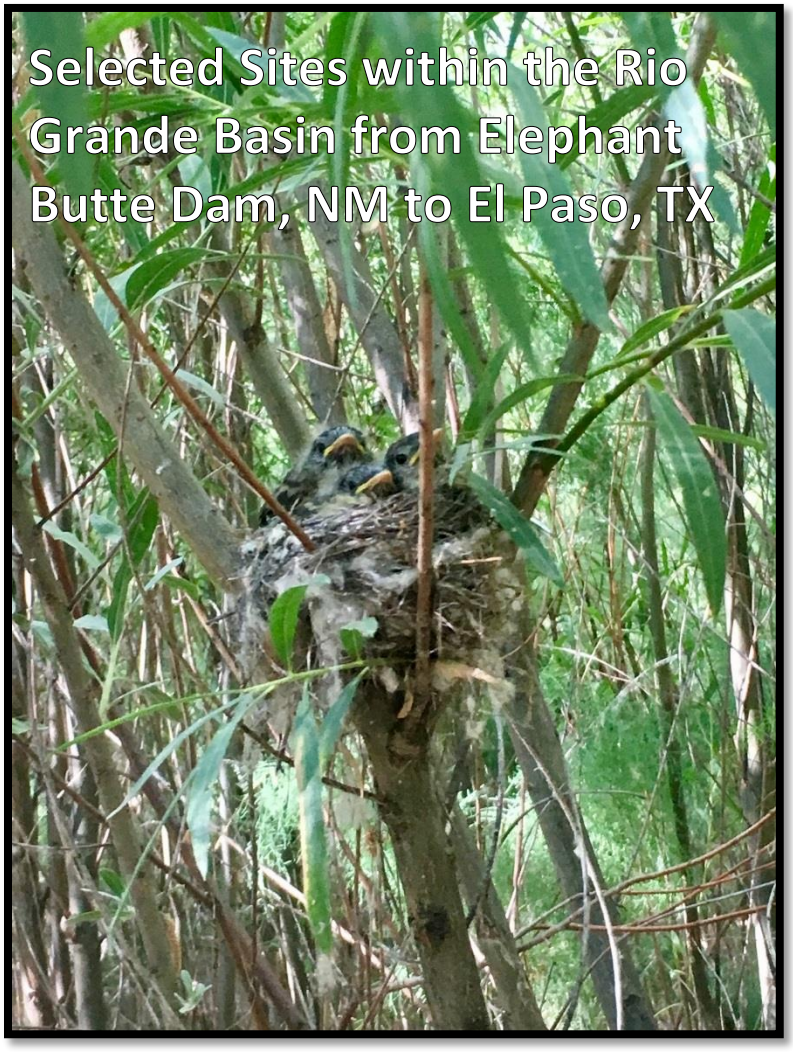
RECLAMATION

Managing Water in the West

2017 Lower Rio Grande Southwestern Willow Flycatcher Study Results



U.S. Department of the Interior
Bureau of Reclamation
Fisheries and Wildlife Resources
Denver, Colorado

March 2018

Mission Statements

The U.S. Department of the Interior protects America's natural resources and heritage, honors our cultures and tribal communities, and supplies the energy to power our future.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

2017 Lower Rio Grande Southwestern Willow Flycatcher Study Results

Selected Sites within the Rio Grande Basin from Elephant Butte Dam, NM to El Paso, TX

Prepared for

Bureau of Reclamation
Albuquerque Area Office
555 Broadway NE, Suite 100
Albuquerque, NM 87102

and

International Boundary and Water Commission
U.S. Section
4171 N. Mesa, Suite C-100
El Paso, TX 79902

by

Bureau of Reclamation
Technical Service Center
Fisheries and Wildlife Resources Group
Matthew Bullard, Fisheries Biologist
Kristen G. Dillon, Wildlife Biologist
Dave Moore, Wildlife Biologist

Cover Photo: M. Bullard

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Executive Summary

During the summer of 2017, the Bureau of Reclamation (Reclamation) conducted surveys for the federally listed endangered Southwestern Willow Flycatcher (SWFL) – a subspecies of the wider-ranging Willow Flycatcher - at selected sites along the Rio Grande between Elephant Butte Dam in New Mexico and El Paso, Texas (210 kilometers [km]). Prior to the breeding season, each site was assessed for potential habitat to determine whether a survey was warranted. A total of 21 sites were surveyed in the summer of 2017. All potentially suitable habitat within each site was surveyed five times. During the 2017 surveys, 116 SWFLs established 68 territories within the Lower Rio Grande. These included 20 unpaired male SWFL territories and 48 SWFL pairs. Forty-three of these pairs were confirmed by observing nesting activity, and they produced 68 nests. Forty-one nests successfully fledged young, 25 failed, and the outcome of two nests was unknown. For the sixth consecutive year, the recovery goal of 25 territories for the Lower Rio Grande Management Unit was exceeded.

Introduction

The Southwestern Willow Flycatcher (*Empidonax traillii extimus*; SWFL) is a State- and Federally-listed endangered subspecies of the Willow Flycatcher (*Empidonax traillii*; WIFL). It is an insectivorous, Neotropical migrant that nests in dense riparian or wetland vegetation in the Southwestern United States (Figure 1). SWFLs typically arrive at their breeding grounds between early May and early June; between late July and mid-August they depart for wintering areas in Mexico, Central America, and northern South America (Sogge et al. 1997, USFWS 2002).

Studies conducted during the late 20th century documented range-wide population declines of SWFLs (USFWS 2002). The primary causes of declining populations are habitat loss and modification (USFWS 2002). The U.S. Fish and Wildlife Service (USFWS) officially listed the SWFL as endangered in February 1995. The SWFL is also listed as endangered or a species of concern by the States of Arizona, California, Colorado, New Mexico, Texas, and Utah (Sogge et al. 1997, TPWD 2005). The USFWS finalized a recovery plan for the SWFL in August 2002. The recovery plan designated six recovery units, subdivided into Management Units based on watershed and hydrologic units, to facilitate the achievement of recovery goals based on local ecological conditions. The Lower Rio Grande of New Mexico was one of the designated management units within the Rio Grande Recovery Unit. To accompany the recovery plan, a series of issue papers associated with the recovery of the endangered SWFL were also prepared by the Recovery Team. These papers addressed current issues and recommended management alternatives in regard to Brown-headed Cowbird (*Molothrus ater*; BHCO) parasitism, livestock grazing, water management, exotic vegetation, habitat restoration, fire management, and recreational impacts (USFWS 2002). In October 2005, USFWS designated Critical Habitat for the SWFL along the Middle Rio Grande of New Mexico between the Isleta Pueblo and Elephant Butte Reservoir (USFWS 2005). The designation was updated in January of 2013 to include the Sevilleta and Bosque del Apache National Wildlife Refuges and a portion of the Elephant Butte Reservoir conservation pool. No critical habitat was designated downstream of Elephant Butte Dam (USFWS 2013).

Presence/absence surveys are conducted to determine the distribution and abundance of the endangered SWFL during the brief breeding season when they become a seasonal resident of the Southwestern United States. Bureau of Reclamation (Reclamation) personnel have conducted presence/absence surveys and nest monitoring during the May to July survey season within the Rio Grande Basin since 1995. Periodic surveys have been conducted within a handful of sites downstream of Caballo Dam since the mid-1990s, but several sites were surveyed for the first time in either 2012 or 2013. In total, 26 sites have been delineated throughout the Lower Rio Grande, 21 of which were formally surveyed in the summer of 2017.

Project Goals

The goals of the presence/absence surveys and nest monitoring conducted in 2017 were to meet the U.S. Section, International Boundary and Water Commission's (USIBWC) and Reclamation's Endangered Species Act compliance commitments for proposed projects, as well as to contribute to current baseline data regarding the population status and distribution of SWFLs in the Lower Rio Grande Basin, New Mexico. The USIBWC is required to conduct annual SWFL surveys to comply with the 2012 Biological Opinion for the project area (USFWS 2012). In 2013, USIBWC and Reclamation signed an Interagency Agreement to work collaboratively to meet both agencies' requirements for SWFL surveys.

Figure 1. Breeding range of the SWFL (adapted from Unitt 1987 and Browning 1993).

Methods

Study Area

Survey sites with potentially suitable habitat were located via a SWFL habitat classification study first conducted in 2012 and repeated in early May 2016 (Moore and Ahlers 2013, 2017). The 210 km stretch of the Lower Rio Grande between Elephant Butte Dam and El Paso, Texas was divided into seven distinct reaches for the classification study (Figure 2). All seven reaches contained at least one site that was found to have potentially suitable habitat. Twenty-one delineated sites encompassed approximately 83 km of riparian corridor and were each surveyed five times in 2017. In order to ensure thorough coverage, surveys were conducted either on foot or by kayak. Surveys were conducted between May 15 and July 17, 2017 in accordance with the methods described in Sogge et al. (2010). When an apparent breeding SWFL pair was located, nest searching and subsequent monitoring were conducted based on methods described in Rourke et al. (1999).

The Caballo Reach is 17 km long and consists of 4 survey sites located in the delta of Caballo Reservoir. The 2016 habitat classification study (Moore and Ahlers 2017) found that this reach contained the largest quantity of suitable SWFL habitat in the Lower Rio Grande [62.9 hectares (ha)]. Although technically within the reservoir pool, Caballo Reservoir water levels are highly managed and the majority of these sites are typically not flooded by more than a foot or two of reservoir water. Much of the non-native woody vegetation in the Caballo delta is mowed regularly to control regenerative growth, but one site within this reach (Salt cedar Patch) consists of an island dominated by salt cedar (*Tamarix* sp.) that is inaccessible to mowing equipment and has grown into suitable non-native SWFL habitat. The bulk of the suitable SWFL habitat in this reach consists of sizeable patches of primarily native habitat that have been left unmowed for the past several years. These unmowed patches, occurring adjacent to either the main river channel, high-flow channels, or the reservoir edge, are occupied by young to mid-aged Goodding's willow (*Salix gooddingii*) mixed with occasional cottonwoods (*Populus deltoides*) and salt cedar and provide moderately to highly suitable habitat for breeding SWFLs. Additionally, the Las Palomas site (14.4 ha), located at the mouth of Palomas Creek, has been fenced in and is managed as a natural area by the Bureau of Land Management. The Las Palomas site consists of a mixture of coyote willow (*Salix exigua*), gallery cottonwoods, sparse salt cedar and cattails (*Typha* sp.). Large portions of the habitat within this reach, due to a primarily native species composition promoted by favorable hydrologic conditions, have the potential to develop into high quality habitat for both the SWFL and the recently-listed Western Yellow-billed Cuckoo (*Coccyzus americanus occidentalis*). Habitat was accessed on foot during surveys unless high river flows and/or reservoir levels limited access, in which case these patches were reached via kayak.

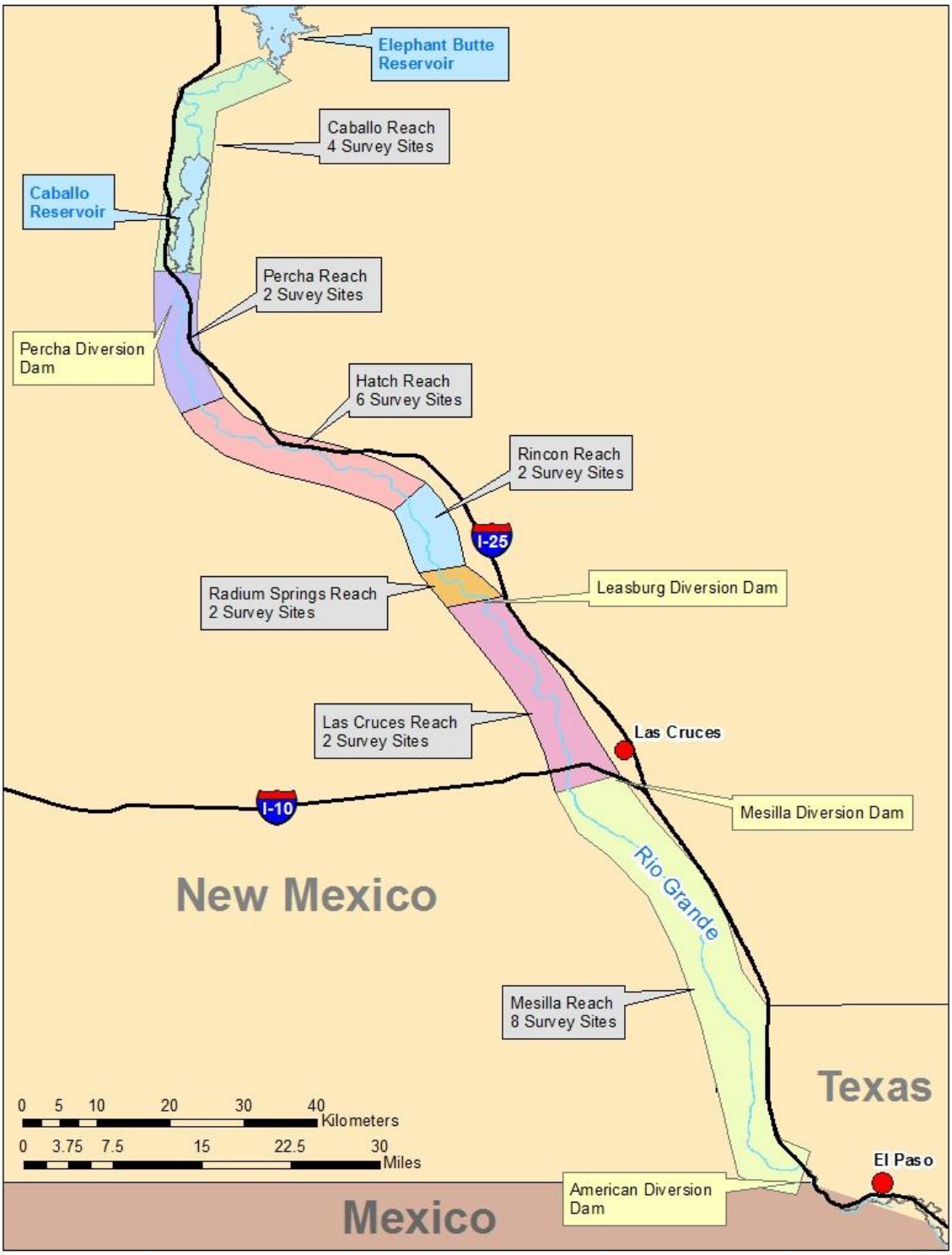


Figure 2. Overview of study area and survey reaches along the Lower Rio Grande, New Mexico.
Note: the length of survey site reaches from north to south along the Rio Grande are approximate whereas the width from east to west is exaggerated for viewing purposes. All survey sites are immediately adjacent to the river within the active floodplain.

