WCFO Field Report

From: Christian Edwards and Erik Woodhouse
Date: May 6, 2021
Subject: Southwestern Willow Flycatcher Monitoring, May-August 2021

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). Typically, three to 11 pairs breed along the Virgin River in St George, Utah (Day 2003, Edwards et al. 2019).

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 2021 by conducting presence-absence surveys at known and potential breeding sites, including restoration project sites. In 2021, in coordination with the Virgin River Program, UDWR also continued monitoring breeding productivity for a fourteenth year. Associated with nest monitoring, UDWR collected habitat data at successful and unsuccessful nest 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. All data were collected by UDWR personnel Christian N. Edwards and Erik T. Woodhouse.

METHODS

Population Size and Distribution
We conducted presence-absence surveys at historic breeding sites, previously occupied breeding sites, potential breeding sites, and currently occupied sites along the Virgin River in St George, Washington Co., Utah (Table 1). We also conducted surveys at a potential breeding site on Sand Wash and at a potential breeding site on the Santa Clara River near the Virgin River confluence. 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. Recording was not broadcasted during surveys conducted at currently occupied breeding sites.

Reproductive Success

We attempted to locate and monitor all active flycatcher nests throughout the 2021 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.

Breeding Habitat and Nest Site Characteristics

During the 2008-2017 breeding seasons, most commonly in mid-late August, following flycatcher departure from breeding territories, we sampled vegetation associated with active nests (Edwards et al. 2019). 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). Additionally, we measured distance to habitat edge, distance to nearest water, and other nest site characteristics (e.g., nest height). We did not collect these data during 2021; however, the vegetation data were used for comparison and discussion in this report.

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 2021 breeding season.

RESULTS AND DISCUSSION

Population Size and Distribution

Nine flycatcher territories, distributed among four breeding sites in the St George study area (Riverside Marsh (n=1), Riverside Restoration (n=3), Seegmiller Marsh (n=3), and Brinton Pond (n=2), Figure 1) were observed in 2021 (Figure 2). One of the three males at the Riverside Marsh Restoration site was unpaired but maintained a territory throughout the breeding season. Additionally, unpaired males was detected multiple times throughout the breeding season at Riverside Marsh (n=1) and Snipe Pond (n=1). During one breeding survey period, a male flycatcher was observed exhibiting territorial behavior (i.e. singing) at the Santa Clara Confluence site and one was observed at Brinton Pond. These birds were classified as migrants and were not included in our total number of breeding males. A total of six female flycatchers were observed at three breeding sites during 2021 (Figure 3), representing the second lowest number of breeding

females observed in the St George study area (2008-2021). All females were paired with one male. No flycatchers were observed in polygynous relationships during the 2021 breeding season.

The number of flycatcher territories in 2021 (n=9) increased from 2020 (n=7) and represented the highest number since 2018 (Figure 4). In 2021, the number of breeding females (n=6) increased from 2020 (n=5) but continued a decline from the historic high observed in 2018 (n=16), and remained lower than the average number of females (n=9.1) observed along the Virgin River in St George, Utah (Figure 4).

At Riverside Marsh and Brinton Pond, the number of territorial males did not change in 2021 compared to 2020. At Seegmiller Marsh the number of territorial males decreased by one; however, three territorial males were observed at the Riverside Marsh Restoration site, including two breeding females. This represents the first documented breeding of flycatchers at this site. This is especially noteworthy because this was a previously unoccupied site dominated by tamarisk and Russian olive. Between 2011 and 2013, extensive habitat restoration work was conducted by UDWR personnel and partners. Enhancement work included selectively removing tamarisk trees, replanting willow stems, and redirecting water flow into habitat.

In 2021, half of the nesting females (n=3) and three of the nine breeding males (33 %) were located within Seegmiller Marsh, suggesting that Seegmiller Marsh remains a population stronghold for nesting flycatchers in the St George study area. Also in 2021, the number of territorial males (n=3) at the Riverside Marsh Restoration site matched the number of males at Seegmiller Marsh. These data suggest that flycatchers breeding along the Virgin River exhibit site fidelity (e.g. Seegmiller Marsh), however, they will occupy additional sites as suitable breeding habitat patches becomes available (e.g. Riverside Marsh Restoration). Our data also suggest that the population size of flycatchers in the St George study area remains relatively low and stable but is variable both spatially and temporally.

The cause(s) of the continued historic low number of breeding female flycatchers is currently unknown. While much of the western U.S., including St George, Utah has experienced several years of extreme drought, the off-channel wetland habitats have remained relatively stable and unaltered due to irrigation return flow and municipal runoff. Although climate change remains a serious threat to all ecosystems, including the Virgin River drainage and riparian habitat, we have observed variability in breeding flycatchers in the past and we assume numbers will rebound as we continue our monitoring and habitat restoration efforts.

On May 26, 2021, a human caused fire was ignited at Brinton Pond and burned approximately six acres of riparian habitat. A small portion of large trees and understory was lost due to the fire and subsequent clearing of debris. Although one male vacated the site following the burn, the nesting pair remained and resumed nesting activity.

Reproductive Success

We monitored a total of eight active nests (i.e., with confirmed flycatcher eggs or nestlings) in 2021 (Table 2, Figure 5). We located three additional flycatcher nests that were partially constructed and abandoned by the female prior to confirmation of egg-laying (i.e. inactive); these nests were not included in nest success calculations or subsequent monitoring activities. Three of six females had successful nests producing a total of seven fledglings (Table 2, Figure 5), this represents the lowest number of fledglings since 2009. Of the successful nests, one was a first nest attempt and two were re-nest attempts following a first nest failure. Three females (50.0 %) attempted to re-nest following a nest failure.

