WCFO Field Report

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Subject: Southwestern Willow Flycatcher Monitoring, May-September 2014

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 2014 by conducting presence-absence surveys at known and potential breeding sites, and at planned future restoration project sites. In 2014, in coordination with the Virgin River Program, UDWR also continued monitoring breeding productivity for a seventh 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 2014. 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 Christian N. Edwards and Erik T. Woodhouse.

METHODS

Population Size and Distribution
We conducted presence-absence surveys at six previously occupied breeding sites (Riverside Marsh, Riverside East, River Road Bridge, Seegmiller Marsh, Y-Drain Marsh, and Snipe Pond), at two potential breeding sites (Schmutz Drain and Mad Dog Pond), and at one restoration project

site (Riverside Marsh) along the Virgin River in St George, Washington Co., Utah. We also conducted surveys at a potential breeding site on Sand Wash and at a potential breeding site near the Santa Clara River and Virgin River confluence (Dixie Center Willows). 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 currently occupied breeding sites. At potential breeding sites, 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 2014 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. During appropriate nest stages (i.e. laying or incubating) and if nest location allowed, we used a six foot stepladder and replaced or addled Brown-headed Cowbird (*Molothrus ater*) eggs from active flycatcher nests.

Breeding Habitat and Nest Site Characteristics
During mid-late September, following flycatcher departure from breeding territories, we sampled vegetation associated with nests active in 2014. 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 2014 breeding season.

RESULTS AND DISCUSSION

Population Size and Distribution
Thirteen flycatcher territories, distributed among five breeding sites in the St George study area (Riverside Marsh, Schmutz Drain, Seegmiller Marsh, Y-Drain Marsh, and Snipe Pond), were occupied in 2014 (Figure 1). This represented the highest value since 2009 and a possible trend shift from the 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. Increases in 2014 were observed most prominently at Riverside Marsh, middle Seegmiller Marsh, and Schmutz Drain (Figure 1), all of which contain a mixed tamarisk and coyote willow

habitat structure and standing water. Twelve female flycatchers were observed and monitored through the 2014 breeding season. This represented the highest number of female flycatchers ever recorded in the St George, Utah study area (Figure 2). From 2013, the number of females at Riverside Marsh doubled (two to four) and increased from zero to four at Seegmiller Marsh.

Reproductive Success

We monitored a total of 16 active nests (i.e., with confirmed flycatcher eggs or nestlings) in 2014 (Table 1). We located nine additional nest that were constructed or partially constructed and abandoned by the female prior to confirmation of egg-laying; these nests were not included in nest success calculations or subsequent monitoring activities (e.g. vegetation sampling). Twelve females had nine successful nests, producing a total of 18 fledglings (Table 1). Three females were successful with their first nest attempt and five were successful with renest attempts following nest failure. One female, following a successful nest, attempted and successfully fledged a second nest.

Four of the seven unsuccessful nest attempts (57 %) failed due to nest predation. No predator was identified. Ten of the 16 total active nests (63 %) were parasitized by Brown-headed Cowbirds; however, only three nests failed due to parasitism (Table 2). UDWR personnel removed and replaced or addled cowbird eggs from five active flycatcher nests which reduced flycatcher nest failures due to parasitism and increased overall reproductive success. Average daily survival rate of flycatcher nests in 2014 decreased from 2013 but remained high compared to previous years (2009-2012) and represents the second highest survival rate during the past six years of breeding monitoring (Figure 3). Based on these data, there was a 58 % probability of a flycatcher nest surviving to fledge at least one young flycatcher (Mayfield survival probability) (Figure 4). Apparent nest success was 56 % (active nests which successfully fledged at least one young flycatcher). Mayfield survival probability for Yellow Warblers in 2014 was 31 % and apparent nest success was 55 %. This represents a dramatic increase in reproductive success for warblers from 2013 values which were 4 % and 13 % respectively.

Nest Site Characteristics and Breeding Habitat

In 2014, flycatchers built 11 active nests in tamarisk trees and five in coyote willow. The use of tamarisk as a nest substrate has not drastically changed among the seven years of this study (Figure 5). However, use of willow has been inconsistent with significant changes between years (Figure 5). The number of nests placed in willow increased dramatically between the 2009 and 2010-2012 breeding seasons and 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 willow-dominated breeding areas (Figure 6) 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 seven years of monitoring (Figure 7). During the 2008 breeding season 90 % of flycatcher nests were placed in tamarisk. A steady decrease was observed over the next four years and by 2012, <50 % were found in tamarisk trees. In 2014, 11 of 16 nests (69 %) were placed in tamarisk compared to nine of 10 nests (90 %) in 2013.