The Percha Reach encompasses two sites, one spanning both sides of the Rio Grande immediately adjacent to the Percha Diversion Dam. The Percha Dam site consists of approximately 5 ha of apparently suitable SWFL habitat in 4 different patches (Moore and Ahlers 2017). Vegetation within these patches ranges from mature, monotypic salt cedar to cottonwoods and coyote willow to a mixture of native and exotic vegetation. A seasonally higher water table, particularly above the dam, supports a higher density of vegetation growth. Habitat within this site was surveyed for the first time in 2013 and five surveys were completed in 2017. The second site in the Percha Reach (Trujillo) was formally surveyed by Reclamation for the first time in 2017. Contractors for USIBWC surveyed this site in 20110 and 2011. Vegetation in Trujillo consists of patches of native coyote willow and exotic salt cedar. The site contains 0.91 ha of suitable SWFL habitat primarily along the southern boundary. The highly regulated river below Caballo Dam prevents seasonal flooding, and vegetation within the Trujillo site is relatively dry. However, Trujillo is a USIBWC restoration site, and it is intended to be irrigated in the future.

The Hatch Reach was the next downstream reach surveyed during 2017 and encompasses 29.6 km of the Rio Grande corridor adjacent to Hatch, New Mexico. The reach includes six survey sites ranging in length from 2.8 to 7.4 km. The river in this reach is highly regulated by Caballo and Percha Dams and the riparian area is typically constrained by levees on either side of the river. Regular mowing of regenerating woody vegetation, both native and exotic, further limits the extent of suitable riparian habitat in this reach. Existing riparian habitat occurs on the river banks, lower terraces, islands, and in backwater areas. The majority of riparian habitat consists of narrow bands of salt cedar [less than 5 meters (m) wide] located immediately on the riverbank. Larger native stands with highly suitable SWFL habitat occur sporadically within the reach. These are typically located on islands or adjacent to backwater areas where a higher water table and periodic flooding provide hydrology sufficient for native tree establishment and development. Several of these patches are flooded during higher river flows and most show a high amount of beaver activity. The habitat classification conducted in the Lower Rio Grande in 2016 documented 45.4 ha of suitable SWFL habitat in this reach, the second largest amount of suitable habitat after the Caballo Reach (Moore and Ahlers 2017). This is a decline from the 52.4 ha of suitable habitat documented in this reach in 2012, predominately due to drought and lack of flows in the Rio Grande in 2013 and 2014 which caused the death of many native willow patches. Wetter conditions during 2015, 2016 and 2017 have rejuvenated much of the native vegetation, and this reach surpasses every reach except Caballo in regards to availability of suitable habitat. The USIBWC is conducting restoration or has planned restoration activities for several sites within the Hatch Reach. The reach was surveyed in its entirety for the first time in 2012, although some habitat patches have been surveyed for SWFLs since 2010. All habitat on both sides of the river was surveyed five times during 2017. The entire reach was surveyed on foot when river flows were low or absent and via kayak when flows were higher. All suitable habitat patches were entered on foot.

The Rincon Valley Reach is a shorter reach (11.3 km) located between the Hatch and Radium Springs reaches. Woody riparian vegetation, when present, consists almost entirely of narrow bands along the riverbanks or larger patches of dry, decadent salt cedar. This reach contains minimal suitable SWFL habitat (0.2 ha) based on the 2016 mapping effort (Moore and Ahlers 2017). However, two sites were created and surveyed for the first time in the summer of 2017. The reach

was surveyed via kayak when the river was too high to cross on foot and any suitable habitat was entered on foot.

The next downstream reach, Radium Springs, encompasses habitat on both sides of the Rio Grande between Broad Canyon Ranch and Leasburg Dam, including Selden Canyon (8.4 km or 5.2 river miles). There are two sites within this reach which have been sporadically surveyed since 1993. Several SWFL territories have been located in this reach historically, with peak occupancy documented between the years 2000 and 2004 when between six and eight territories were located annually. Native riparian habitat in this reach is limited by the highly regulated river and an active floodplain constrained by private landowner activities, a railroad grade, or steep canyon walls. Overbank flooding rarely occurs in this reach and much of the riparian habitat is perched above the river channel and very dry. Salt cedar, in various age classes, dominates the woody vegetative composition and ranges from narrow swaths immediately adjacent to the river to larger patches where the active floodplain widens. Where hydrology is more favorable, native woody vegetation consisting primarily of coyote willow has become established - forming either mixed stands with salt cedar or small, monotypic patches immediately adjacent to the river. Several of these patches were deemed suitable for breeding flycatchers, and this reach ranked after Caballo and Hatch with 13.7 ha of suitable habitat in the 2016 habitat classification study. It is in these mixed coyote willow/salt cedar patches that SWFLs have been historically documented. USIBWC and cooperators have initiated, or plan to implement, riparian restoration activities within several sites in this reach. Sites were surveyed primarily via kayak since much of the floodplain in the reach is privately owned. Both sites in this reach were surveyed five times in 2017.

The Las Cruces Reach is the second longest reach in the study area, extending from Leasburg Dam to Mesilla Dam. Flycatcher habitat within this reach is very limited by hydrological conditions (e.g. regulated flows, perched floodplain) and floodplain management activities. The active floodplain is tightly restricted in many areas by levees and periodic mowing of the riparian area. These constraints have reduced woody vegetation growth along most of the length of this reach. Indeed, no suitable SWFL habitat was documented in this reach in 2016, illustrating a loss of the minimal area of suitable habitat (1.2 ha) documented in 2012. Two survey sites, located immediately downstream of Leasburg Dam, were added to this reach in 2017 (sites LD-01 and LD-02). However, one site (LD-02) was excluded from surveys based on a lack of habitat. Site LD-01 was surveyed five times via kayak in 2017.

The Mesilla Reach is the southernmost and longest reach in the study area and encompasses approximately 64 km of the Rio Grande, divided into eight study sites, between Las Cruces, New Mexico and El Paso, Texas. High quality riparian habitat is very limited in this reach – 2.1 hectares of suitable flycatcher habitat was documented during the 2016 study, down from 8.1 hectares in 2012. Riparian habitat within much of this reach was historically absent or limited due to a highly regulated river, extensive mowing by USIBWC, and a perched floodplain. Drought conditions and minimal releases from Caballo Reservoir between 2012 and 2014 reduced the extent of native vegetation. However, a resurgence of potentially suitable SWFL habitat was documented in 2016 due to more persistent river flows, and Reclamation surveyed habitat within four of the eight sites in 2017 (sites ELLA-02 to ELLA-05). Additionally, USIBWC surveyed the Sunland Park Restoration site

in ELLA-08 in 2017 (see attached map).

Presence/Absence Surveys

All sites/habitat patches were surveyed using the repeated call-playback method in accordance with the protocols established in Sogge et al. (2010). Surveys were conducted a minimum of 5 days apart, typically between 0530 and 1030 mountain daylight time (MDT; depending on weather conditions), by trained and permitted personnel. Survey forms were completed daily.

Five surveys were conducted in all sites within the study area. The first survey conducted in late-May increases the likelihood of detection, since territorial males are more vocal when establishing territories than after nesting has begun. It was anticipated that migrant WIFLs (Willow Flycatchers that are not the *extimus* subspecies) would also be detected. The second and third surveys were conducted between early and late June, while the fourth and fifth surveys were conducted from late June to mid-July. These surveys are intended to (1) confirm the establishment of territories and/or nesting, (2) detect late settling males, and (3) determine which sites remained occupied throughout the breeding season. Although WIFLs documented on or after June 13 are generally considered resident birds (i.e., SWFLs), some late migrants were detected from mid- to late June. Each WIFL detection is evaluated based on behavior, vocalizations, repeat detections, and time of year to determine whether the detection is that of a migrant or resident SWFL.

Nest Searches/Monitoring

Nest searches were conducted by a permitted biologist upon discovery of a SWFL pair. To minimize disturbance and maximize accuracy of monitoring efforts, nest searches and monitoring were conducted using methods outlined in Martin and Geupel (1993) and the Southwestern Willow Flycatcher Nest Monitoring Protocol (Rourke et al. 1999). The nest area was located by observing diagnostic SWFL breeding behavior and listening for calls within the habitat patch. Once located, the nest site was approached cautiously with minimum disturbance to vegetation. Typically, adult SWFLs did not immediately reveal nest locations. All suitable midstory trees and shrubs in the suspected area were carefully inspected until the characteristic small, cup-shaped nest [as described in Tibbitts et al. (1994)] was found. Nests were usually located within a few minutes of nest search initiation. Once located, descriptive flagging was placed at a distance from the nest (usually 8 to 10 m) to minimize predator attraction. On subsequent visits, time spent at the nest was minimized, dead-end trails were not made, and a variety of paths to and from the nest were used to minimize disturbance and predator attraction.

Data were collected and recorded at all nest sites on a Willow Flycatcher Nest Record Form. Nest contents were not monitored during the nest building/egg laying stages, or as the suspected fledging date approached, because these periods are when disturbance is most likely to cause adults to abandon the nest or cause force-fledging of nestlings. Nests with eggs/young were examined quickly using a mirror mounted on a telescopic pole or a straight branch. Nesting chronology was then estimated following the initial search and examination. Subsequent visits

were minimized and timed so at least one inspection would be made of both eggs and nestlings. Data resulting from these inspections were recorded on the Nest Record Form.

At the conclusion of the first or early-season nesting attempts, the nesting pair was not monitored for approximately one week to minimize disturbance and allow for possible initiation of another nesting attempt. Following this period a re-nest/second brood search was performed to detect any subsequent nesting attempts. A re-nest is a nesting attempt that occurs after a nest fails, while a second brood occurs after a nest successfully fledges young. When possible, nests were monitored through completion. However, a few nests were not monitored to completion and had nestlings at least eight days old at the last visit; these were considered successful based on best professional opinion. The practice of addling or removing Brown-headed Cowbird eggs from parasitized SWFL nests has been utilized within the Middle Rio Grande when necessary and possible. Addling, if done at the proper time, prevents hatching of BHCO eggs and negates a parasitism event. This activity was adapted to Lower Rio Grande SWFL nest surveys in 2012 and continued through 2017. SWFL eggs were never disturbed and time spent at the nest was minimized. Frequently, based on nesting chronology, it was determined that the BHCO egg would not have a chance to hatch, and in these cases nests were monitored normally to minimize disturbance.

At the conclusion of the season, nesting chronology was reviewed and nesting variables (success, predation, parasitism, and abandonment rates) were determined. A database for all nests with known outcomes in the Lower Rio Grande was compiled. Habitat variables were then analyzed to determine habitat preferences and nesting variables were compared to habitat and hydrological variables to determine possible relationships. Due to differences in habitat, nests within the delta of Caballo Reservoir were considered separately from those in the remainder of the study area. Habitat variables included nest substrate species and dominant territory vegetation, and hydrological variables included distance to water and hydrology immediately under the nest.