The one female observed at Brinton Pond attempted to build three nests over the course of the breeding season. The first and third nests were abandoned prior to eggs being laid (i.e. inactive). The second nest was active with three flycatcher eggs and when first located contained a cowbird egg which was partially buried in the nest cup. However, a second cowbird egg was laid in the nest which corresponded with the disappearance of two flycatcher eggs and the abandonment by the female. The third nest was also parasitized by cowbirds and abandoned. Following their third failed attempt and continual harassment by cowbirds the pair left the site between July 7 and 8 and was not detected again.

Four of the five unsuccessful nest attempts (80.0 %) failed due to cowbird brood parasitism (Figure 6). This represents the highest percentage of nest failure due to cowbird parasitism during the duration of our study. Brood parasitism of flycatcher nests by cowbirds represents an important factor contributing to reduced nest success, productivity, and fecundity, both range-wide and along the Virgin River in St George, Utah. Cowbird control programs, intended to reduce the numbers of breeding adult cowbirds via trapping and euthanasia, have proven to be effective tools in the management of endangered bird species, including flycatchers (Whitfield et al. 1999, Kus and Whitfield 2005). In 2013 we initiated a pilot study to investigate the effectiveness of cowbird control in the St George study area. Over eight years of management (2013-2020) our data confirmed that trapping and removing adult cowbirds can increase the nesting success and overall productivity of breeding riparian bird species (i.e. flycatchers; Edwards et al. 2019). However, our cowbird trapping efforts did not occur during the 2021 breeding season. It is possible that our lack of trapping resulted in the high brood parasitism rates (62.5 %) and nest failures due to cowbirds (80.0 %). We strongly recommend the cowbird management practices (i.e. adult trapping) recommence in the 2022 breeding season.

One nest failed due to predation by an unknown predator. The depredation event occurred during the egg-laying stage and the nest remained fully intact. No video camera was in place at the nest. However, in 2020, video recording at Seegmiller Marsh captured footage of a Greater Roadrunner (*Geococcyx californianus*) at an active flycatcher nest. It did not remove contents from the nest but did damage one egg. Additional video footage showed the female flycatcher removing the damaged egg from her nest following the departure of the roadrunner. Additionally, a video camera recording of an active flycatcher nest at Y-Drain Marsh in 2015 captured footage of an adult Cooper's Hawk (*Accipiter cooperii*) perching next to and observing a flycatcher nest containing eggs only. The hawk left the nest unharmed but we assume that both the Cooper's Hawk and Greater Roadrunner remain potential nest predators, especially if there are nestlings present.

In 2021, average daily survival rate (DSR) for a flycatcher nest was 96.9 % and there was a 40.9% probability of a flycatcher nest surviving to fledge at least one young flycatcher (Mayfield survival probability, Figure 7). In 2021, apparent nest success (active nests which successfully fledged at least one young flycatcher) was 37.5 %. Nesting success rates observed during the 2021 breeding season were lower than 2020 and below the 14-year apparent nest success average for the St George study area (47.5 %).

Nest Site Characteristics and Breeding Habitat

In 2021, flycatchers built six of eight nests (75.0 %) in tamarisk trees. At Brinton Pond, one nest was placed in a Velvet ash (*Fraxinus velutina*). This represents the third consecutive year during the 14-year study that a flycatcher built a nest in an Ash tree (all at Brinton Pond). At the Riverside Marsh Restoration site, for the first time since 2015, a flycatcher built a nest in a Coyote willow. The total number of nests found in tamarisk trees has not drastically changed during this study; however, the use of willow as a nest substrate has been inconsistent with

significant changes between years. 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; a continued decline was observed between 2014 and 2016. Proportionately, the use of tamarisk as a nest substrate has drastically changed over 14 years of monitoring (Figure 8). During the 2008 breeding season 90 % of flycatcher nests were placed in tamarisk trees. However, a steady decrease was observed over the next four years and by 2012, <50 % were located in tamarisk. In 2013, a shift was observed as flycatchers began to select tamarisk over willow as a nest substrate (Figure 8). The trend continued throughout the 2014-2021 breeding seasons during which 88 of 104 total active nests (84.6 %) were placed in tamarisk trees.

The decrease in willow use as a nest substrate observed in 2013 is likely a result of concealment from predators and parasites (i.e. cowbirds) which tamarisk provide because they are structurally more complex and collect more debris than willow. 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 years of greatest nesting success (≥70 % apparent nest success) occurred during the 2008, 2013, and 2017 breeding seasons which coincide with high tamarisk use (≥90 %) by nesting flycatchers (Figure 8). In 2009, beetle-induced tamarisk defoliation occurred during peak flycatcher breeding and negatively affected hatching success by exposing active nests to predators and extreme abiotic conditions (e.g. 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 time tamarisk defoliation occurred after peak flycatcher breeding. Between 2013 and 2017, tamarisk defoliation continued to occur after peak breeding season and we observed flycatchers returning to tamarisk substrates to build their nests.

