WCFO Field Report

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Subject: Southwestern Willow Flycatcher Monitoring, May-September 2013

INTRODUCTION

The Southwestern Willow Flycatcher (*Empidonax traillii extimus*; hereafter flycatcher) is an obligate riparian bird that occurs patchily along rivers and streams throughout much of the southwestern U.S. from April through September. Females build small open-cup nests, which are typically placed in the fork of small-diameter vertical branches, 2-7 m above the ground. Successful flycatchers typically produce a single clutch per year, but will occasionally produce a second clutch following a successful nest. Unsuccessful flycatchers will re-nest multiple times following nest failure. The flycatcher was federally listed as endangered in 1995 due to declining populations caused primarily by the loss and modification of breeding habitat (USFWS 1995). The current flycatcher population consists of approximately 1000 known pairs, and an estimated population size of 1200 pairs (USFWS 2002). Three to 11 pairs breed along the Virgin River in St George, Utah (Day 2003).

Breeding habitat is characterized by a mosaic of relatively dense tree and shrub growth, typically in association with surface water or saturated soil, interspersed with more open areas, open water, or shorter, sparser vegetation along rivers, streams, or other wetlands. Plant species composition, vegetation height and density, and patch size vary greatly, but most occupied sites typically consist of dense vegetation in the interior of the patch and within 3-4 m of the ground (Sogge and Marshall 2000, USFWS 2002). Flycatchers historically nested primarily in willows (e.g., *Salix exigua*, *S. gooddingii*), buttonbush (*Cephalanthus occidentalis*), and seepwillow (*Baccharis salicifolia*), but now also nest in thickets dominated by tamarisk (e.g., *Tamarix ramosissima*) and Russian olive (*Elaeagnus angustifolia*). Because habitat loss and degradation are the main factors contributing to the decline of the species, the Southwestern Willow Flycatcher recovery plan emphasizes the increase and improvement of breeding habitat through restoration of native breeding habitat and the management of exotic vegetation (USFWS 2002).

Utah Division of Wildlife Resources (UDWR) continued long-term population monitoring in 2013 by conducting presence-absence surveys at known and potential breeding sites, and at planned future restoration project sites. In 2013, in coordination with the Virgin River Program, UDWR also continued monitoring breeding productivity for a sixth year. As a flycatcher surrogate species (ecologically similar and more common), Yellow Warbler (*Setophaga petechia*; hereafter warbler) breeding behavior and productivity were also monitored in 2013. Associated with nest monitoring, UDWR sampled habitat at successful and unsuccessful nest sites and at randomly selected sites within occupied habitat patches. Toward the goal of recovering the St George flycatcher population, UDWR will use these data to refine ongoing riparian habitat restoration activities to benefit Southwestern Willow Flycatchers specifically. Data were collected by UDWR personnel Robert C. Dobbs, Christian N. Edwards, and Erik T. Woodhouse.

METHODS

Population Size and Distribution
We conducted presence-absence surveys at six previously occupied breeding sites (Seegmiller Marsh, Riverside Marsh, Riverside East, Snipe Pond, River Road Bridge, and Y-Drain Marsh), at three potential breeding sites (Sand Wash, Schmutz Drain, and Target Willows), and at two

restoration project sites (Below Washington Fields Diversion and Riverside Marsh) along the Virgin River in St George, Washington Co., Utah. We followed the standardized Southwestern Willow Flycatcher survey protocol (Sogge et al. 2010), conducting one survey during each of three survey periods (15-31 May, 1-24 June, and 24 June-17 July) at sites where restoration work is not currently planned. At sites where restoration projects are planned, we conducted one survey during the first survey period and two surveys during each of the latter two survey periods. Prior to attempting surveys we used aerial photographs to delineate survey areas and to identify survey routes providing adequate coverage of the area. During surveys we walked survey routes, stopping every 20-30 m. At each stop we first looked and listened for flycatchers for 1-2 min, after which, if a flycatcher was not detected, we broadcasted a 20 sec recording of a flycatcher song, and then again looked and listened for responding flycatchers. Total number of adult flycatchers was recorded.