Results

Presence/Absence Surveys

During presence/absence surveys conducted from May 15 through July 17, 154 WIFLs were detected within the Lower Rio Grande Basin (Table 1). Of these, 38 were determined to be migrants based on behavior and lack of subsequent detections. The other 116 detections consisted of 20 unpaired males and 48 pairs resulting in 68 territories. Nesting was documented for 43 of the pairs. Figures 3 through 10 show an overview of the sites surveyed and WIFLs documented in 2017. The following narrative describes sites where resident SWFLs were detected. See Appendix for survey forms.

Las Palomas (Figure 3) is a restoration site managed by the Bureau of Land Management. The site is managed as a natural area and protected from mowing and cattle grazing. It stretches for 0.7 km within the floodplain and contains scattered patches of suitable SWFL habitat. The site can be flooded based on river flows and releases from Elephant Butte Dam. The site retains water well and supports willow and cottonwood vegetation. A marsh surrounded by cattails and coyote willows is located in the middle of the site. Several patches of mature coyote willow surround the marsh and cover the eastern boundary in the site where the water overbanks. These patches of coyote willow are highly suitable for SWFLs, and in 2017 five territories were documented. Of the five territories, four were nesting pairs and one was an unpaired male SWFL.

The **Caballo Delta South Site** (Figure 3) is the southern-most site within the delta of Caballo Reservoir. It is approximately 3.5 km long and 1.5 km wide. Much of the site is regularly flooded by fluctuations in reservoir pool levels. A large swath of habitat on the western edge of the site contains a mixture of mature cottonwoods, young to mid-aged Goodding's willow, and salt cedar. This habitat is considered to be potentially suitable habitat for breeding SWFLs and is the only patch surveyed within this site. Six WIFLs, including three migrants and three unpaired male SWFLs were detected in this site in 2017.

Table 1. Summary of WIFL detections within survey sites between Caballo Reservoir and Radium Springs, NM – 2017.

Site Name	WIFLs Observed[(1)]	Est. Number of Pairs	Est. Number of E.t. extimus[(2)]	Est. Number of Territories	Nest (s) Found[(3)]	Nest Success	Comments[(4)]	County
Las Palomas	9	4	9	5	6	3 successful; 2 failed; 1 unknown	1 unpaired male; 4 pairs w/ nests	Sierra
Caballo Delta North	2	0	0	0	N/A	N/A	2 migrants	Sierra
Caballo Delta South	6	0	3	3	N/A	N/A	3 migrants; 3 unpaired males	Sierra
Caballo Reach[5] Summary	17	4	12	8	6	3 successful; 2 failed; 1 unknown	5 migrants; 4 unpaired males; 4 pairs w/ with nests	
Percha	2	0	0	0	N/A	N/A	2 migrants	Sierra
Trujillo	1	0	0	0	N/A	N/A	1 migrant	Sierra
Percha Reach[6] Summary	3	0	0	0	N/A	N/A	3 migrants	
HA-01	11	4	9	5	7	1 successful; 5 failed; 1 unknown	2 migrants; 1 unpaired male; 1 pair; 3 pairs w/ nests	Dona Ana
HA-02	57	26	56	30	40	27 successful; 13 failed	1 migrant; 4 unpaired males; 1 pair; 25 pairs w/ nests	Dona Ana
HA-03	1	0	0	0	N/A	N/A	1 migrant	Dona Ana
HA-04	7	2	5	3	3	3 successful	2 migrants; 1 unpaired male; 2 pairs w/ nests	Dona Ana
HA-05	4	0	1	1	N/A	N/A	3 migrants; 1 unpaired male	Dona Ana
HA-06	34	12	30	18	12	7 successful; 5 failed	4 migrants; 6 unpaired males; 3 pairs; 9 pairs w/ nests	Dona Ana
Hatch Reach[7] Summary	114	44	101	57	62	38 successful; 23 failed; 1 unknown	13 migrants; 13 unpaired males; 5 pairs; 39 pairs w/ nests	
HA-07	2	0	0	0	N/A	N/A	2 migrants	Dona Ana
HA-08	3	0	0	0	N/A	N/A	3 migrants	Dona Ana
Rincon Reach[8] Summary	5	0	0	0	N/A	N/A	5 migrants	

Radium Springs	10	0	3	3	N/A	N/A	7 migrants; 3 unpaired males	Dona Ana
Radium Springs Reach[9] Summary	10	0	3	3	N/A	N/A	7 migrants; 3 unpaired males	
LD-01	5	0	0	0	0	N/A	5 migrants	Dona Ana
Las Cruces Reach[10] Summary	5	0	0	0	0	N/A	5 migrants	
Lower Rio Grande Summary	**154**	**48**	**116**	**68**	**68**	**41 successful; 25 failed; 2 unknown**	**38 migrants; 20 unpaired males; 5 pairs; 43 pairs w/ nests**	

Table 1 (cont'd). Summary of WIFL detections within survey sites between Caballo Reservoir and Mesilla, NM – 2017.

[1] When a single WIFL responded to the recorded call and there was no evidence of pairing, it was considered to be an unpaired male. It is possible that some WIFLs counted as males may have been females, especially during the migration period.

[2] A WIFL was considered to be a resident *Empidonax traillii extimus* if it was documented on or after June 10 and exhibited behavioral characteristics typical of a territorial WIFL or if nesting activity could be confirmed.

[3] A SWFL territory consists of a resident Southwestern Willow Flycatcher male defending a home range, unpaired or paired.

[4] Unpaired male refers to both confirmed unpaired males and males whose breeding status has not been determined.

[5] Caballo Reach = Within the conservation pool of Caballo Reservoir.

[6] Percha Reach = Downstream of Caballo Dam to Hwy 185 bridge in Arrey, NM

[7] Hatch Reach = From Hwy 185 bridge south of Arrey, NM downstream to Kit Karson Road south of Hatch, NM.

[8] Rincon Reach = From Kit Karson Rd south of Hatch, NM downstream to the mouth of Coyote Canyon (5.5 miles upstream of Leasburg Dam).

[9] Radium Springs Reach = From the mouth of Coyote Canyon to Leasburg Dam.

[10] Las Cruces Reach = From Leasburg Dam to Calle del Norte road (Hwy 359) in Mesilla, NM.

Migrant – any WIFL detected only during the period prior to June 10th and where breeding was neither confirmed nor suspected.

Unpaired Male – a resident SWFL that was documented on or after June 10th and exhibited behavioral characteristics typical of a territorial flycatcher, however breeding was neither suspected nor confirmed

Pair – a SWFL territory where breeding was confirmed or behavioral evidence strongly suggested that pairing had occurred

Pair w/ nest – a SWFL territory where breeding was confirmed by the discovery of an active nest.

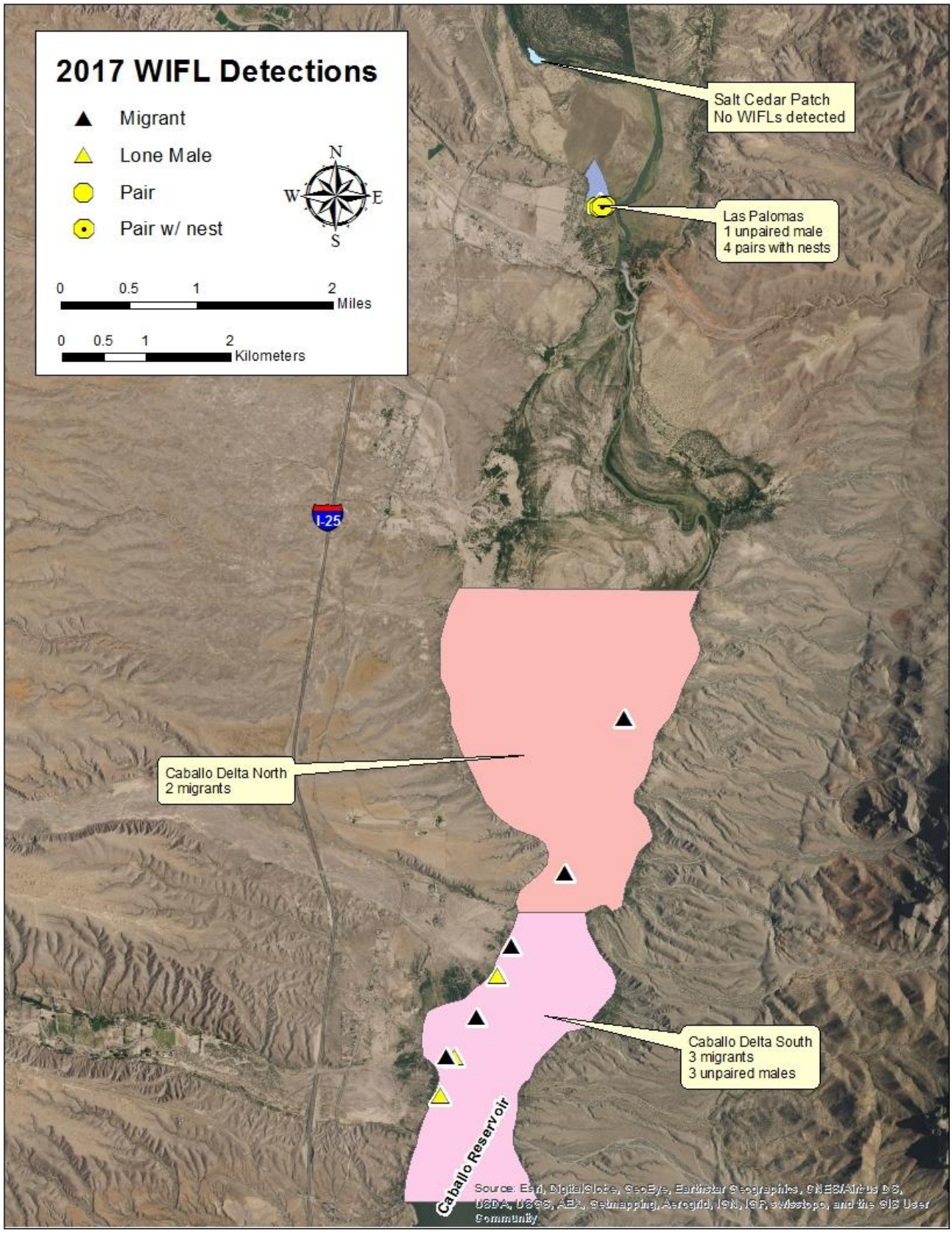


Figure 3. Overview of survey sites and SWFL detections within the Caballo Reach 2017.

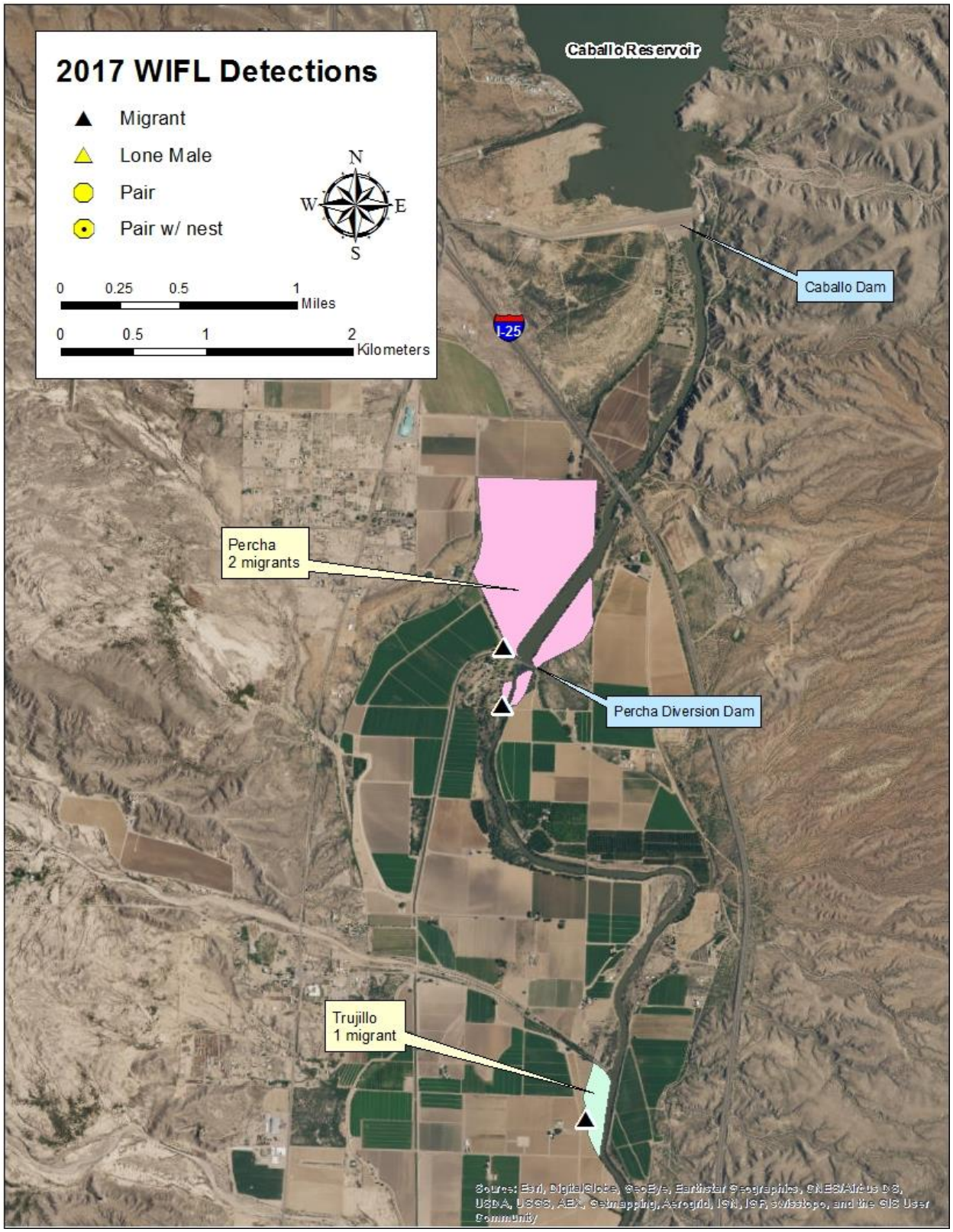


Figure 4. Overview of survey sites and SWFL detections within the Percha Reach 2017.