Additionally, flycatchers exhibited two major shifts in the use of specific breeding sites within the St George study area between 2008 and 2018 likely due to tamarisk defoliation events by tamarisk leaf beetles. The most dramatic shift occurred between 2009 and 2010 where flycatchers essentially vacated sites dominated by non-native vegetation (tamarisk) and moved to sites dominated by large native (willow) vegetation (Figure 9). In 2014, flycatchers initiated a shift back to tamarisk dominated habitats due to timing of defoliation events occurring after flycatcher critical breeding stages (Figure 9). This shift continued through the 2020 breeding season. However, a minimal increase in the use of native-dominated breeding habitat was observed in 2020 due to the continued presence of flycatchers at Brinton Pond, which is dominated by both young and old growth willow, ash, and Fremont cottonwood (*Populus fremontii*). The appearance of nesting flycatchers in the Riverside Marsh Restoration site in 2021, which contains large stands of native trees, has contributed to the steady increase in flycatcher use of native-dominated habitat over the past two years (Figure 9). During 2018 and 2019, peak beetle-induced defoliation occurred at breeding sites during the first two weeks of July and negatively affected flycatcher reproductive success for the first time since 2009. In 2020 and 2021, tamarisk browning and defoliation occurred in late July at Seegmiller Marsh and it is assumed that defoliation did not negatively affect reproductive success.

Our data suggest first, that in the absence of defoliation by the tamarisk leaf beetle during peak flycatcher breeding season, female flycatchers prefer to nest in tamarisk trees which provide better concealment for nests from predators. Second, that cowbird brood parasitism is a major threat to successful flycatcher nesting along the Virgin River in St George, Utah. Third, although tamarisk dominated habitats are suitable for and often preferred by nesting flycatchers, habitat enhancement projects which restore native vegetation can be successful in expanding suitable breeding habitat for flycatchers. Fourth, beetle-induced tamarisk defoliation varies both spatially and temporally along the Virgin River and remains a threat to the overall nesting success of flycatchers.

Banding and Re-sighting

No flycatchers were banded in the St George study area in 2021; however, two banded adults were re-sighted (Table 3) one of which was confirmed as previously breeding along the Virgin River in St George, Utah prior to the 2021 breeding season. All re-sighted birds were banded during the nestling stage by SWCA personnel at nesting sites along the Virgin River in the St George study area.

LITERATURE CITED

Edwards, C.N., E.T. Woodhouse, R.C. Dobbs, and R.A. Fridell. 2019. Status, Reproductive Success, and Habitat Use of the Southwestern Willow Flycatcher on the Virgin River, Utah. 2008-2017. Utah Division of Wildlife Resources Publication Number 19-19. 69 pp.

Kus, B.E. and M.J. Whitfield. 2005. Parasitism, productivity, and population growth: response of Least Bell's Vireos (*Vireo bellii pusillus*) and Southwestern Willow Flycatchers (*Empidonax traillii extimus*) to cowbird (*Molothrus* spp.) control. Ornithological Monographs 57: 16-27.

Martin, T.E., C. Paine, C.J. Conway, W.M. Hochachka, P. Allen, and W. Jenkins. 1997. Breeding Biology Research and Monitoring Database (BBIRD) field protocol. Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, Montana.

McLeod, M.A. and T.J. Koronkiewicz. 2009. Southwestern Willow Flycatcher surveys, demography, and ecology along the lower Colorado River and tributaries, 2008. Annual report submitted to U.S. Bureau of Reclamation, Boulder City, NV by SWCA Environmental Consultants, Flagstaff, Arizona.

Rourke, J.W., T.D. McCarthey, R.F. Davidson, and A.M. Santaniello. 1999. Southwestern Willow Flycatcher nest monitoring protocol. Nongame and Endangered Wildlife Program Technical Report 144. Arizona Game and Fish Department, Phoenix, Arizona.

Sogge, M.K., D. Ahlers, and S.J. Sferra. 2010. A natural history summary and survey protocol for the southwestern willow flycatcher. U.S. Geological Survey Techniques and Methods 2A-10.

U.S. Fish and Wildlife Service [USFWS]. 1995. Final rule determining endangered status for the Southwestern Willow Flycatcher (*Empidonax traillii extimus*). Federal Register 60: 10694-10715.

U.S. Fish and Wildlife Service [USFWS]. 2002. Southwestern Willow Flycatcher recovery plan. Albuquerque, NM.

Whitfield, M.J., K.M. Enos, and S.P. Rowe. 1999. Is Brown-headed Cowbird trapping effective for managing populations of the endangered Southwestern Willow Flycatcher? Studies in Avian Biology 18: 260-266.

Table 1. Presence-absence survey sites (2008-2021) for Southwestern Willow Flycatchers in the St George study area, Washington Co., Utah. (WFD = Washington Fields Diversion).

Site	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Riverside Marsh*	x - oc	x - oc	x - oc	x - oc	x - oc	x - oc	x - oc	x - oc	x - oc	x	x - oc	x - oc	x - oc	x - oc
Riverside East*	-	x - oc	x - oc	x - oc	x - oc	x - oc	x	x	x	x	x	x	x	x
River Rd Bridge*	x - oc	x - oc	x - oc	x	x	x	x	x	-	-	x	x	x	x
Seegmiller Marsh*	x - oc	x - oc	x - oc	x - oc	x - oc	x	x - oc	x - oc	x - oc	x - oc	x - oc	x - oc	x - oc	x – oc
Schmutz Drain+	-	x	x	x	x	x	x - oc	x	x	x	x	x	x	x
Y-Drain Marsh*	-	-	-	x - oc	x - oc	x - oc	x - oc	x - oc	x - oc	x - oc	x - oc	x - oc	x	x
Snipe Pond*	-	x	x - oc	x - oc	x - oc	x - oc	x - oc	x - oc	x	x	x	x	x	x
Riverside Restoration^	-	-	-	-	-	x	x	x	x	x	x	x	x - oc	x - oc
Springs Pond Outflow^	-	-	-	-	-	-	-	-	x	x	x	x	-	-
Rio Virgin Estates (JD 6)^	-	-	-	-	-	-	-	-	x	x	x	x	-	-
Mad Dog Pond^	-	-	-	x	x	-	x	x	x	x	x	-	-	-
Below WFD^	-	-	x	x	x	-	-	-	-	-	-	-	-	-
Brinton Pond+	-	-	-	x	-	-	-	-	-	x - oc	x - oc	x - oc	x - oc	x - oc
Above WFD+	-	-	-	-	-	-	-	-	x	x - oc	x	x	x	x
Santa Clara Confluence^	-	-	-	-	-	-	x	x	x	x	x	x	x	x
Sand Wash^	-	-	-	-	-	-	x	x	x	x	x	x	x	x