Reproductive Success

We attempted to locate and monitor all active flycatcher and warbler nests throughout the 2013 breeding season following standard methods (Martin et al. 1997, Rourke et al. 1999). We searched for nests primarily by observing adult behavior and systematically searching vegetation. We generally checked nests every three to four days, but increased nest check frequency to every one to two days in anticipation of nest stage transitions. We monitored nests from a distance when possible, but approached nests closely to observe nest contents and thus determine nest stage transition dates, clutch size, hatching success, and nest fate.

Spot Mapping and Relative Abundance

We attempted to locate and monitor all flycatcher and warbler territories at six previously occupied flycatcher breeding sites (see above), one potential breeding site (Schmutz Drain), and one restoration project site (Riverside Marsh). From mid-May to early July each site was visited four to nine times, using aerial photographs to map the movement and activity of singing males. Presence of females, active nests, and fledglings were also recorded. Relative abundance values equaled the total number of adult birds per unit area of each site.

Breeding Habitat and Nest Site Characteristics

During mid-late September, following flycatcher departure from breeding territories, we sampled vegetation associated with nests active in 2013. We used standard methods (Martin et al. 1997) to quantify canopy cover, canopy height, foliage height density, and shrub-sapling stem density within a 5 m radius plot, and tree density within an 11.3-m radius plot centered on nest sites (use plots) and randomly selected sites (nonuse plots). We also measured distance to nearest canopy gap, distance to nearest water, and other nest site characteristics (e.g., nest height, nest substrate height).

Banding and Re-sighting

Toward the goal of understanding flycatcher demography, SWCA Environmental Consultants (Flagstaff, Arizona; hereafter SWCA) maintains a long-term banding program throughout much of the Lower Colorado River Recovery Unit, including the St George study area (McLeod and Koronkiewicz 2009). We thus attempted to re-sight color-banded flycatchers returning or dispersing to breeding sites along the Virgin River throughout the 2013 breeding season. Additionally, in 2013, SWCA personnel placed federal metal and plastic color bands on eight to 10 day old flycatcher nestlings in the St George study area.

RESULTS AND DISCUSSION

Population Size and Distribution
Seven flycatcher territories, distributed among three breeding sites in the St George study area (Riverside Marsh, Riverside East, and Y-Drain Marsh), were occupied in 2013 (Figure 1). This represented an ongoing decline in the number of active territories since 2008-2009, when effects of the Tamarisk Leaf Beetle (*Diorhabda carinulata)* were first apparent at flycatcher breeding areas. The overall decline has been driven primarily by sharp declines at Riverside Marsh and Seegmiller Marsh, which are dominated by tamarisk (e.g., *Tamarix ramosissima*). This overall decline has been offset to some degree by increases at sites which have a more mixed tamarisk and coyote willow habitat such as, Riverside East, Snipe Pond, and Y-Drain Marsh. However, in 2013, no breeding flycatchers were observed at Snipe Pond (Figure 1). Although the number of female flycatchers has remained constant since 2011 at Riverside Marsh and Riverside East, and has steadily increased at Y-Drain Marsh, the total number of females observed in 2013 represents the lowest number during the six years of breeding monitoring (Figure 2).

Reproductive Success
We monitored a total of 10 active nests (i.e., with confirmed flycatcher eggs or nestlings) in 2013 (Table 1). We located one additional nest that was constructed and immediately abandoned by the female prior to confirmation of egg-laying; this nest was not included in nest success calculations or subsequent monitoring activities (e.g. vegetation sampling). Seven females had eight successful nests, producing a total of 21 fledglings (Table 1). Five females were successful with their first nest attempt and two were successful with renest attempts following nest failure. One female, following a successful nest, attempted and successfully fledged a second nest.