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 7). In 2009, 80 % 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 %, compared to 70 % 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 and 2014, tamarisk defoliation again occurred after breeding season and we observed a 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

No flycatchers were banded in the St George study area in 2014. However, we re-sighted 10 breeding adult flycatchers with bands. Six were confirmed as occupying the Virgin River in St George, Utah in 2013, four of which were banded by SWCA personnel in St George in 2013.

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 2014.

Site	Active nests[1]	Parasitized nests	Failed nests	Successful nests[2]	Total fledglings
Riverside Marsh	6	4	2	4	9
Riverside East	0	0	0	0	0
River Road Bridge	0	0	0	0	0
Seegmiller Marsh	6	4	3	3	4
Y-Drain Marsh	3	1	1	2	5
Snipe Pond	1	1	1	0	0
All sites combined	**16**	**10**	**7**	**9**	**18**

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

Table 2. Active Southwestern Willow Flycatcher nests which were parasitized by Brown-headed Cowbirds along the Virgin River in St George, Washington Co., Utah in 2014. Fate and cause are referring to the final outcome of the flycatcher nest. Nest ID codes represent year, breeding site (R=Riverside Marsh, SM=Seegmiller Marsh, YD=Y-Drain Marsh, SP=Snipe Pond), territory number, and nesting attempt.

Nest ID	Fate	Cause	Cowbird eggs	Cowbird egg fate
14R1B	Success	-	2	Replaced by UDWR / Addled by UDWR
14R11A	Success	-	1	Depredated
14R2D	Success	-	2	Buried by host / Replaced by UDWR
14R3AA	Fail	Cowbird	1	Fledged
14SM1A	Success	-	1	Depredated
14SM2B	Fail	Predation	1	Replaced by UDWR and depredated
14SM3A	Fail	Cowbird	1	Abandoned by host
14SM3B	Fail	Predation	2	Replaced by UDWR and depredated
14YD3A	Fail	Cowbird	1	Abandoned by host
14SP1A	Fail	Predation	1	Addled and finally removed by UDWR

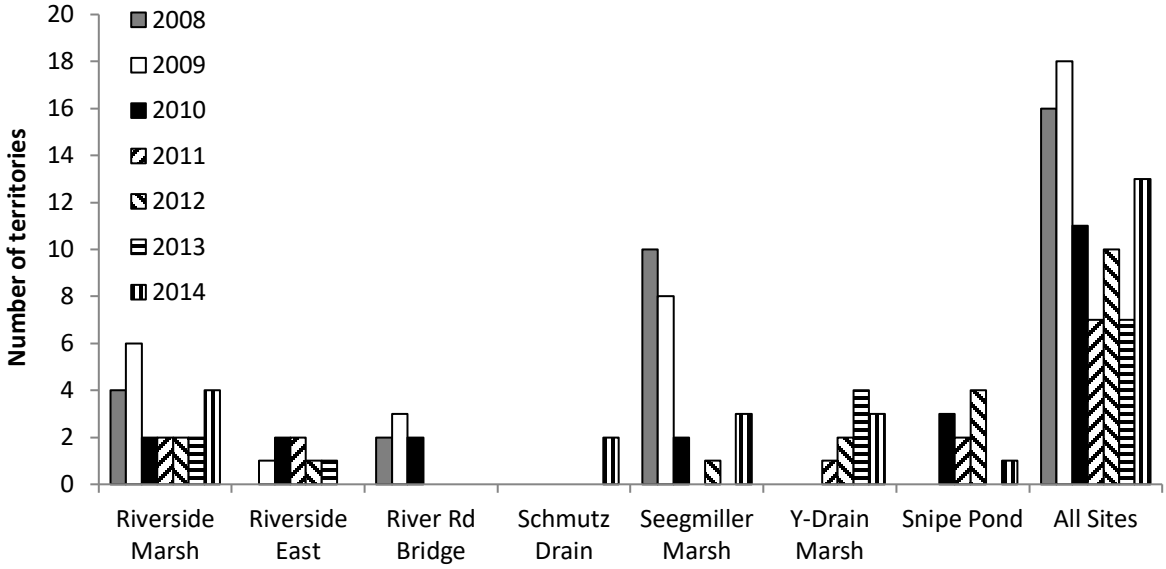

Figure 1. Number of Southwestern Willow Flycatcher territories (males exhibiting territorial behavior beyond 31 May) among years (2008-2014) at seven breeding sites, and overall, along the Virgin River in St George, Washington Co., Utah.