x = Survey conducted.
oc = Occupied by breeding flycatcher(s).
* Historic breeding site. + Previously occupied. ^ Potential breeding site.

Table 2. Number of active nests, nests parasitized by Brown-headed Cowbirds, failed nests, successful nests, and total fledglings produced by Southwestern Willow Flycatchers at breeding sites in 2021 along the Virgin River in the St George study area, Washington Co., Utah.

Site	Active nests[1]	Parasitized nests	Failed nests	Successful nests[2]	Total fledglings
Riverside Marsh	0	-	-	-	-
Riverside Restoration	3	2	2	1	1
Riverside East	0	-	-	-	-
Seegmiller Marsh	4	2	2	2	6
Y-Drain Marsh	0	-	-	-	-
Snipe Pond	0	-	-	-	-
Brinton Pond	1	1	1	0	0
All sites combined	**8**	**5**	**5**	**3**	**7**

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

Table 3. Adult Southwestern Willow Flycatchers that were re-sighted in 2021 at breeding sites along the Virgin River in the St George study area, Washington Co., Utah. All re-sighted adults were banded as nestlings prior to the 2021 breeding season.

Site	Adult ID	Color-band combination[1]	Banding location and year
Seegmiller Marsh	SM2	TQ:GKG	Riverside Marsh (2013)
Seegmiller Marsh	SM3(F)	EE[2]	Seegmiller Marsh (2017)

[1] Color-band codes: TQ = turquoise federal band, K = black, G = green, EE = electric yellow federal band. Color combinations are read as the bird's left leg and right leg, top to bottom. (F = female).
[2] Only one confirmed banded (EE) but left or right leg was not determined. The color-band code for other leg was not confirmed.

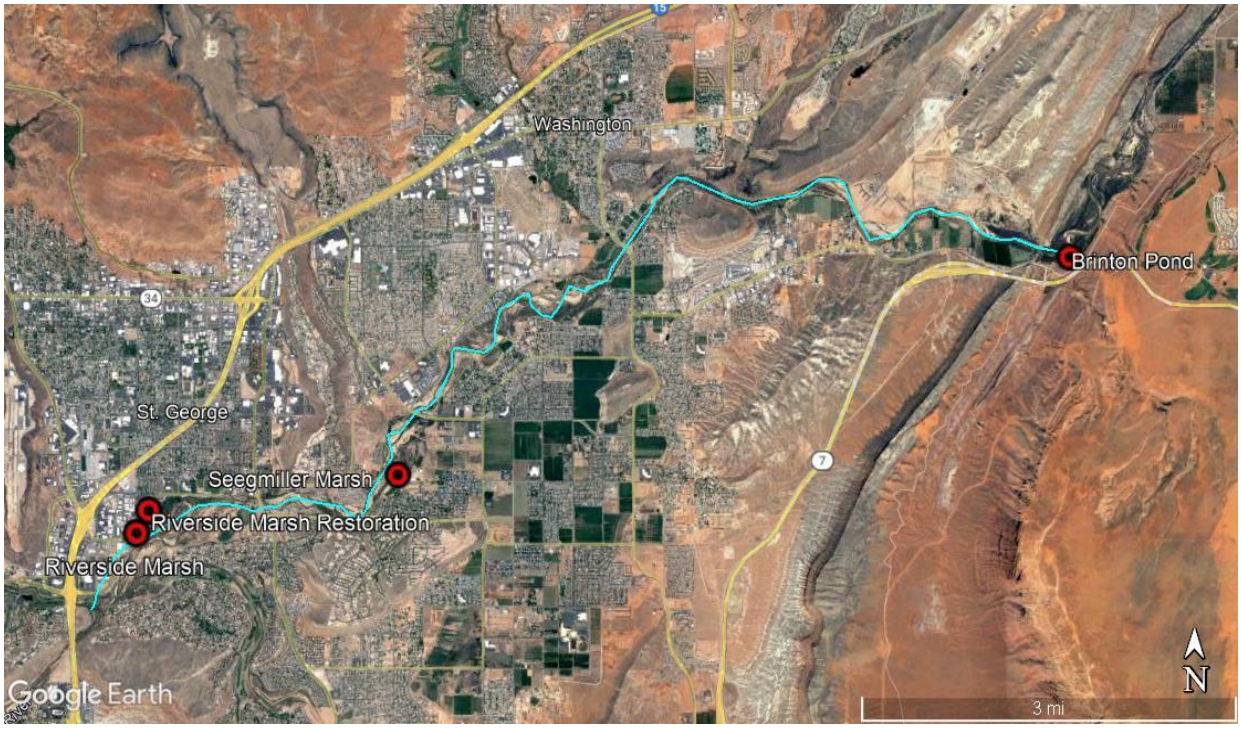

Figure 1. Southwestern Willow Flycatcher occupied breeding sites along the Virgin River in the St George study area, Washington Co., Utah in 2021.