Both of the unsuccessful nest attempts failed due to nest predation. No nests failed due to parasitism by Brown-headed Cowbirds (*Molothrus ater*). However, UDWR personnel removed a cowbird egg from an active flycatcher nest and replaced it with an infertile cowbird egg which potentially prevented a flycatcher nest failure due to parasitism. Average daily survival rate of flycatcher nests in 2013 increased dramatically from previous years (2009-2012) and represents the highest survival rate during the six years of breeding monitoring (Figure 3). Based on these data, there was a 74.6 % probability of a flycatcher nest surviving to fledge at least one young flycatcher (Mayfield survival probability) (Figure 4). Apparent nest success was 80.0 % (active nests which successfully fledged at least one young flycatcher). Both Mayfield survival probability (3.7 %) and apparent nest success (12.5 %) for warblers in 2103 were drastically lower than flycatchers.

Spot Mapping and Relative Abundance
Data show that warblers occupy habitat similar to flycatchers along the Virgin River in St George, Utah (Table 2). At all sites surveyed in 2013 the relative abundance and total number of warblers was greater than flycatchers. Data also show that throughout the breeding season at two breeding sites (Riverside Marsh and Y-Drain Marsh) the number of warblers steadily decreased as the number of flycatchers steadily increased (Figures 5, 6).

Nest Site Characteristics and Breeding Habitat
In 2013, flycatchers built nine active nests in tamarisk trees and one in coyote willow. The use of tamarisk as a nest substrate has not drastically changed among the six years of this study (Figure 7). However, use of willow increased dramatically between the 2009 and 2010-2012 breeding seasons which was followed by a dramatic decrease in 2013. The increase from 2009 to 2012 is likely a result of flycatchers shifting from tamarisk-dominated breeding areas to more mixed tamarisk-willow breeding areas due to the negative effects of the tamarisk leaf beetle on nest

microhabitat. The decrease in willow use observed in 2013 is likely a result of concealment from predators that tamarisk provide because they are structurally more complex and collect more debris than willow. Proportionately, the use of tamarisk as a nest substrate has drastically changed over the six years of monitoring (Figure 8). During the 2008 breeding season 90.0 % of flycatcher nests were placed in tamarisk. A steady decrease was observed over the next four years and by 2012, <50.0 % were found in tamarisk trees. However, in 2013 we observed again that 90.0 % of all flycatcher nests were built in tamarisk.

It is assumed that flycatchers select tamarisk over willow substrates to decrease the risk of nest failure from predation and increase overall nesting productivity. The greatest nesting success occurred during the 2008 and 2013 breeding seasons which coincide with the years of highest tamarisk use by nesting flycatchers (Figure 8). In 2009, 80.0 % of nests were located in tamarisk; however, beetle-induced tamarisk defoliation occurred during peak flycatcher breeding and negatively affected hatching success be exposing active nests to predators and extreme abiotic conditions (nest success in 2009 was 13.0 %, compared to 70.0 % in 2008). An increased use of willow substrates by flycatchers was observed from 2010 to 2012, during which tamarisk defoliation occurred after peak flycatcher breeding. In 2013, tamarisk defoliation again occurred after breeding season and we observed a dramatic shift of flycatcher nests back to tamarisk substrates. These data suggest that the greatest threat to successful nests for flycatchers in the St George, Utah study area is depredation, and female flycatchers prefer to nest in tamarisks which better conceal nests from predators.

Banding and Re-sighting

SWCA personnel banded 13 flycatcher nestlings in the St George study area in 2013 (Table 3). Ten nestlings from three nests were banded at Y-Drain Marsh and three nestlings from one nest were banded at Riverside Marsh. Two adult flycatchers were observed with bands in 2013. However, neither was confirmed as previously occupying the Virgin River in St George, Utah.

LITERATURE CITED

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Table 1. Number of active nests, nests parasitized by Brown-headed Cowbirds, nests failed, nests successful, and total fledglings produced by Southwestern Willow Flycatchers at previously occupied breeding sites along the Virgin River in St George, Washington Co., Utah in 2013.