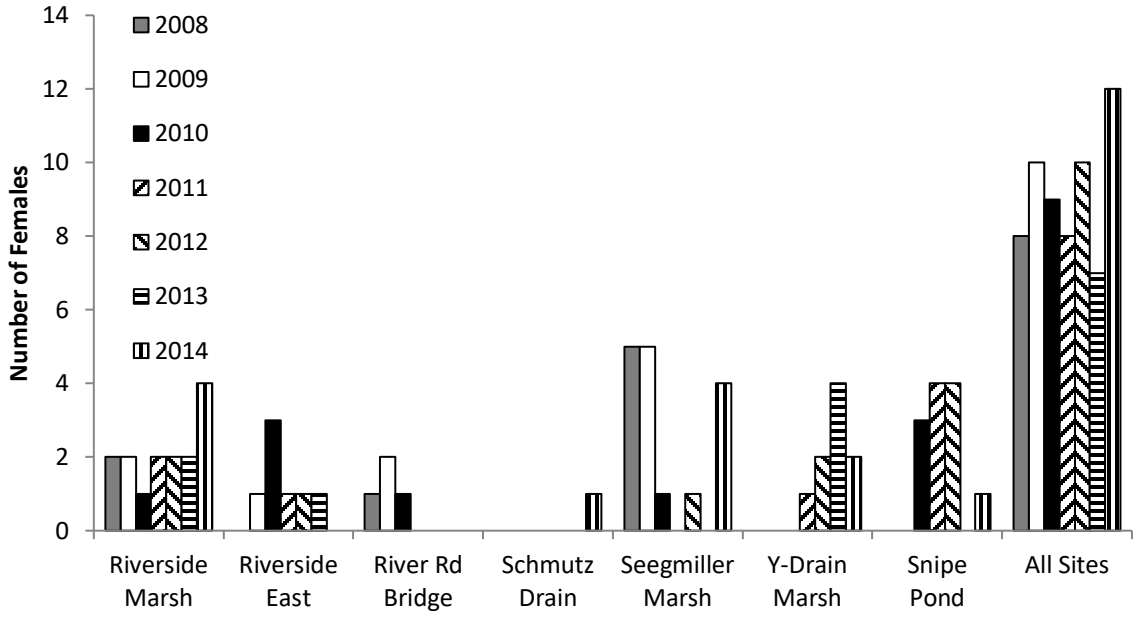

Figure 2. Number of confirmed Southwestern Willow Flycatcher breeding pairs among years (2008-2014) at seven breeding sites, and overall, along the Virgin River in St George, Washington Co., Utah.

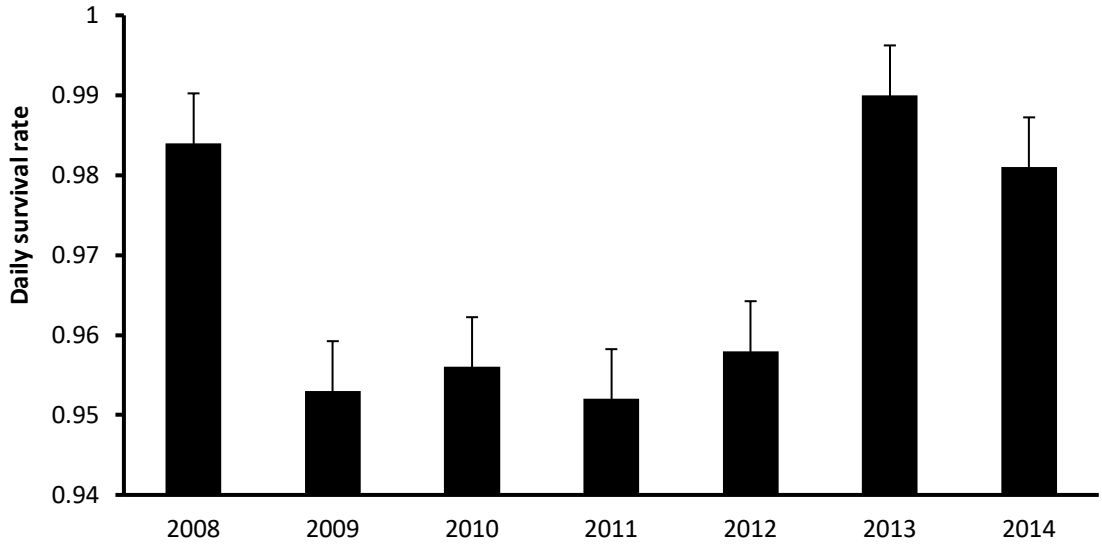

Figure 3. Mean (± SE) daily survival rate of active Southwestern Willow Flycatcher nests along the Virgin River in St George, Washington Co., Utah, 2008-2014.