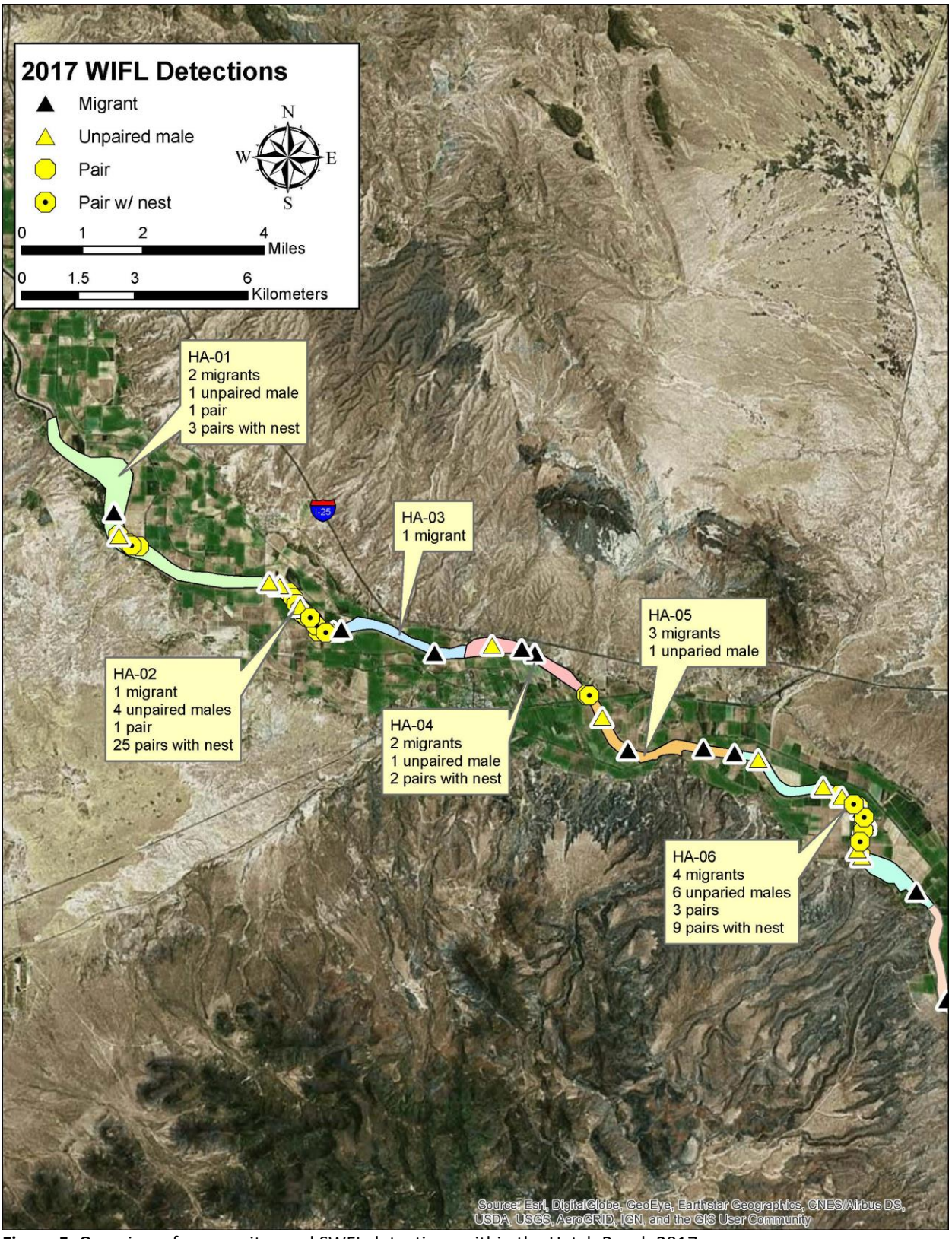


Figure 5. Overview of survey sites and SWFL detections within the Hatch Reach 2017.

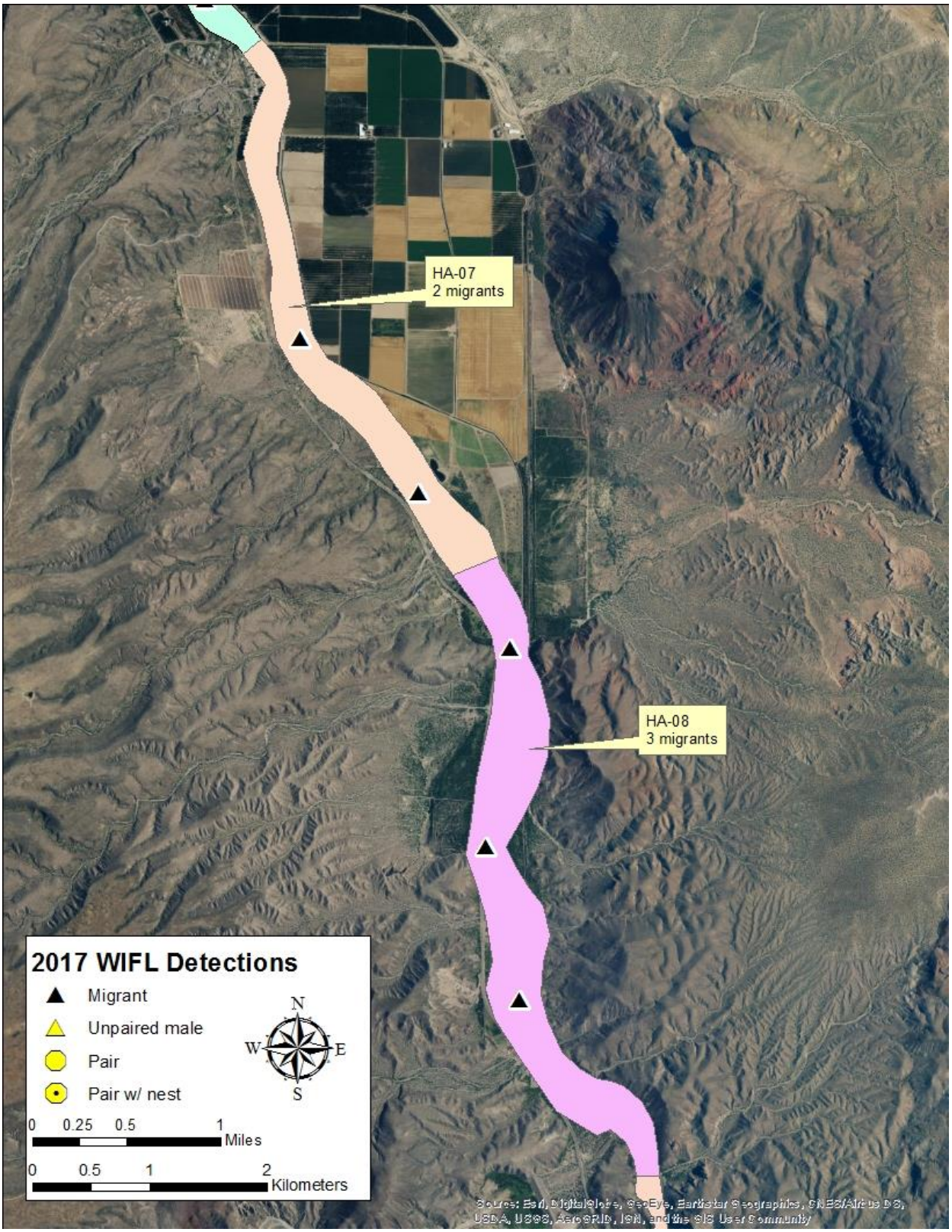


Figure 6. Overview of survey sites and WIFL detections within the Rincon Valley Reach 2017.

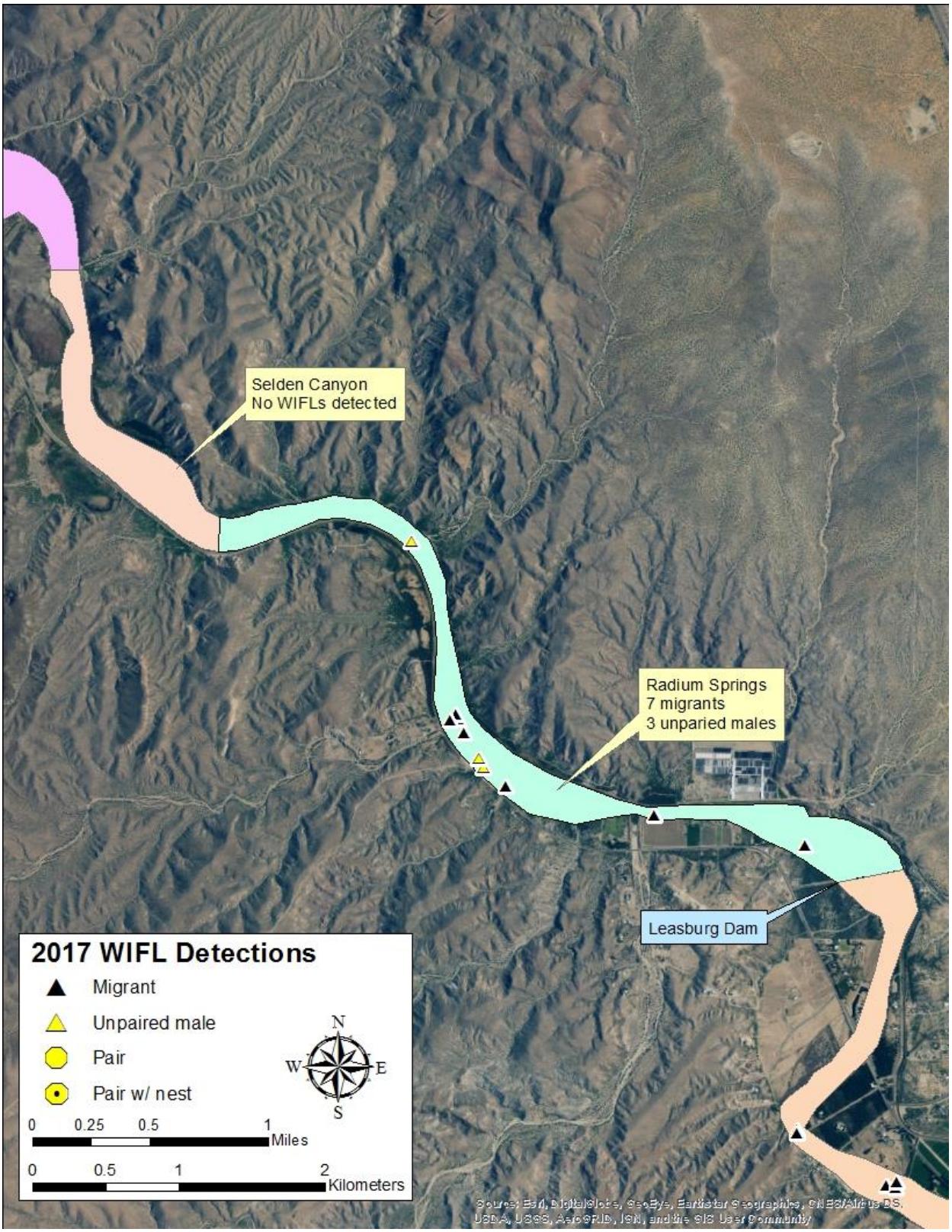


Figure 7. Overview of survey sites and WIFL detections within the Radium Springs Reach 2017.