Site	Active nests[1]	Parasitized nests	Failed nests	Successful nests[2]	Total fledglings
Seegmiller Marsh	0	0	0	0	0
Y-Drain Marsh	7	2	2	5	12
Riverside Marsh	2	0	0	2	6
River Road Bridge	0	0	0	0	0
Riverside East	1	0	0	1	3
Snipe Pond	0	0	0	0	0
All sites combined	**10**	**2**	**2**	**8**	**21**

[1] Nests with confirmed Southwestern Willow Flycatcher eggs or nestlings.
[2] Nests producing ≥ 1 fledgling.

Table 2. Number of adult Southwestern Willow Flycatcher (first value) and Yellow Warbler (second value) observed from 15 May to 12 July (Date 1-8) at breeding and potential breeding sites along the Virgin River in St George, Washington Co., Utah in 2013. Breeding site abbreviations refer to Seegmiller Marsh (SM), Riverside Marsh (RS), Riverside East (RSE), Snipe Pond (SP), River Road Bridge (RRB), Y-Drain Marsh (YD), Schmutz Drain (SD), and Riverside Marsh Restoration (RSR).

Site	Area (acres)	Date 1	Date 2	Date 3	Date 4	Date 5	Date 6	Date 7	Date 8
SM	10.4	0 / 5	0 / 3	0 / 5	0 / 4	0 / 4	-	-	-
RS	4.5	1 / 10	2 / 9	2 / 7	2 / 6	4 / 5	5 / 6	5 / 3	5 / 5
RSE	4.0	1 / 3	3 / 3	2 / 4	2 / 4	-	-	-	-
SP	6.2	0 / 8	0 / 10	1 / 9	3 / 5	1 / 7	1 / 6	0 / 7	0 / 4
RRB	3.0	0 / 6	0 / 6	0 / 7	0 / 7	0 / 6	0 / 6	0 / 6	0 / 0
YD	3.7	2 / 11	2 / 13	2 / 14	4 / 12	5 / 13	5 / 12	8 / 9	8 / 8
SD	5.2	0 / 11	0 / 15	0 / 17	0 / 17	0 / 18	0 / 18	0 / 14	0 / 11
RSR	12.5	0 / 11	0 / 9	0 / 10	0 / 10	-	-	-	-

Table 3. Southwestern Willow Flycatchers banded at nests along the Virgin River in St George, Washington Co., Utah in 2013.

Site	Nest #	Color-band combination[1]	Federal-band number
Riverside Marsh	3A	TQ:DGD	2540-58124
Riverside Marsh	3A	TQ:GKG	2540-58125
Riverside Marsh	3A	TQ:ORO	2540-58126
Y-Drain Marsh	1B	RG:VI	2660-23007
Y-Drain Marsh	1B	WY:VI	2660-23008
Y-Drain Marsh	1B	DWD:VI	2660-23009
Y-Drain Marsh	2B	VI:YDY	2660-23010
Y-Drain Marsh	2B	RYR:VI	2660-23011
Y-Drain Marsh	2B	VI:YDY	2660-23013
Y-Drain Marsh	2B	VYV:VI	2660-23015
Y-Drain Marsh	3A	RBR:XX	2590-53159
Y-Drain Marsh	3A	GYG:XX	2590-53160
Y-Drain Marsh	3A	KWK:XX	2590-53174

[1] Color-band codes: TQ = turquoise federal band, VI = violet federal band, XX = standard silver federal band, G = green, R = red, O = orange, Y = yellow, G = green, D = dark blue, B = light blue, V = violet, W = white, K = black, Z = gold. Color combinations are read as the bird's left leg and right leg, top to bottom.