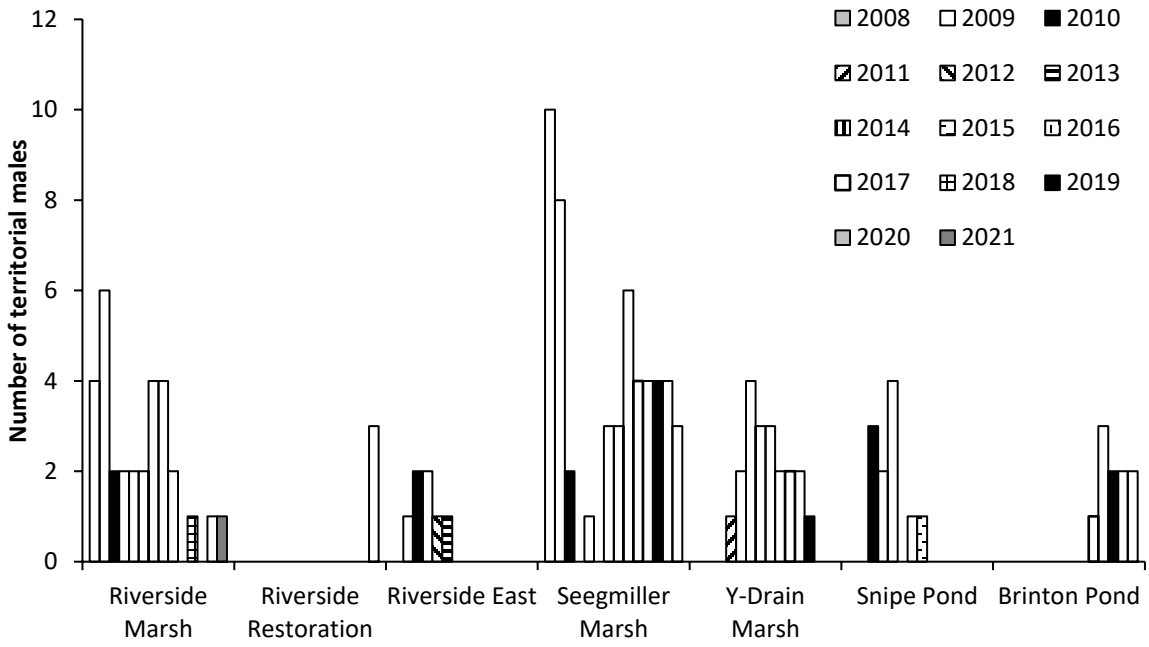

Figure 2. Number of Southwestern Willow Flycatcher territories (males exhibiting territorial behavior beyond 31 May) among years (2008-2021) at seven breeding sites along the Virgin River in the St George study area, Washington Co., Utah.

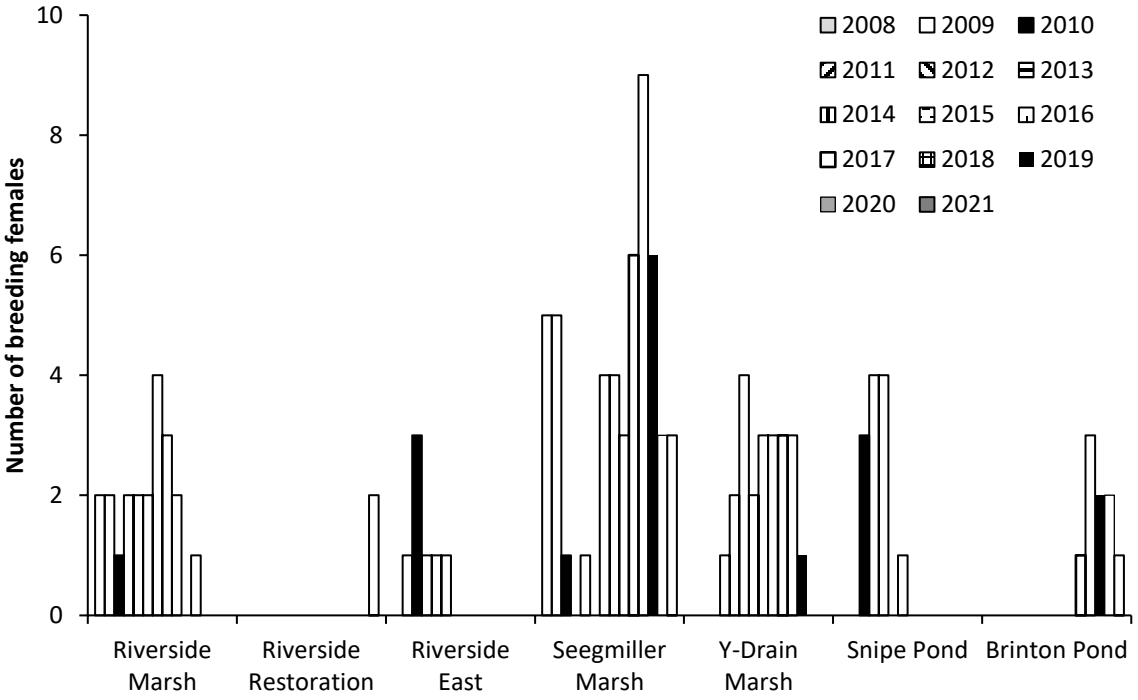

Figure 3. Number of confirmed Southwestern Willow Flycatcher breeding pairs among years (2008-2021) at seven breeding sites along the Virgin River in the St George study area, Washington Co., Utah.