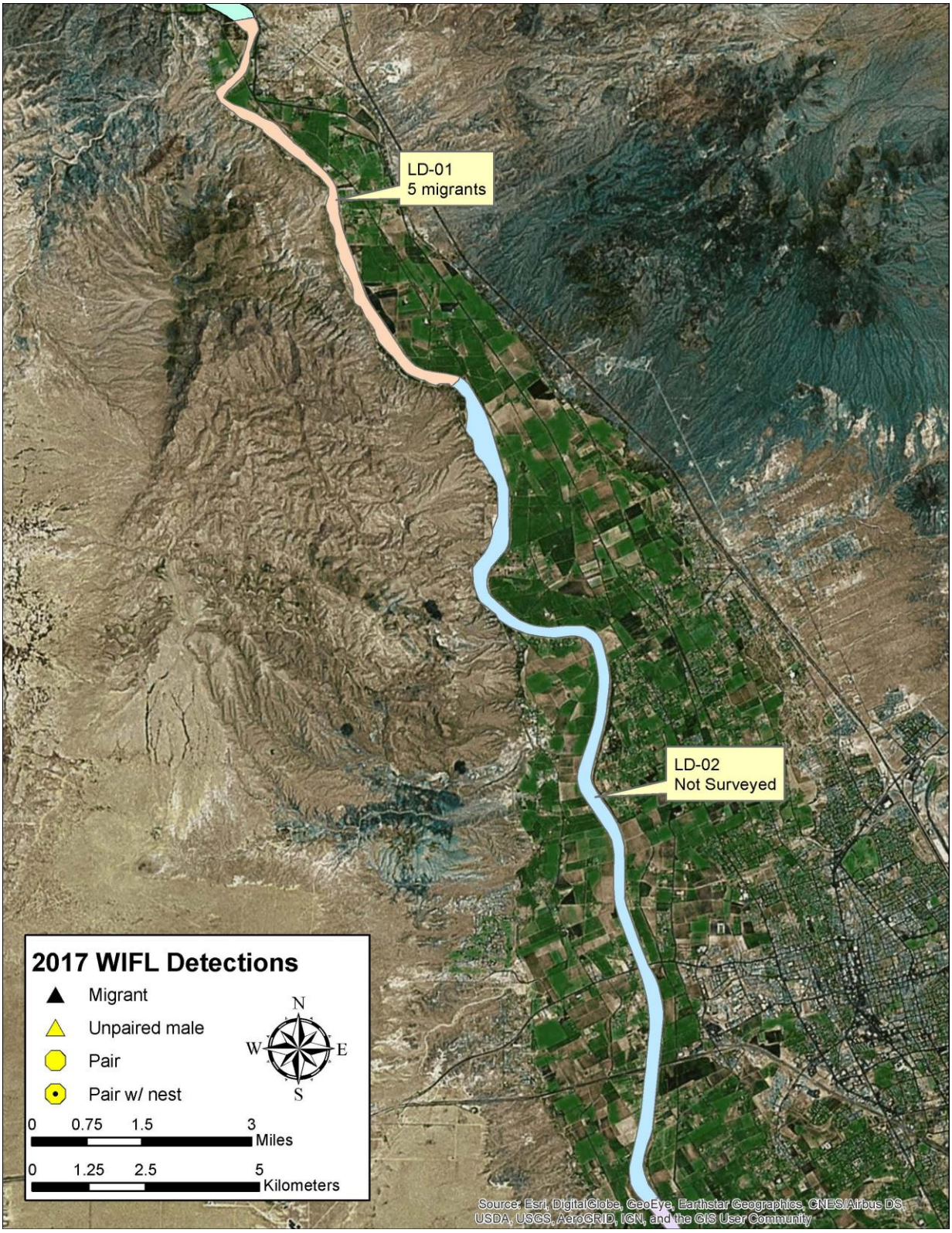


Figure 8. Overview of survey sites and WIFL detections within the Las Cruces Reach 2017.

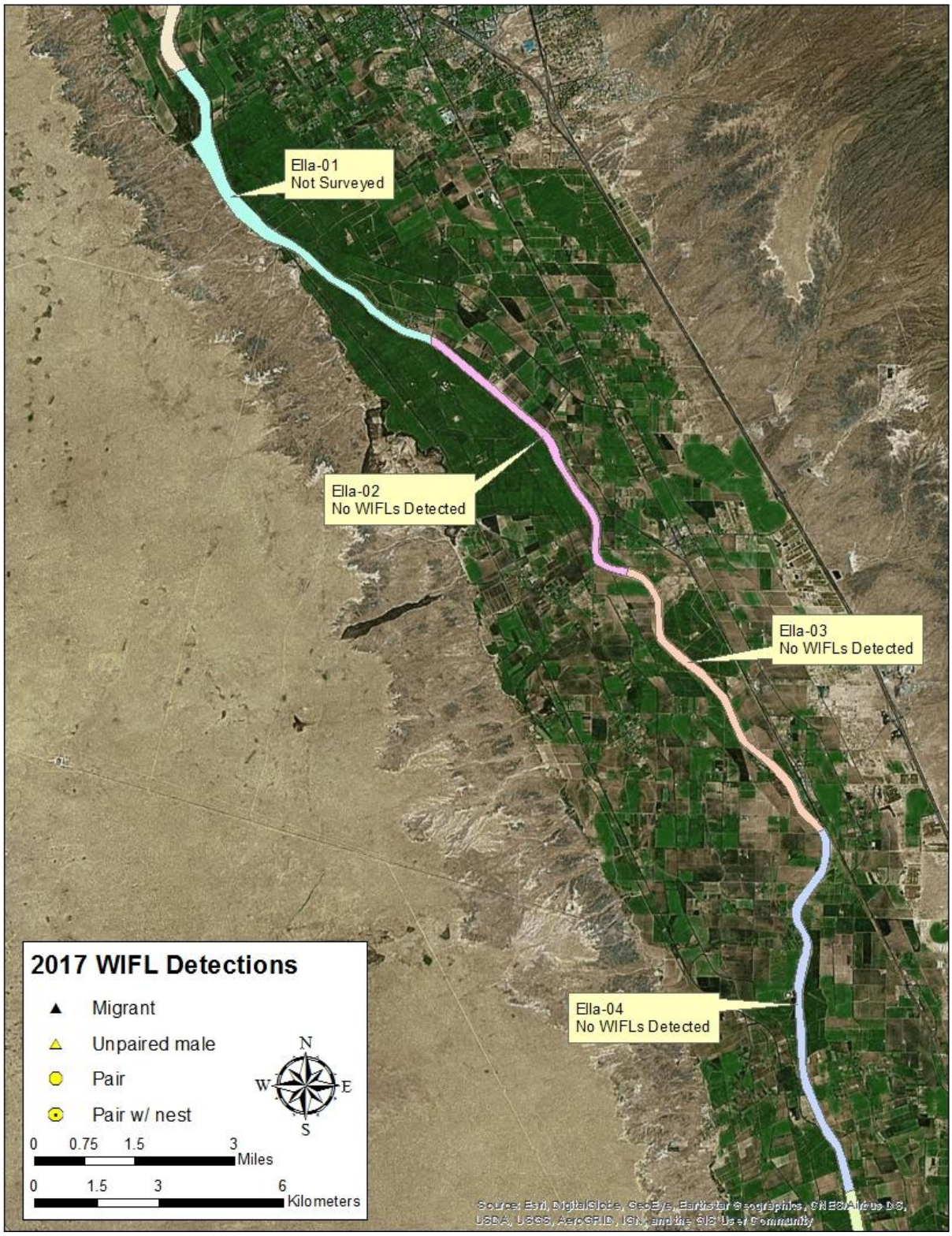


Figure 9. Overview of survey sites and WIFL detections within the northern half of the Mesilla Reach 2017.

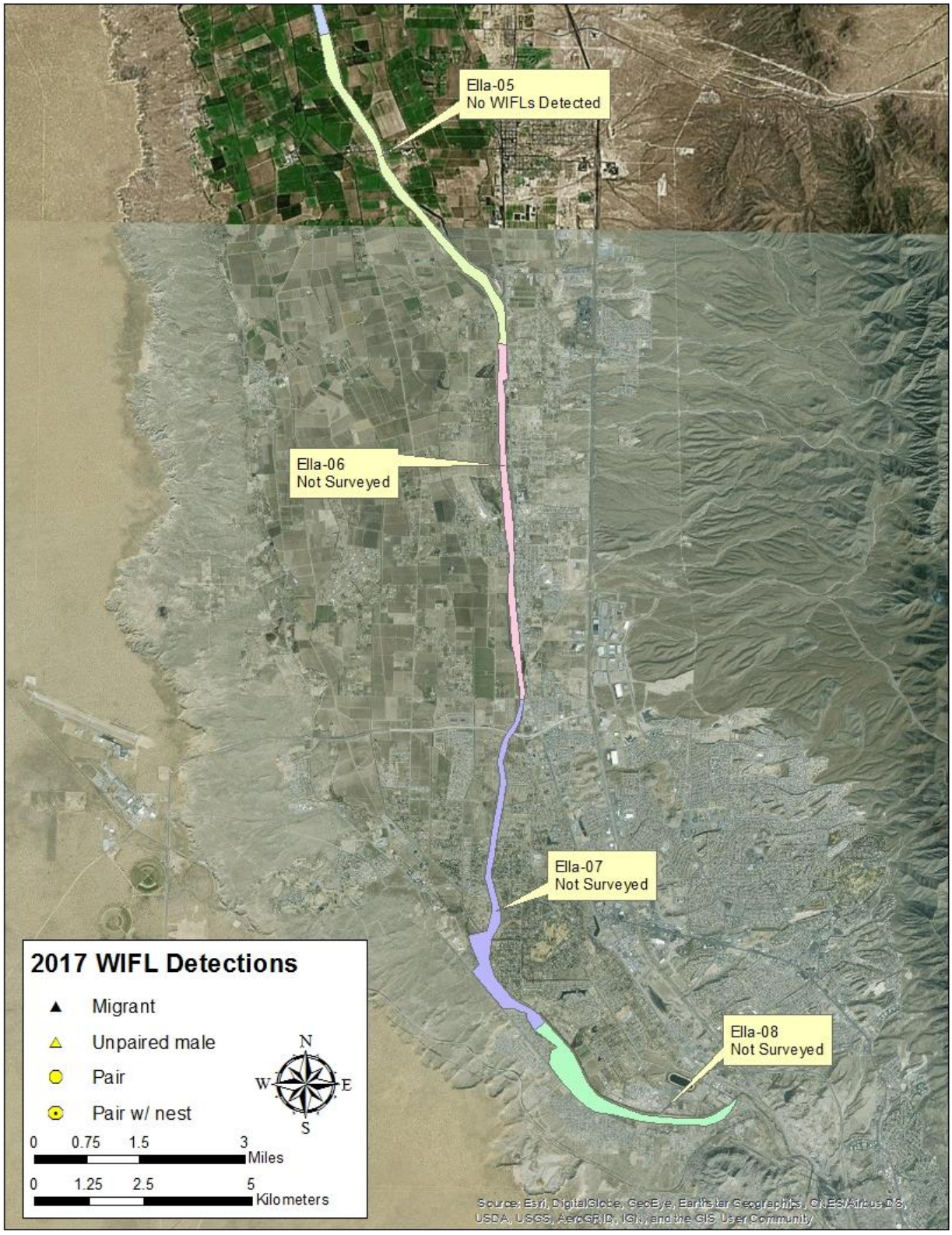


Figure 10. Overview of survey sites and WIFL detections within the southern half of the Mesilla Reach 2017.

Site HA-01 (Figure 5) is the most upstream site in the Hatch Reach. It is approximately 7.4 km in length and encompasses the active floodplain, which is restricted in this reach by riverside roads and levees. It includes the Crow Canyon Site which has been surveyed and occupied by resident SWFLs since 2010. Potentially suitable SWFL habitat within this site is limited to lower terraces or islands immediately adjacent to the river. Most of the remaining floodplain is either perched and dry, or regularly mowed. The patches of potentially suitable habitat consist of relatively large coyote willow interspersed with salt cedar. These areas are often flooded by normal river flows and most exhibit signs of extensive beaver activity. Extreme drought and a dry river during recent years negatively impacted native habitat in this site. Within patches occupied by SWFLs in 2012, a majority of willows either showed signs of severe water stress or had died by May of 2013. By the summer of 2015, many of these patches had begun to rejuvenate due to increased river flows. This site contains large areas that are either currently undergoing or slated for restoration by the USIBWC. During 2017 surveys in this site, 11 WIFLs were documented including one unpaired resident male SWFL and four breeding pairs. The pairs produced seven nests; only one nest successfully fledged young, five failed due to predation, and one outcome was unknown.

