predator of Willow Flycatcher nests. McCabe (1991) also reported a nest lost to a milk snake (*L. triangulum*). Another nest was lost to snake predation, but we do not know the species of snake in this event.

All 8 Willow Flycatcher nests were located on the edge of mature sweetgum stands or near canopy openings within 5–10 m of the nest. We speculate that nesting along habitat edges made the birds susceptible to high rates of parasitism and predation at Red Slough WMA. Nest sites were <3 m off the ground in the midstory canopy layer (Walkinshaw 1966, Holcomb 1972). Overstory canopy cover was variable with some nest sites in open sweetgum stands and others in stands with high canopy closure. Ground story vegetation was dense and mainly composed of grasses and forbs. We were

able to locate flycatcher nests due to the exposed nature of the nest sites. Predators and brood parasites also found these nests and contributed to the low success rate we observed at Red Slough.

We speculate that Willow Flycatchers nesting at Red Slough are a result of apparent population increases in the Central United States. Red Slough provides nesting habitat which resulted in a small nesting population of Willow Flycatchers. Although nest success was poor, due to parasitism and predation, other Willow Flycatchers may be nesting in the area successfully. We recommend finding more nests in southeastern Oklahoma to further examine nest success. We also recommend aging nesting Willow Flycatchers to determine if these are adult or second year birds.

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Two noteworthy records of Yellow Rail in Oklahoma. — Yellow Rails (*Coturnicops noveboracensis*) are secretive birds with a breeding range that extends from Nova Scotia and New Brunswick west to Montana and Alberta with an isolated population breeding in south-central Oregon and northern California (Bookhout 1995; Popper and Stern 2000; Sterling 2008). Yellow Rails winter along the Gulf and Atlantic Coastal Plains from Texas to North Carolina (Bookhout 1995) and have recently been discovered overwintering in small numbers in southeastern Oklahoma at Red Slough Wildlife Management Area in McCurtain County (Butler et al. 2010). Table 1 shows a monthly summary of Yellow Rails banded at this location from November 2008 through March 2011. Currently, Yellow Rails are not known to winter at other locations in the state.

At 1100 on 27 January 2011, RB and TS conducted a prescribed burn at Hugo Wildlife Management Area, approximately 3 kilometers east of Messer, Oklahoma (Choctaw County). This 40 ha field was dominated by *Panicum* spp. and *Sporobolus* spp. At approximately 1235, the fire flushed a Yellow Rail. The rail was picked up by TS and photographed (Fig. 1). This bird was aged as an AHY/ASY (after hatch year/after second year) individual by CJB based upon the characters given by Pyle (2008), including the relatively rounded shape of the secondaries, the relatively large extent of the white on the secondaries, and the white-tipped primary coverts visible in the photograph. After photographing the bird, the Yellow Rail was released at an adjacent (unburned) field. This location is approximately 80 km northwest of the only known wintering population at Red Slough WMA and is noteworthy because Yellow Rails have not previously been encountered during mid-winter in Oklahoma away from Red Slough WMA. This record suggests that the winter distribution of Yellow Rails may be wider than previously documented and this species may overwinter at other locations in the Red River Valley and elsewhere in southern Oklahoma in *Panicum* and *Sporobolus*-dominated fields.

A second noteworthy record occurred on 2 April 2011, when JNS discovered a dead Yellow Rail at 301 E Archer Street in downtown Tulsa (Tulsa County). This specimen was collected and deposited by CJB in the Natural History Museum at the University of Central Oklahoma (specimen number to be determined). This bird was an AHY/AHS female based upon the plumage characteristics described above and the presence of ovaries. This record is noteworthy for two reasons. First, records of Yellow Rails away Red Slough WMA are quite scarce (see Heck and Arbour (2008) for a summary). Secondly, although Yellow Rails arrive at their breeding grounds in Minnesota and Wisconsin beginning the last week of April (Bookhout 1995), the timing of spring migration in this species is not well understood. Tomer (1959) described a Yellow Rail collected in Delaware County on 7 March 1842 but it is unclear if this bird

was a winter resident or a migrant. Arterburn (1997) captured a live Yellow Rail in downtown Tulsa on 9 April 1994 and relocated it to a nearby marsh. Arterburn also photographed another Yellow Rail in Tulsa County on 27 April 2002 (<http://www.pbase.com/image/93469472>). Scott (1978) encountered a Yellow Rail in Payne County on 23 April 1975. Nineteen Yellow Rails (14 new birds, five recaptures) were banded by CJB on 26 March 2010 at Red Slough WMA, but only a single Yellow Rail was encountered (and banded) on 9 April 2010 and none were encountered on 7 May 2010. These records suggest that the spring migration of Yellow Rails through Oklahoma begins in early April (or possibly late March) and continues throughout April.