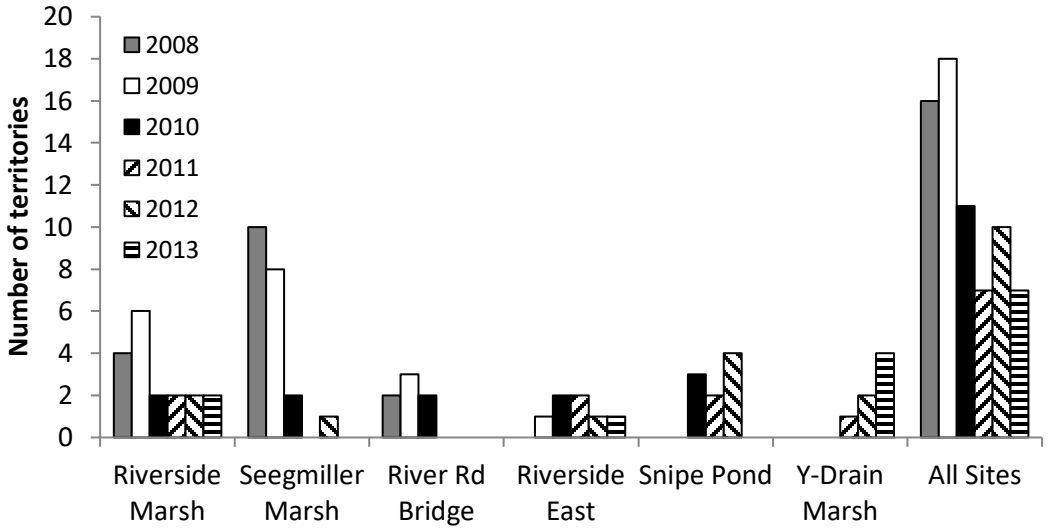

Figure 1. Number of Southwestern Willow Flycatcher territories (males exhibiting territorial behavior beyond 31 May) among years (2008-2013) at six breeding sites, and overall, along the Virgin River in St George, Washington Co., Utah.

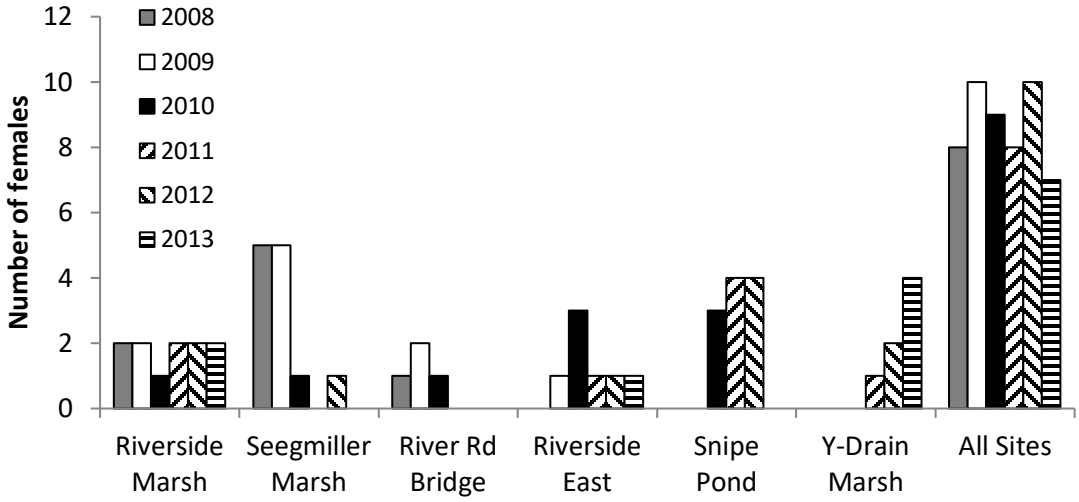

Figure 2. Number of confirmed Southwestern Willow Flycatcher breeding pairs among years (2008-2013) at six breeding sites, and overall, along the Virgin River in St George, Washington Co., Utah.