Site HA-02 (Figure 5) is immediately downstream of HA-01 and encompasses 2.8 km of riparian corridor. It is very similar to HA-01 in that potential SWFL habitat is limited to either the riverbank or lower terraces and islands. Several suitable patches of habitat have established in this reach in association with either a higher water table or periodic flooding. These patches consist of mid-aged coyote willow intermixed with occasional salt cedar. This site was also severely impacted by drought and a lack of river flows in recent years but appears to be recovering. During 2017 surveys, 57 WIFLs were located in this site, making it the most highly occupied site in the Lower Rio Grande study area. The 57 WIFLs included one migrant and 30 territories consisting of 4 resident unpaired male SWFLs and 26 breeding pairs. The pairs produced 40 nests of which 27 successfully fledged young and 13 failed.

Site HA-04 (Figure 5) is located immediately downstream of site HA-03 and consists of 3.3 km of riparian corridor on either side of the river. The extent of potentially suitable SWFL habitat is limited due to the perched floodplain and mowing in some areas. Similar to other Hatch Reach sites, higher quality habitat occurs on lower terraces or islands where hydrology is more suited to the establishment and development of native vegetation. A one hectare patch of suitable habitat occurs within a marsh complex in the downstream end of the site adjacent to ongoing and potential future USIBWC restoration sites. Seven WIFLs including two migrants, one resident unpaired male SWFL and two breeding pairs were detected in 2017. The two breeding pairs produced three successful nests during the summer.

HA-05 (Figure 5) is the next downstream site immediately below HA-04. It consists of 4.9 km of riparian corridor on either side of the river. Habitat is restricted to lower terraces and islands and vegetation outside of the river bank is limited by routine mowing. Native habitat within the river banks persists in the form of mature coyote willows. In some areas, saltcedar is

interspersed with the coyote willow. Islands typically contain the highest quality habitat in the site. In 2017 four WIFLs were detected within this site. Of these, one was a resident unpaired male SWFL and the others were determined to be migrants.

Site HA-06 (Figure 5) is the furthest downstream site in the Hatch Reach and encompasses 7.7 km of riparian corridor on both sides of the Rio Grande. Riparian habitat within this site is similar to site HA-04 and is dominated by narrow strips of predominately mixed and native vegetation immediately adjacent to the river. Small strips or patches of suitable habitat occur sporadically where hydrology is more suitable due to lower banks or the presence of high-flow channels. In 2017, 34 WIFLs were detected in this site including 4 migrants, 6 resident unpaired male SWFLs and 12 pairs. Nine of these pairs nested in 2017 and built 12 nests. Seven nests successfully fledged young and five failed.

The **Radium Springs Site** (Figure 7) is one of two sites located within the Radium Springs Reach. This site is approximately 6 km in length and has been surveyed in whole or in part since 1996. The site typically supports between one and five SWFL territories. Much of the riparian corridor within this site is under private ownership. Riparian habitat within this site is not as restricted as in upstream reaches and occupies much of the floodplain. However, the majority of the riparian habitat is perched above the river channel and remains relatively dry due to a lack of overbank flooding. Dominant vegetation within these perched areas typically consists of saltcedar in varying densities and age classes. Higher quality native habitat in the form of coyote willow and occasional Goodding's willow occurs on lower terraces and river bars. Ten WIFLs were documented in this site in 2017, including seven migrants and three resident unpaired male SWFLs.

Nest Searches/Monitoring

Nest searches were conducted for all SWFL pairs located within the Lower Rio Grande study area where access was granted in 2017. Distance between study sites and limited access due to high water presented logistical challenges that prevented nest searching within certain territories and regular monitoring of some nests. Nest monitoring was conducted as outlined in the nest monitoring protocol (Rourke et al. 1999). There were 66 SWFL nests monitored with known outcomes in the Lower Rio Grande during 2017. Of these, 41 successfully fledged young (62 percent) and 25 failed (Table 1). Of those that failed, 17 were predated (68 percent), 3 were parasitized by cowbirds, and 5 were abandoned. Initial nesting attempts were located between early June and mid-July and all nesting attempts were completed by mid-August. Four territories were established in the Las Palomas site and produced six nests, one of which had an unknown outcome. The remaining nests were all located downstream of Caballo Dam. These included 39 first nests and 22 renests or second broods.

Due to the great difference in habitat and environmental variables between Caballo Reservoir delta sites and sites located downstream along the Rio Grande, two datasets were compiled.

Habitat within the Caballo Reservoir delta consists of relatively large patches of Goodding's willow between 8 and 12 m in height interspersed with salt cedar stands and open areas in a broad floodplain. Nesting habitat in downstream reaches is very linear and narrow due to a leveed floodplain and is dominated by coyote willow between 6 and 10 m in height. Nests downstream of Caballo Reservoir were considered separately from upstream nests during data summarization for several reasons:

1) Hydrology within the reservoir delta is influenced primarily by fluctuating reservoir and groundwater levels and nests downstream are affected primarily by river flows.
2) Vegetative composition and patch size are highly different in the Caballo delta (large patches of primarily Goodding's willow) compared to downstream (relatively narrow strips of coyote willow).
3) The two nesting sub-populations are separated by approximately 25 miles of riparian corridor and the Caballo territories are likely more associated with the large breeding population in Elephant Butte Reservoir.

However, no statistical analysis was performed on either dataset in 2017 due to the small sample size. Nevertheless, when 2013 through 2017 data were combined sufficient data were available for statistical analysis, presented in the discussion section. The data are summarized in the following sections and details are located in the attachments. See the Appendix for Nest Record Forms.

Caballo Delta Nests

There were four nesting pairs in the Caballo Reservoir delta in 2017 and six nests were found. Only the nests with known outcomes are discussed. All five known-outcome nests were found in native-dominated (coyote willow) habitat. All nests were found above at least saturated soil throughout the breeding season and three of the five were above flooded soils. Three of the five nests successfully fledged young in 2017. The remaining two nests failed due to predation and parasitism. Due to a small sample size within the Caballo Delta, a statistical comparison could not be conducted for habitat and nesting variables.

Downstream Nests

Fifty one of the sixty one nests (83 percent) monitored downstream of Caballo Reservoir were located in native-dominated (willow) habitat. Eighty two percent of the nests (42 of 51) found in native-dominated habitat were constructed in coyote willow. Of the nine remaining nests, seven were found in saltcedar and two were found in *Baccharis*. Small sample sizes prevented within-year statistical comparisons of habitat and nesting variables.

Hydrologically, nests downstream of Caballo Reservoir were similar. Flow releases from Caballo Reservoir provided water to the Hatch and Radium Springs sites throughout the summer. The river was continuous throughout the breeding season and water was present through most of the breeding habitat. Thus, 58 of the 61 known-out nests (95 percent) were above at least saturated soil during the nesting cycle and 16 of those were above floodwater. Two nests were above dry ground throughout the nesting cycle. Being that the "Flooded all cycle" nests are a subset of "Saturated all cycle" nests, no within-year statistical analyses were conducted as most

of the data are the same sample. A total of 38 of the 61 nests (62 percent) successfully fledged SWFLs. Sixty-two percent of nests over saturated soil fledged young and both of the nests over dry soil throughout the nest cycle fledged young. Sixty-two percent of nests (10 of 16) above flood water fledged SWFL chicks. Depredation was the primary cause of nest failure, responsible for 17 of 23 (74 percent) failed nesting attempts. Three nests were parasitized by Brown-headed Cowbirds but two of the three nests still fledged SWFL chicks. Five nests were abandoned for unknown reasons. Due to the narrow nature of the floodplain vegetation, all nests were within 50 m of surface water during a majority of their nesting cycles. See the Attachment for additional details regarding nesting variable analyses.

Discussion

Presence/Absence Surveys

According to the Southwestern Willow Flycatcher Final Recovery Plan (USFWS 2002), the Lower Rio Grande Management Unit of the Rio Grande Recovery Unit encompasses the Rio Grande between Elephant Butte Dam and the International Boundary at El Paso, Texas. The recovery goal for this Management Unit is 25 SWFL territories. With the exception of two sites (Radium Springs and Selden Canyon), SWFL surveys had not been conducted in this reach prior to 2010. Surveys have been conducted sporadically within the Radium Springs and Selden Canyon sites since 1996 and between one and eight territories were documented annually. Other sites in this reach were partially surveyed during 2010 and 2011. During these years, four and six SWFL territories, respectively, were located in two different sites. In 2012, following extensive reconnaissance of the Lower Rio Grande, all potential flycatcher habitat within four study reaches was surveyed a minimum of three times and 28 SWFL territories were located (Figure 11). In 2013, the survey area expanded to include the Percha Dam Site and five surveys were conducted in all potential habitat; 38 SWFL territories were located, representing a 36 percent increase from 2012.

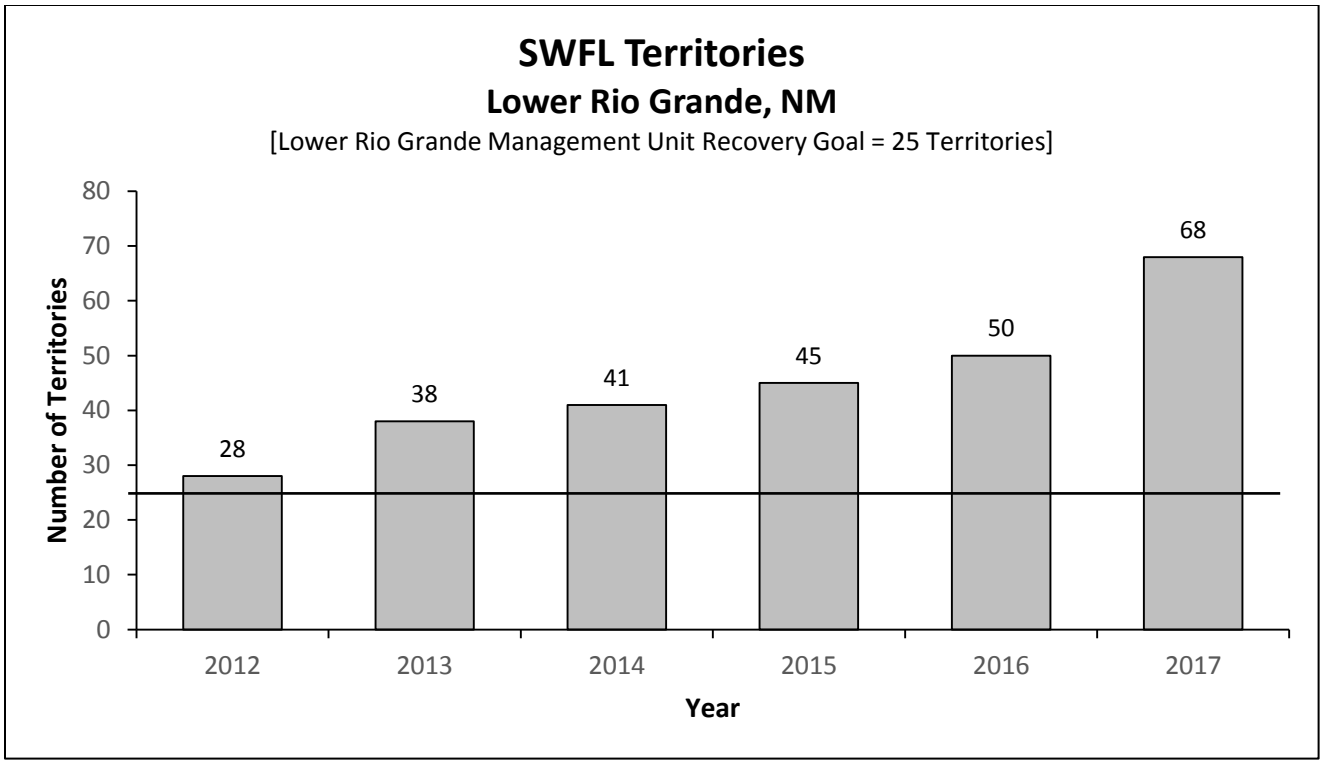
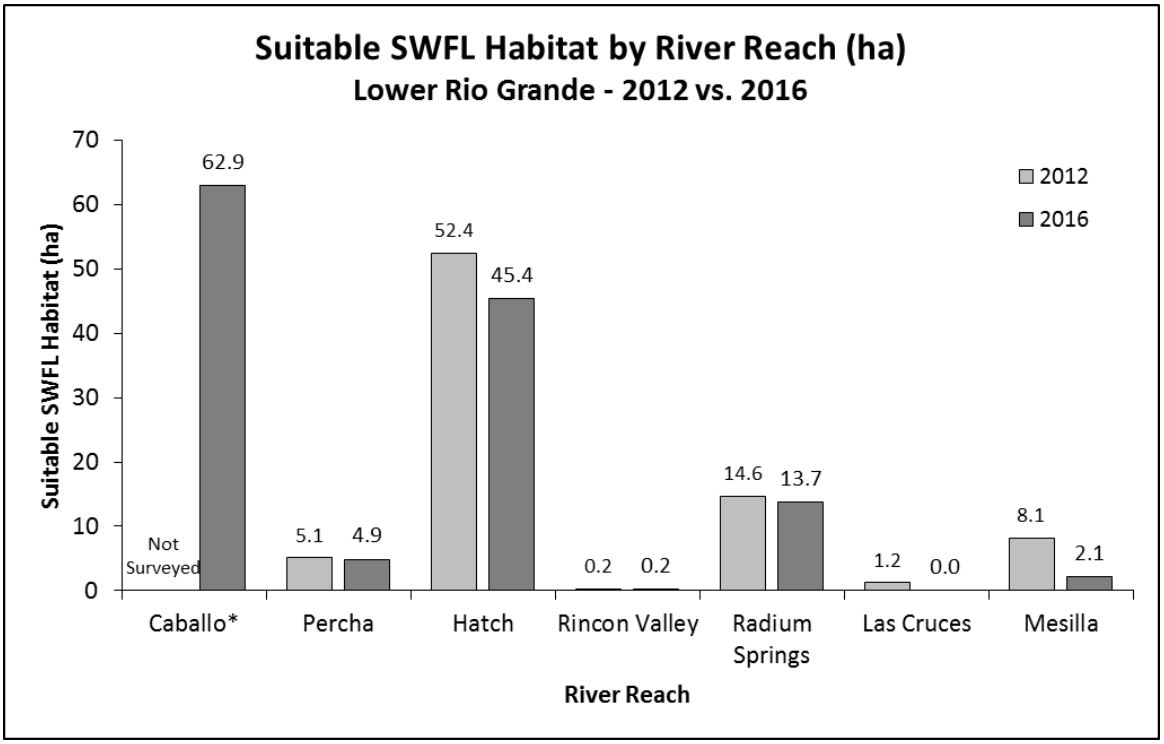


Figure 11. Lower Rio Grande SWFL territories south of Elephant Butte Dam to El Paso, TX – 2012 to 2017.