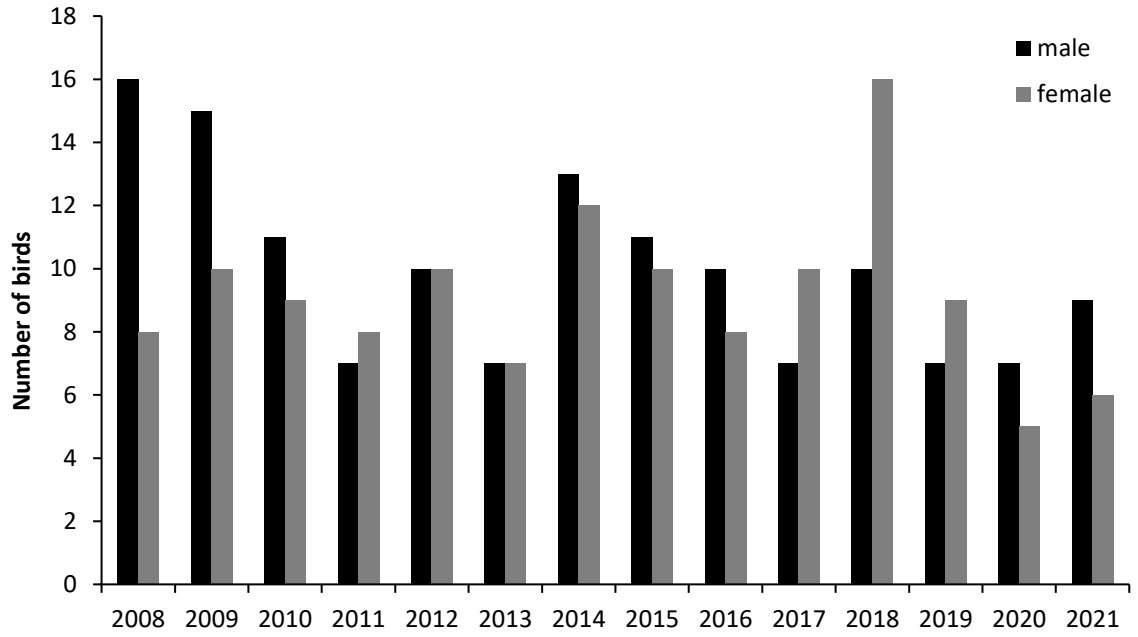

Figure 4. Number of breeding male and female Southwestern Willow Flycatchers observed along the Virgin River in the St George study area, Washington Co., Utah in 2021.

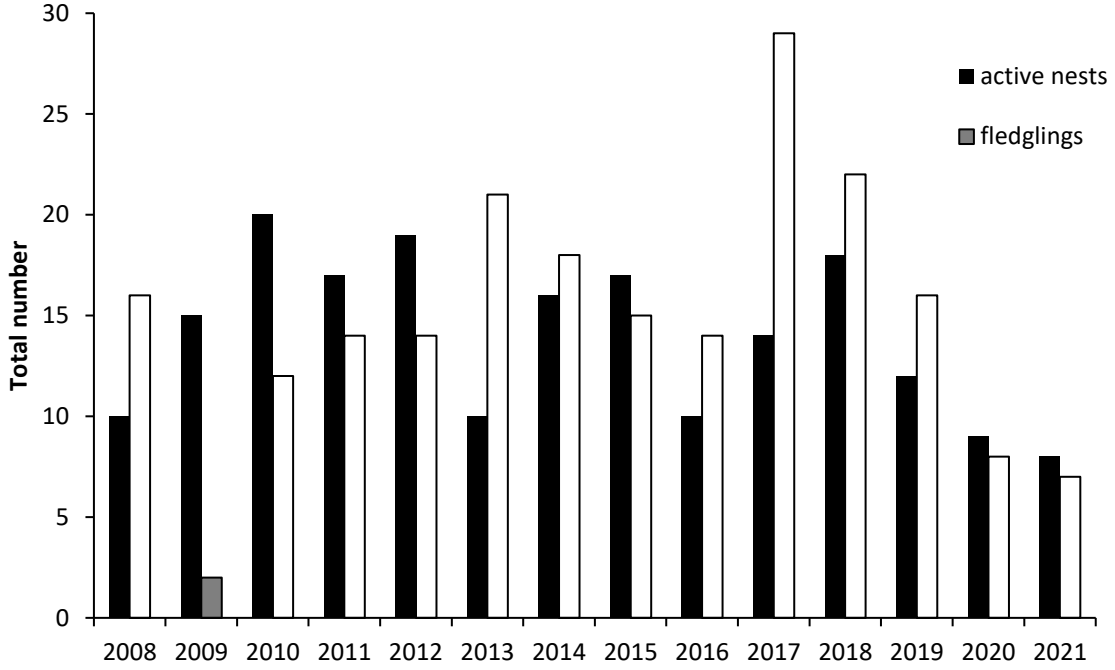

Figure 5. Number of Southwestern Willow Flycatcher active nests and fledglings observed along the Virgin River in the St George study area, Washington Co., Utah, 2008-2021.