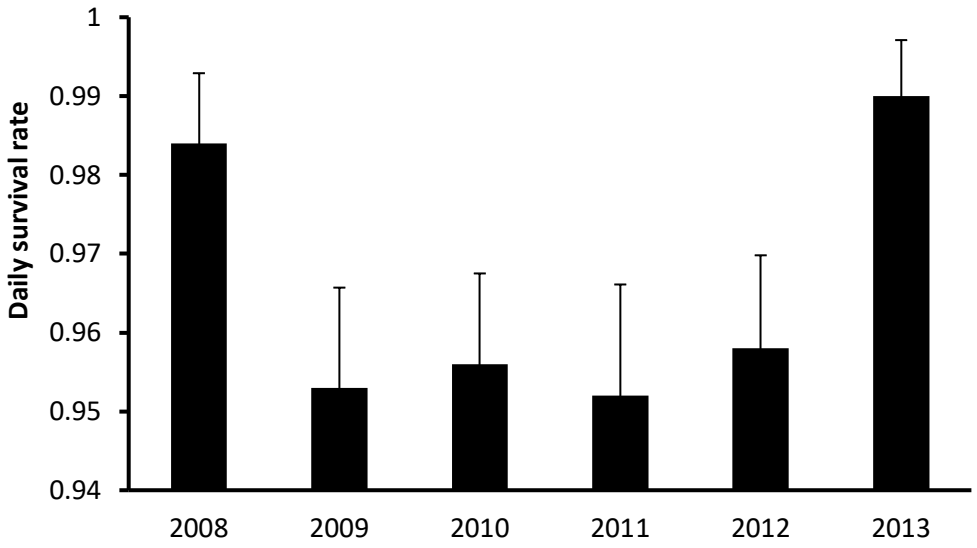

Figure 3. Mean (± SE) daily survival rate of active Southwestern Willow Flycatcher nests along the Virgin River in St George, Washington Co., Utah, 2008-2013.

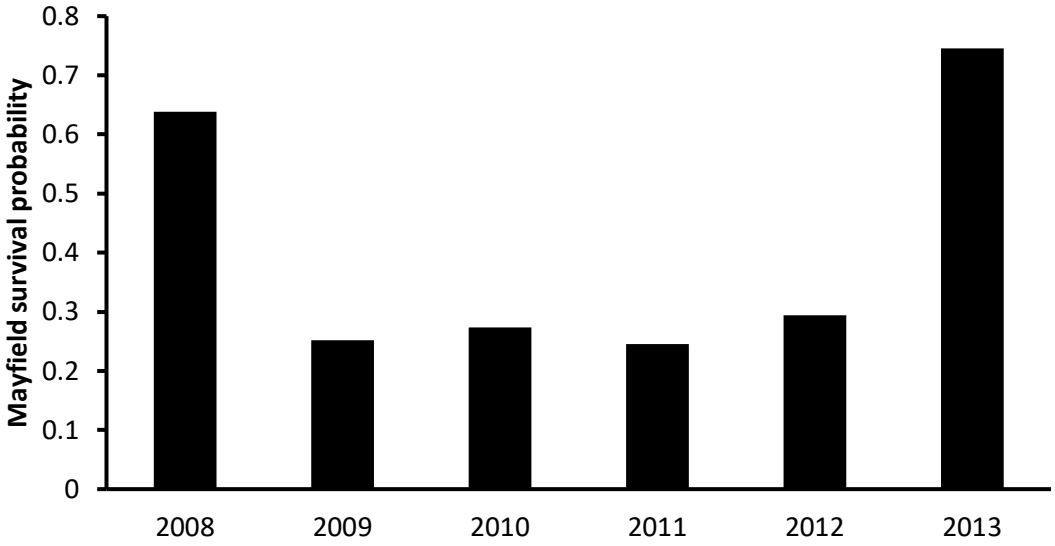

Figure 4. Mayfield survival probability of active Southwestern Willow Flycatcher nests along the Virgin River in St George, Washington Co., Utah, 2008-2013.