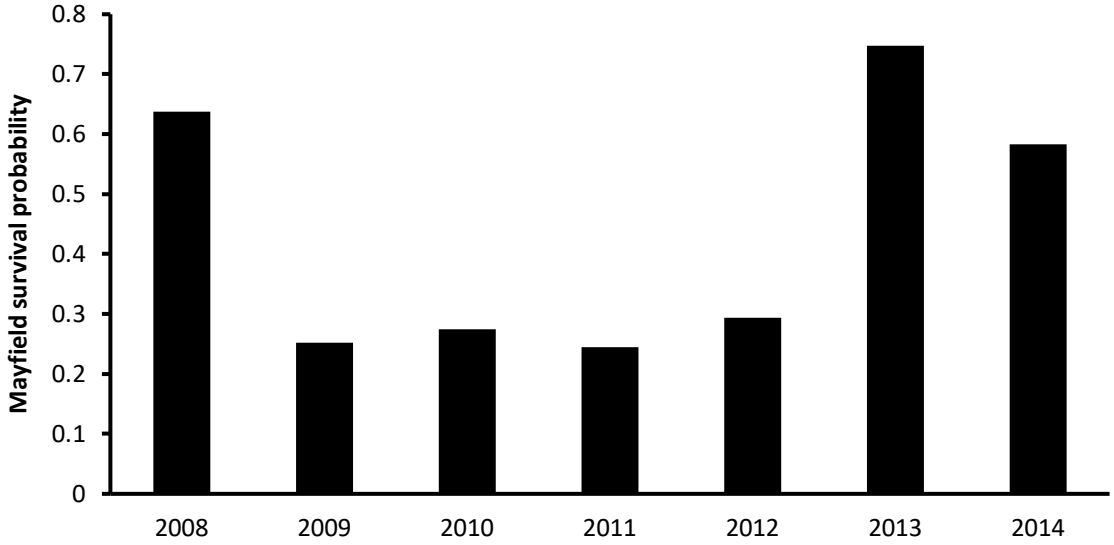

Figure 4. Mayfield survival probability of active Southwestern Willow Flycatcher nests along the Virgin River in St George, Washington Co., Utah, 2008-2014.

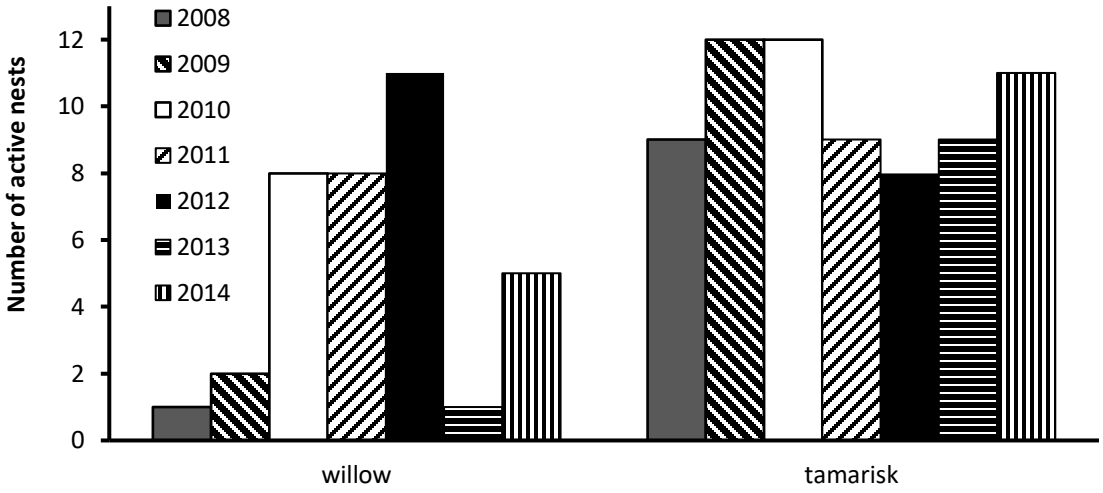

Figure 5. Number of Southwestern Willow Flycatcher nests built in coyote willow and tamarisk among years (2008-2014) along the Virgin River in St George, Washington Co., Utah.