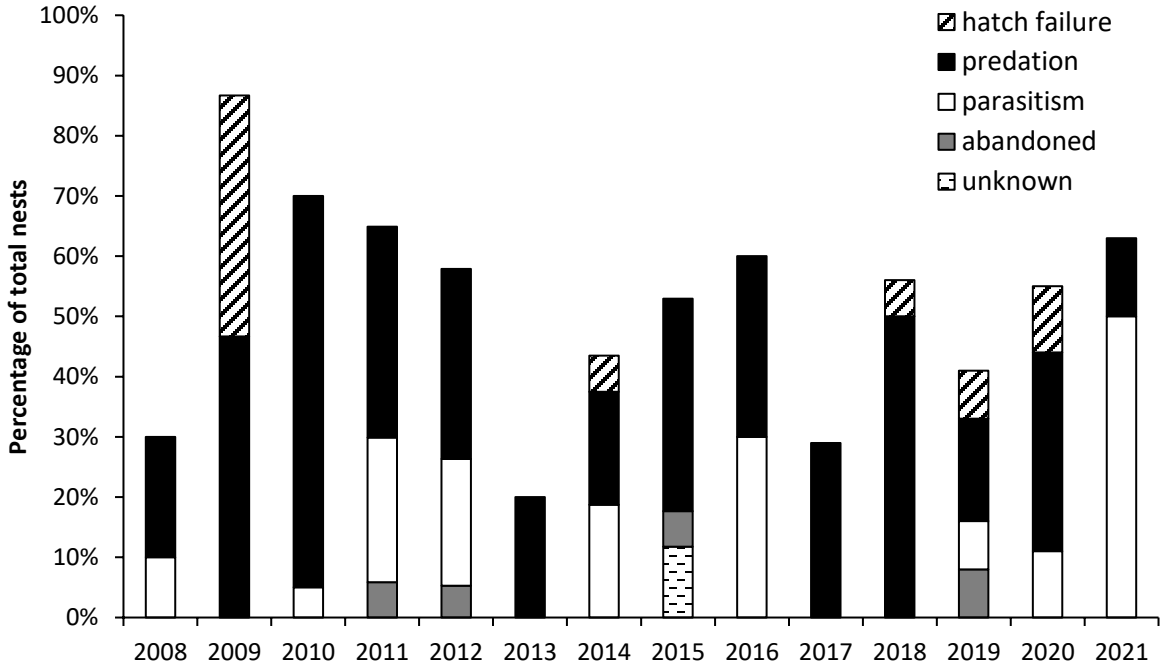

Figure 6. Cause of nest failure of Southwestern Willow Flycatcher nests along the Virgin River in the St George study area, Washington Co., Utah, 2008-2021.

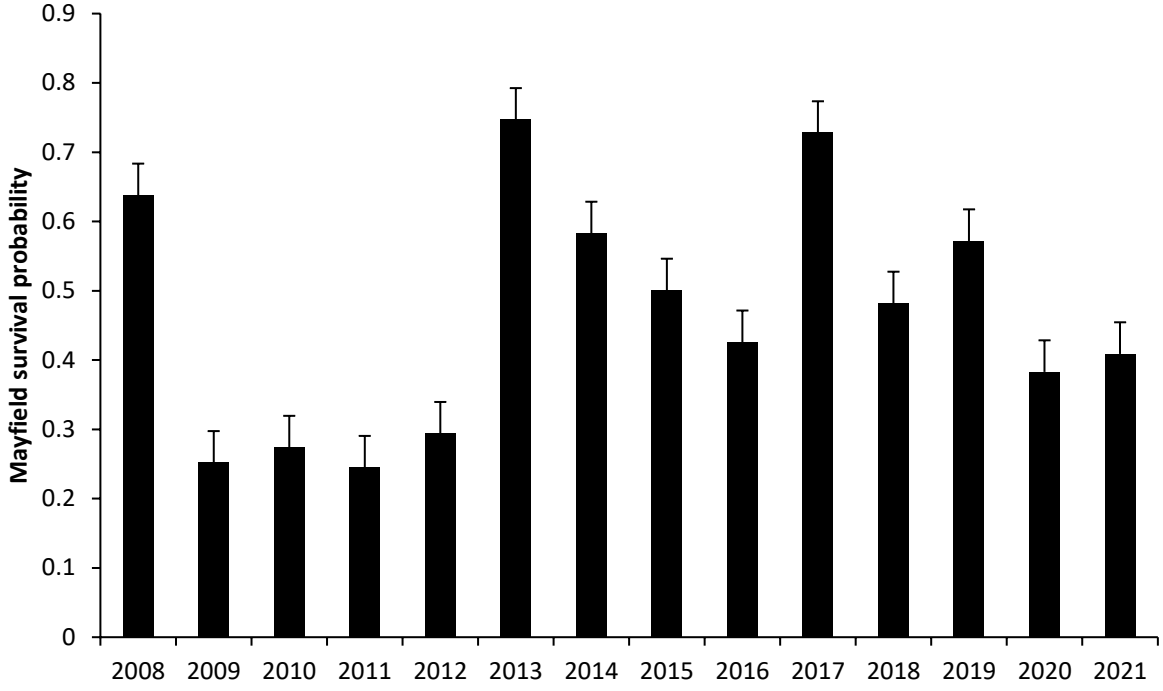

Figure 7. Mayfield survival probability(± SE) of active Southwestern Willow Flycatcher nests along the Virgin River in the St George study area, Washington Co., Utah, 2008-2021.