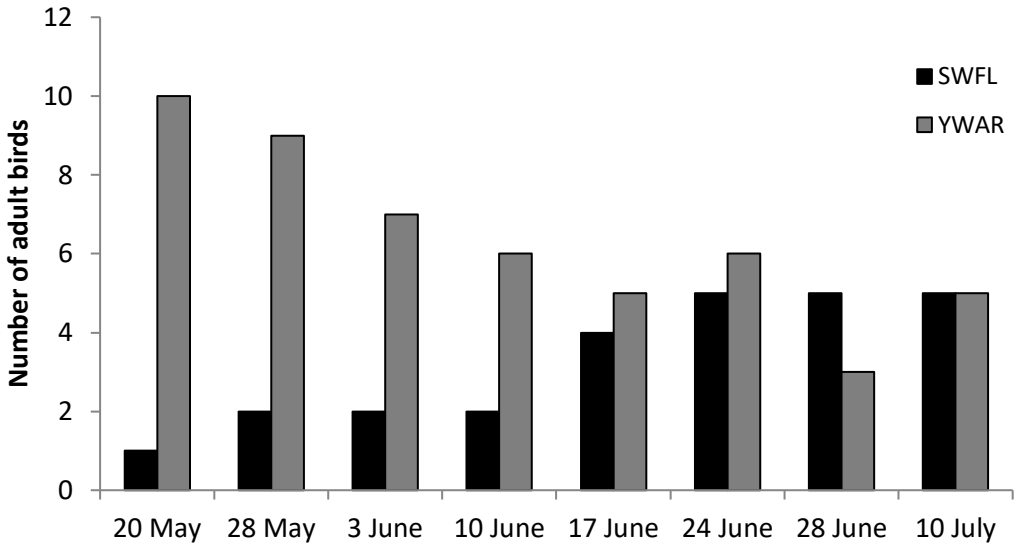

Figure 5. Number of adult Southwestern Willow Flycatchers (SWFL) and Yellow Warblers (YWAR) at Riverside Marsh during the 2013 breeding season along the Virgin River in St George, Washington Co., Utah.

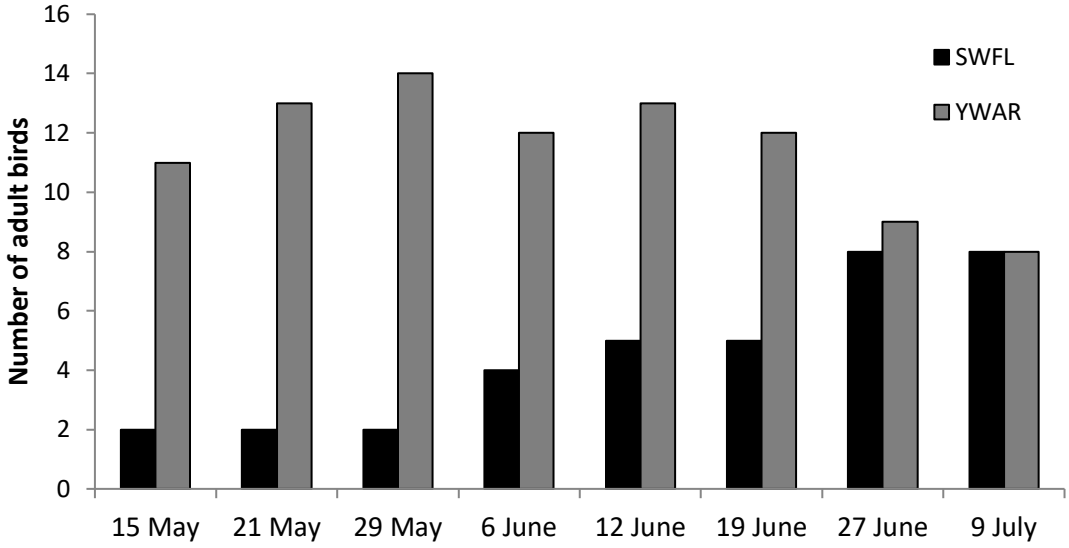

Figure 6. Number of adult Southwestern Willow Flycatchers (SWFL) and Yellow Warblers (YWAR) at Y-Drain Marsh during the 2013 breeding season along the Virgin River in St George, Washington Co., Utah.