Territory numbers have continued to increase annually in the Lower Rio Grande to a maximum of 68 territories in 2017. This represents the sixth consecutive year of increasing territory numbers in this portion of the Rio Grande; territory numbers have more than doubled since 2012. Territory numbers have also exceeded recovery goals for six consecutive years. Based on the results of the habitat mapping effort conducted in 2016 (Moore and Ahlers 2017), there is ample unoccupied suitable habitat in the Lower Rio Grande study area. Although drought and low river flows between 2012 and 2014 resulted in declines in the quantity of suitable SWFL habitat between the 2012 and 2016 classification studies (Figure 12), these impacts are reversing in the Hatch reach due to wetter conditions and suitable habitat appears to be expanding in the Caballo Reach. Based on these trends, it is possible that the SWFL population in the Lower Rio Grande may continue to grow in coming years, particularly within the Caballo Reach where habitat availability is increasing.



***The Caballo Reach was not surveyed in 2012.**

Figure 12. Suitable SWFL Habitat by River Reach, 2012 vs. 2016.

Caballo Reach

Surveys within this reach had not been conducted prior to 2012. Reservoir management and mowing operations have limited the growth of woody vegetation within the exposed reservoir pool but several patches of native Goodding's willow, cottonwood and exotic salt-cedar have persisted. Habitat suitability mapping conducted by Reclamation in 2016 located approximately 63 ha of suitable SWFL habitat in the Caballo Reservoir delta, more than in any other reach (Moore and Ahlers 2017). Although the Caballo reach was not included in the initial 2012 habitat classification study, field observations suggest that suitable SWFL habitat is increasing in this reach. During surveys in 2012, a breeding SWFL pair was found within one of the patches dominated by Goodding's willow. After expanding to a high of 15 territories in 2014, the population has again declined in this reach over the last 3 years with only 8 territories and 4 breeding pairs in 2017 (Figure 13). The Caballo Delta contains the only sizeable expanse of Goodding's willow-dominated habitat within the entire Lower Rio Grande. If suitable hydrologic conditions persist and the native-dominated stands continue to develop and expand, this reach could provide some of the most viable SWFL habitat in the future.

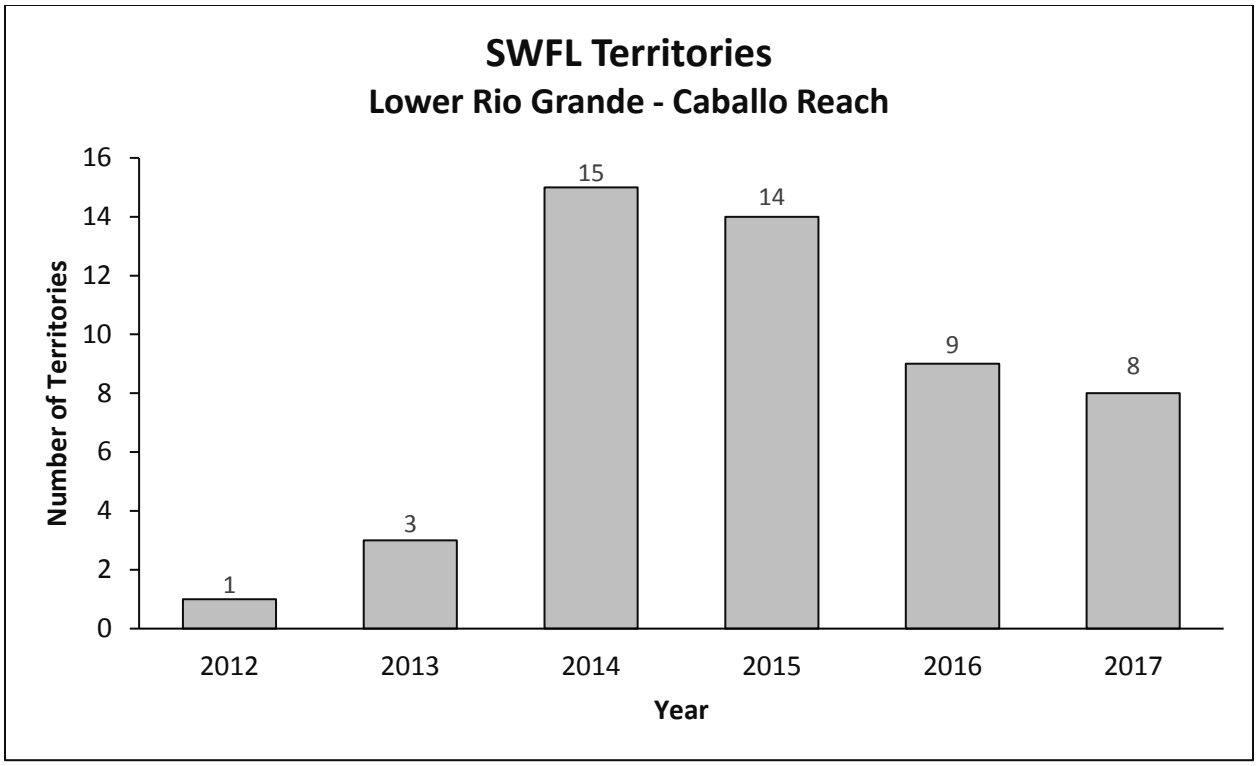


Figure 13. SWFL territories located within the Caballo Reach – 2012 to 2017.

Percha Reach

The habitat adjacent to Percha Dam, including the abandoned Percha Tree Farm, has been considered for riparian restoration. Water backed up by the dam contributes to a higher water table in the adjacent floodplain and promotes dense growth of a mixture of willows, cottonwood, salt-cedar, white mulberry (*Morus alba*) and Siberian elm (*Ulmus pumila*) (Ahlers et al. 2016). Approximately five ha in the Percha Reach were classified as suitable SWFL breeding habitat during the habitat classification study conducted in 2016 (Moore and Ahlers 2017). In order to achieve compliance for potential future restoration activities, flycatcher surveys have been conducted annually in this site since 2013. No resident SWFLs have been detected during any of these six years of surveys. Continuation of surveys will ascertain whether these patches of habitat become occupied by breeding SWFLs in the future.

Hatch Reach

Several isolated patches within the HA-01 and HA-04 sites were surveyed by USIBWC contractors in 2010 and 2011. One of these patches, the Crow Canyon B patch (within the current HA-01 site) supported four SWFL territories during each of those years (TRC Environmental Corporation 2011). This occupied habitat is dominated by large coyote willow (5 to 10 centimeters (cm) diameter at breast height with occasional saltcedar trees, and averages approximately 7 m in height. The most suitable habitat is located on lower terraces or islands adjacent to backwaters and typically has had extensive beaver activity. Standing water is often

present during “normal” river flows making these areas also some of the most suitable SWFL habitat within the entire Lower Rio Grande. Several similar patches of suitable habitat occur throughout the Hatch Reach which prompted comprehensive surveys of the entire reach in 2012. Three surveys in 2012 documented 25 territories, including 20 pairs, making it the most abundantly occupied reach within the study area. Survey effort in this reach was increased to five surveys in 2013 and 30 territories were documented. The surveys conducted in 2014 and 2015 recorded a decline in territory numbers, likely due to the degradation of habitat that occurred during the drought of 2012 to 2014. However, this habitat has since begun to rebound and the extent and quality of suitable habitat may increase if conditions continue to improve. Indeed, 57 SWFL territories, including 44 breeding pairs, were documented in this reach in 2017—the highest number of detections since surveys began in 2012. Moreover, this reach supports the majority of SWFL territories below Caballo Dam (Figure 14).

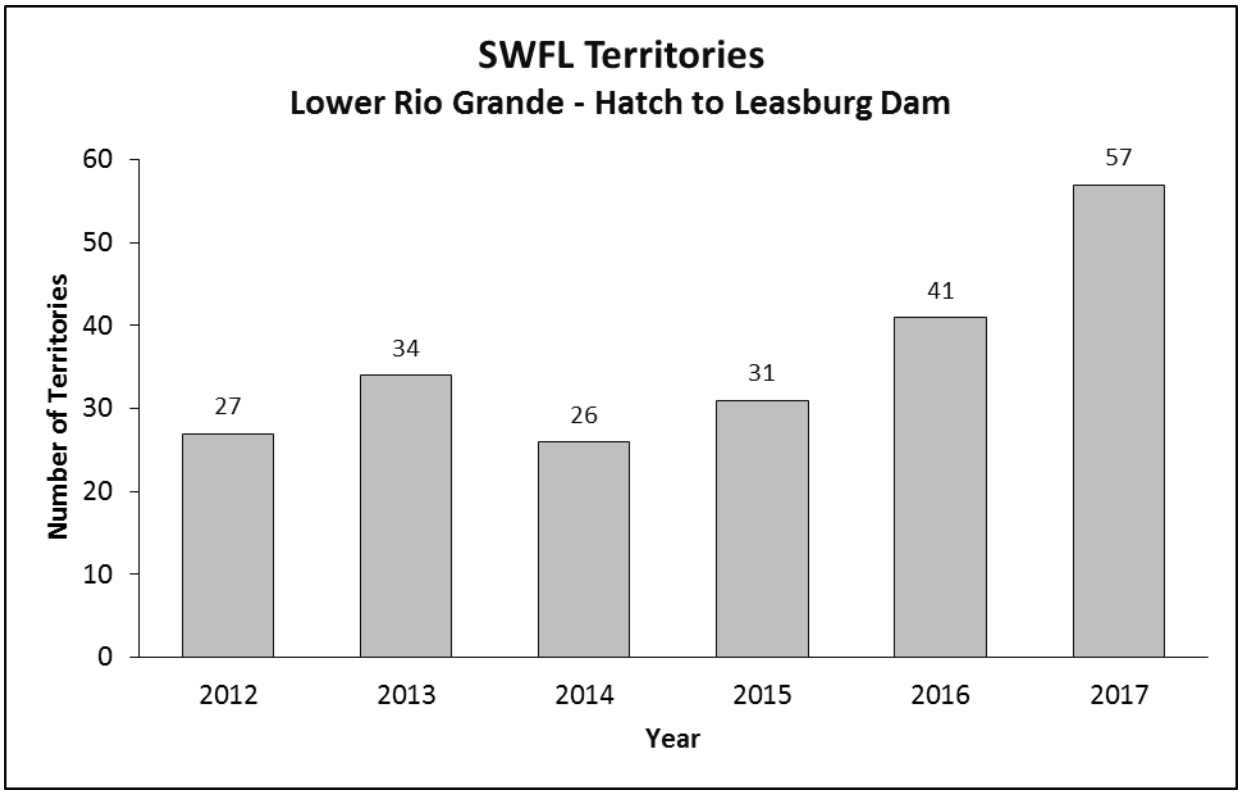


Figure 14. SWFL territories located below Caballo Dam (Hatch and Radium Springs Reaches) – 2012 to 2017.