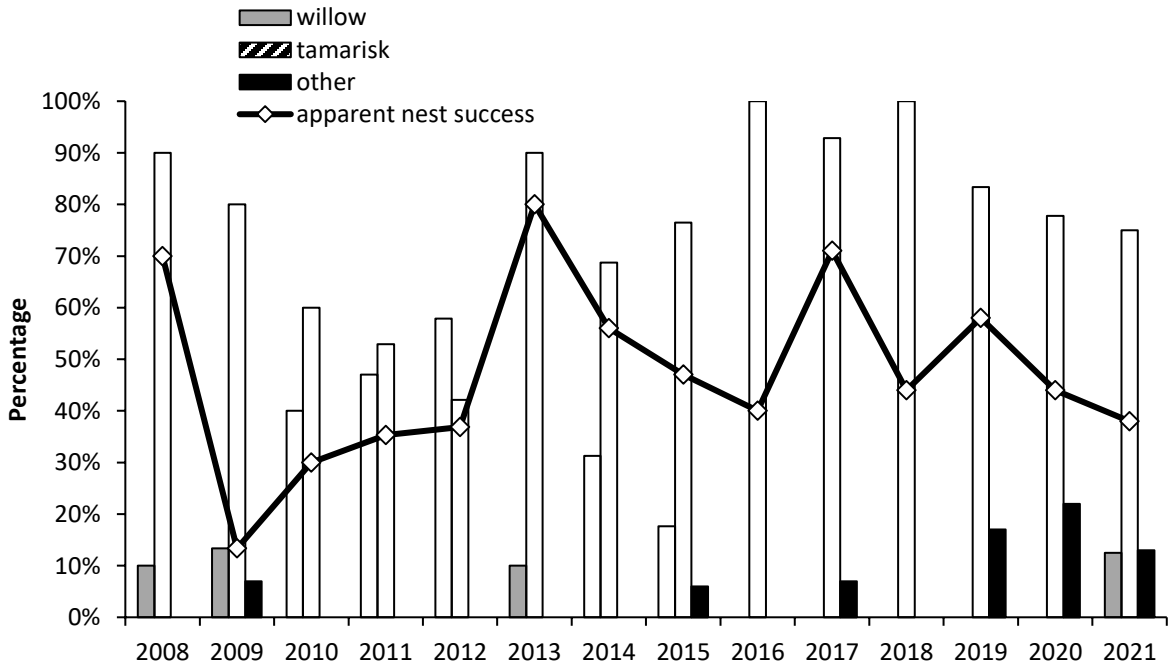

Figure 8. Proportion of Southwestern Willow Flycatcher nests placed in tamarisk, coyote willow, or other substrates and apparent nest success from 2008-2021 along the Virgin River in the St George study area, Washington Co., Utah. Species included in "other" substrates are Russian olive (*Elaeagnus angustifolia*), Seepwillow (*Baccharis salicifolia),* Fremont cottonwood (*Populus fremontii*), and Velvet ash (*Fraxinus velutina*).

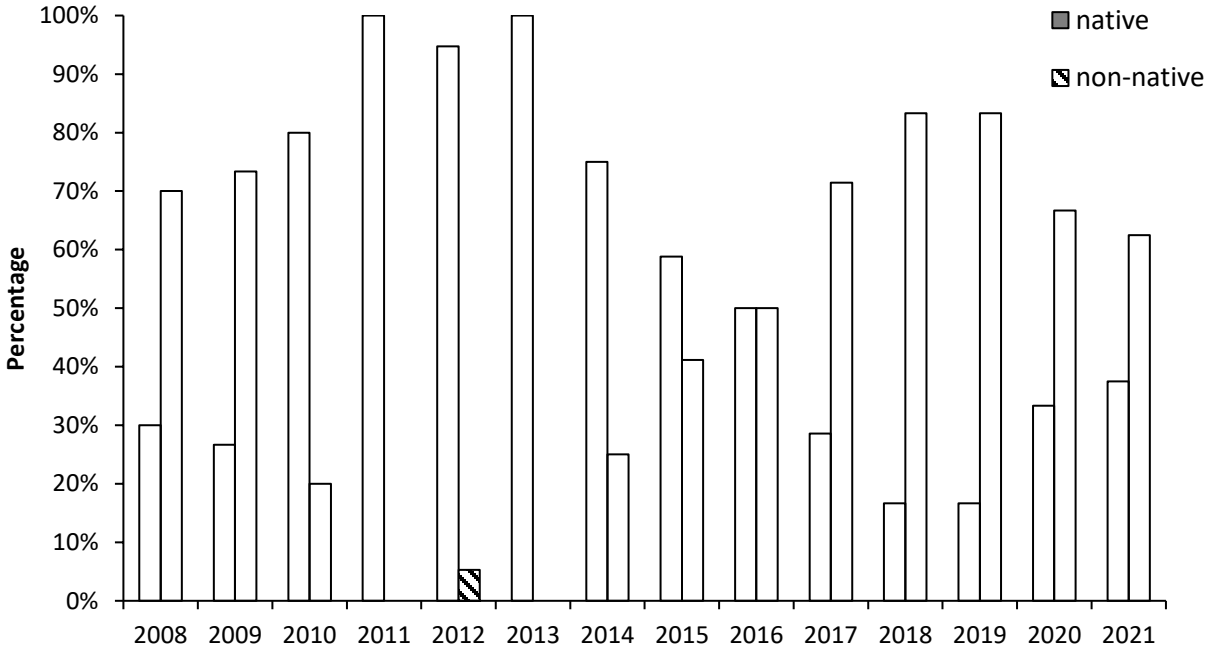

Figure 9. Proportion of Southwestern Willow Flycatcher territories in native (i.e. willow) and non-native (i.e. tamarisk) dominated habitat from 2008-2021 along the Virgin River in the St George study area, Washington Co., Utah.