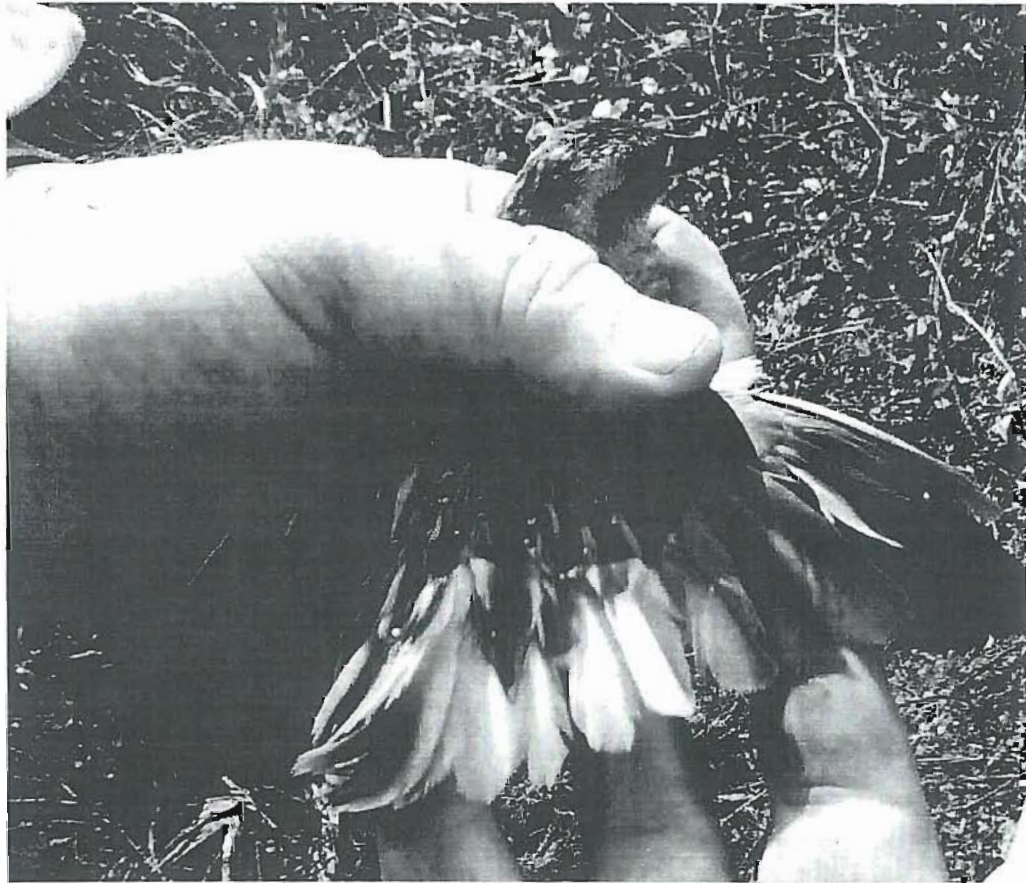


Figure 1. This Yellow Rail at Hugo WMA (Hugo County), discovered on 27 January 2011, was the first mid-winter record in Oklahoma away from Red Slough WMA (McCurtain County).

Table 1. The number of new Yellow Rails banded each month at Red Slough WMA during the period 2008–2011.

Month	Number of new Yellow Rails banded, excluding recaptures
October 2008	13
November 2008	9
December 2008	1
January 2009	1
February 2009	0
March 2009	2
October 2009	16
November 2009	10
December 2009	3
January 2010	4
February 2010	6
March 2010	14
April 2010	1
October 2010	1
November 2010	11
December 2010	4
January 2011	5
February 2011	2
March 2011	1

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CHRISTOPHER J. BUTLER, *University of Central Oklahoma, 100 North University Drive, Edmond, OK 73034* cbutler11@uco.edu

RICHARD BEAGLES, *Oklahoma Department of Wildlife Conservation, 1801 N. Lincoln, Oklahoma City, OK 73152* redhugowma@yahoo.com

TERRY STUART, *Oklahoma Department of Wildlife Conservation, 1801 N. Lincoln, Oklahoma City, OK 73152* kevrockman@yahoo.com

JILL NICHOLE STINEDURF, *1803 W Laredo Place, Broken Arrow, OK 74012* jstinedurf@gmail.com

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