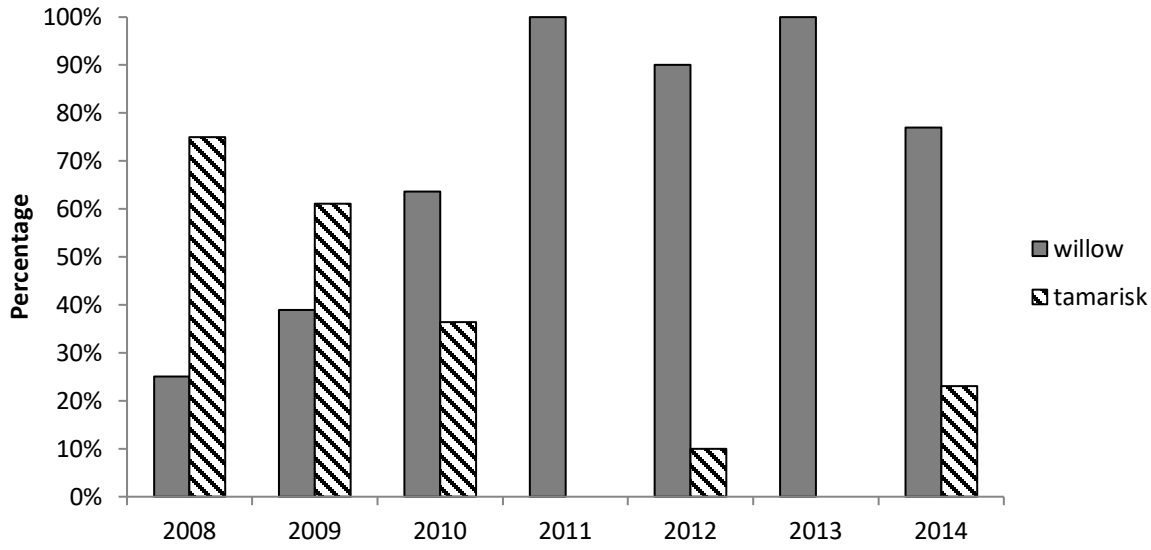

Figure 6. Proportion of Southwestern Willow Flycatcher territories in native (willow) and non-native (tamarisk) dominated habitat from 2008-2014 along the Virgin River in St George, Washington Co., Utah.

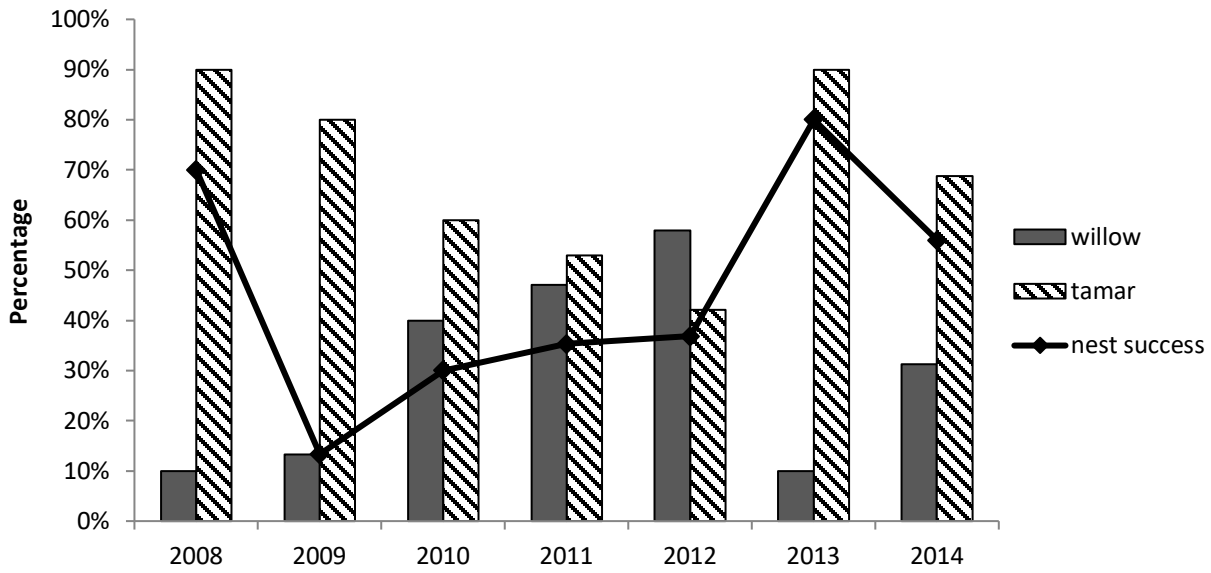

Figure 7. Proportion of Southwestern Willow Flycatcher nests placed in tamarisk and coyote willow substrates and apparent nest success from 2008-2014 along the Virgin River in St George, Washington Co., Utah.