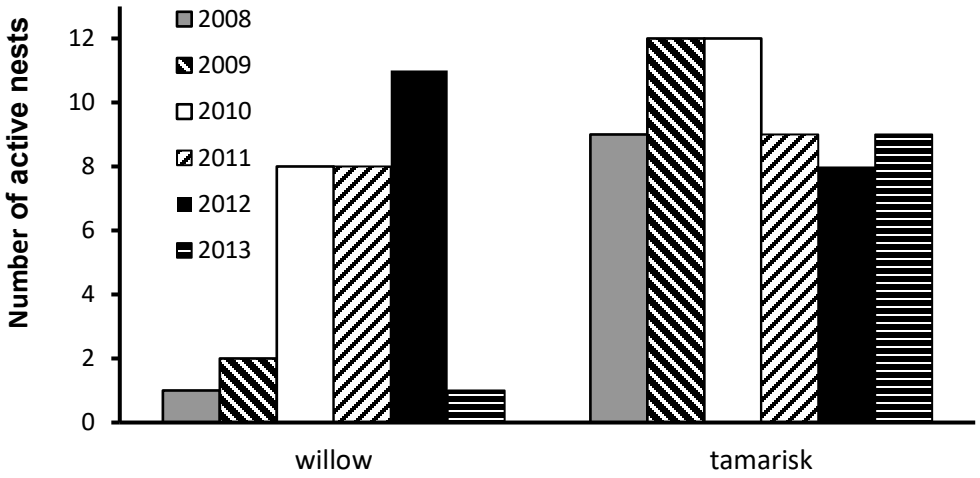

Figure 7. Number of Southwestern Willow Flycatcher nests built in coyote willow and tamarisk among years (2008-2013) along the Virgin River in St George, Washington Co., Utah.

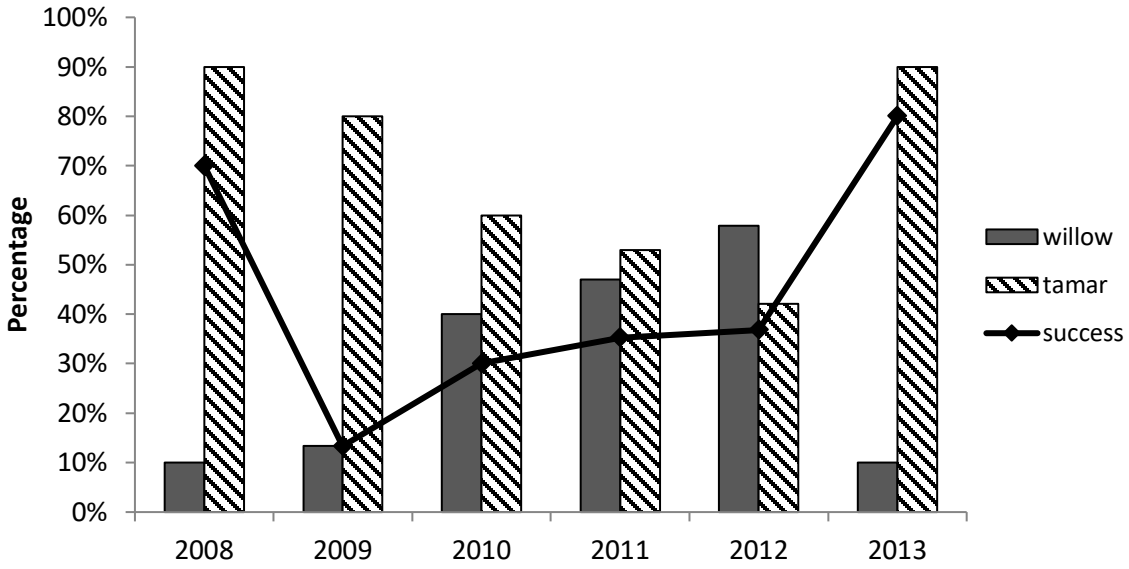

Figure 8. Proportion of Southwestern Willow Flycatcher nests placed in tamarisk and coyote willow substrates and apparent nest success from 2008-2013 along the Virgin River in St George, Washington Co., Utah.