Rincon Valley Reach

Based on the results of the 2016 habitat mapping effort (Moore and Ahlers 2017), this reach contains one of the smallest extents of suitable SWFL breeding habitat of any reach in the Lower Rio Grande (0.2 ha) and has never been previously surveyed by Reclamation. The Broad Canyon Arroyo restoration site in this reach was surveyed by USIBWC contractors in 2010-11. This reach was surveyed five times in 2017 for the first time. However, no SWFL territories were detected. In the absence of successful riparian restoration in this reach, it is unlikely that

suitable SWFL breeding habitat will develop in the future.

Radium Springs Reach

SWFL surveys have been sporadically conducted within this reach by various entities since 1996. It is difficult to determine which areas within each of the two sites were surveyed in any given year. However, it appears that portions of the Selden Canyon Site were surveyed during nine seasons between 1999 and 2011 and between zero and five SWFL territories were documented annually. Comprehensive surveys of the site by Reclamation personnel between 2011 and 2015 documented up to two territories. No migrant or resident WIFLs were detected in this site in 2017. The Radium Springs site was surveyed in part or in its entirety during 11 seasons between 1996 and 2012. Territory numbers fluctuated between one and five during this period. During 2013 and 2014, all habitat within this reach was surveyed and four territories were located each year. The number of territories again increased in 2015 and 2016 to seven and eight territories, respectively. This represents the largest number of territories documented in the site since surveys began 20 years ago. In 2017 Reclamation documented a slight population decline; only three SWFL territories were recorded in Radium Springs. The larger populations in upstream reaches may act as source populations for this reach. Additionally, it appears that overall habitat abundance and quality has remained relatively constant or may be increasing. Combined, these factors suggest that this population may grow in the future.

Las Cruces Reach

This reach, like the Rincon Reach, is almost entirely devoid of suitable SWFL habitat. Two USIBWC restoration sites, called the Clark Lateral and the Leasburg Extension Lateral Wasteway 8, were surveyed in 2010. Neither site contains suitable breeding SWFL habitat. Annual preseason reconnaissance in 2014, 2015, and 2016 has confirmed the continued lack of suitable SWFL habitat. In 2017 this reach was surveyed five times for the first time but no SWFL territories were documented. Without significant riparian restoration efforts, this reach will likely not support breeding SWFLs.

Mesilla Reach

This reach was surveyed entirely or in part by various entities between 2010 and 2013. Several areas slated for restoration were surveyed by USIBWC contractors during 2010 and 2011. Within one of these patches, a USIBWC restoration site called Sunland Park (in the current ELLA-08 site), five WIFLs were documented during the first two surveys in mid-May and mid-June of 2011 (TRC Environmental Corporation 2011). The two individuals located during the second survey were classified as resident SWFLs, although they were not located during the third survey period and were more likely late migrants. Surveys conducted throughout this reach during 2012 and 2013 by Reclamation did not document any migrants or SWFLs. Habitat declines led to the exclusion of this reach from the survey effort in 2014 and 2015. Pre-season reconnaissance in 2017 suggested a resurgence of patches of potentially suitable SWFL habitat and ELLA-02, 03, 04, 05, and 08 were again surveyed this year. However, no migrant or resident WIFLs were detected. In the absence of major changes within this reach, it is unlikely that a

population of breeding SWFLs will develop here in the future.

Nest Searches/Monitoring

Intensive SWFL nest monitoring was conducted within the Lower Rio Grande for the first time in 2013. Nests monitored in the subsequent four breeding seasons increased the sample size and provided increased confidence in nesting variable analyses. Several intriguing patterns were noted during those years. Annual variation in nest success was summarized for both the Caballo Reservoir nests and those downstream of Caballo Reservoir. However, sample sizes were insufficient to conduct statistical analyses on Caballo Reservoir nests, and analyses were therefore restricted to downstream nests.

Annual Nest Success

Nest success rates have been historically low overall, but exhibited an increasing annual trend in the SWFL population below Caballo Reservoir (Figure 15). In 2016 and 2017, nest success reached the highest levels (60 and 62 percent, respectively) since Reclamation began nest searching in 2013. Nests monitored in the Lower Rio Grande between 2013 and 2017 have fledged young 49 percent of the time (n=179). This is notably higher than the 36 percent fledging rate (432 of 1175 nests) observed in the Middle Rio Grande during the same time period (Moore and Ahlers 2016). Minimum SWFL nest success in the Middle Rio Grande population was 49 percent when that population was expanding between 2002 and 2008 (Moore and Ahlers 2012). Nevertheless, the percentage of nests that have successfully fledged young annually in the Lower Rio Grande has increased from 33 percent in 2013 (n = 30) to 62 percent in 2017 (n = 66) below Elephant Butte Dam. Moreover, nesting success observed during the same time period in the Middle Rio Grande ranged from 28 to 44 percent, suggesting that the Lower Rio Grande nest success rate is within the range of natural variation for the species. The generally low nest success rates from 2012 to 2014 can likely be attributed to the narrow, linear nature of the available habitat, particularly in the Hatch Reach, yielding reduced concealment from predators and cowbirds, which may have been exacerbated by drought conditions. The high success rates observed in 2016 and 2017 are a testament to the habitat recovery that has occurred.

Cowbird parasitism rates, which have been historically high particularly within the Caballo Reservoir delta population, appear to be declining. Only once during the past 13 years did cowbird parasitism exceed 20 percent in the Middle Rio Grande SWFL population. Although the Caballo Delta sample size between 2013 and 2017 is considerably smaller, the overall parasitism rate was 35 percent (7 out of 20 nests with known fates – Figure 16). However, only one nest failure has been attributed to cowbird parasitism in the last three years, suggesting that parasitism rates may be declining. The SWFL Recovery Plan (USFWS 2002) states that parasitism rates exceeding 20 percent for several years could be a cause for concern and possibly warrant mitigating action. The current numbers have not exceeded this threshold, however, monitoring should continue. Overall, nest data collected during the past six breeding seasons suggest that nest success is increasing and that both predation rates and parasitism rates are decreasing below Elephant Butte Dam. Moreover, the overall number of nests has

increased over the last six years, attributed primarily to increases in the Hatch Reach. However, annual fluctuations regularly occur in avian populations and six years of data are insufficient to understand long term population trends and the demographic significance of annual fluctuations. Continued annual monitoring will provide further insight into the growth trajectory of the Lower Rio Grande SWFL population and the factors that may limit growth rates.

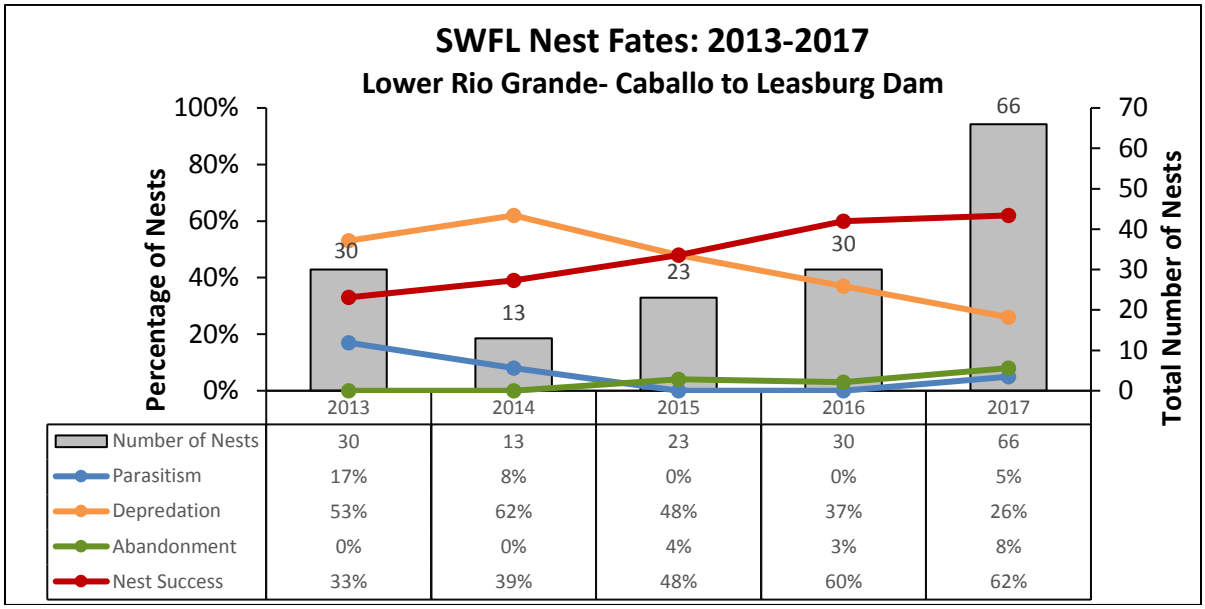


Figure 15. SWFL nest variables – Lower Rio Grande nests – Hatch to Leasburg Dam – 2013 to 2017.
Percentages may sum to >100% in a given year because a single nest may be parasitized and predated or successful.

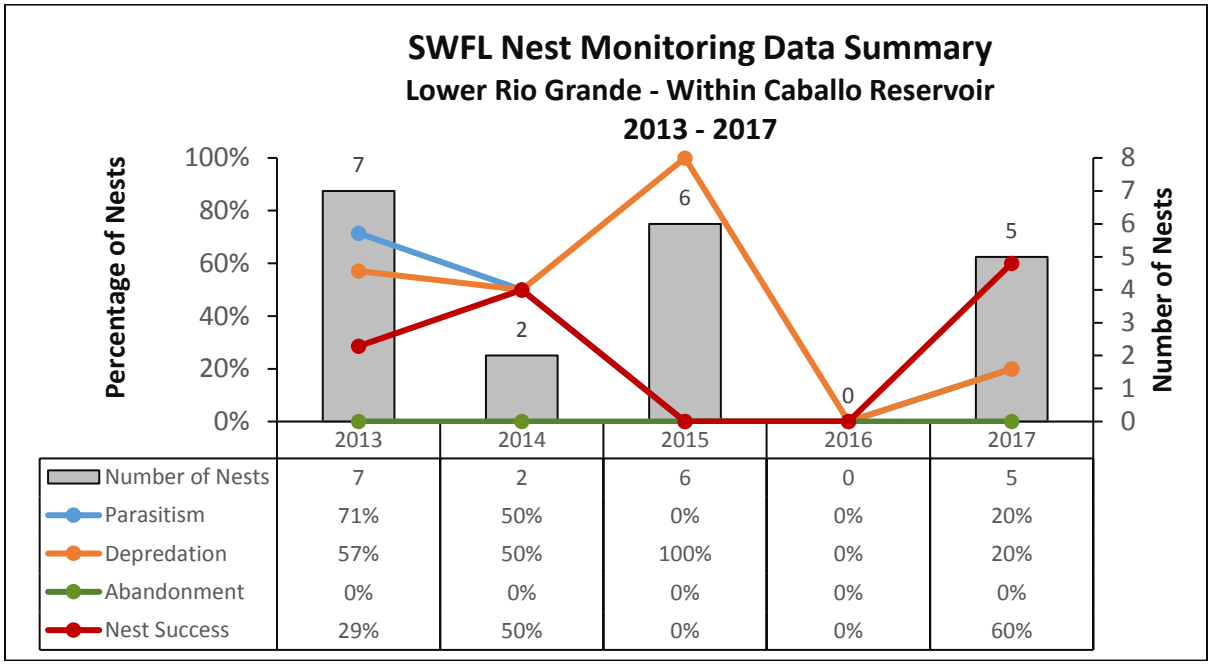


Figure 16. SWFL nest variables – Lower Rio Grande Caballo Reservoir delta – 2013 to 2017.
Percentages may sum to >100% in a given year because a single nest may be both parasitized and predated or successful.

Nesting Substrate

SWFLs breeding downstream of Caballo Reservoir constructed 79 percent of nests in willow (*Salix* spp.) and 19 percent of nests in saltcedar between 2013 and 2017 (*n* = 157). SWFLs breeding in Caballo Reservoir constructed 65 percent of nests in willow in this same time period (*n* =20). Although SWFLs do historically nest in willow and other native riparian vegetation, this high use of willow for nesting reflects the dominance of willow habitat on the Lower Rio Grande. Indeed, 89 percent of territories downstream of Caballo Reservoir were dominated by native vegetation between 2013 and 2017. A Pearson's chi-squared test found no significant difference in nest success between nests constructed in willow (52%, *n*= 124) and nests constructed in saltcedar (57%, *n*= 30) south of Caballo Reservoir (χ^2= 0.18, Df= 1, *P*= 0.68; Attachment 2). Additionally, results of a Student's t-test suggested no significant difference in nest productivity between nesting substrates (t= 0.95, Df= 1, *P*= 0.35) or dominant vegetation types (t= 1.52, Df= 1, *P*= 0.13) in the breeding territory (Attachment 2). Observed productivity of successful nests was approximately 2.8 offspring per nest constructed in willow (*n*= 65) or in a native-dominated territory (*n*= 69), and 2.5 offspring per nest constructed in saltcedar (*n*= 17) or in a mixed native and exotic-dominated territory (*n*= 13). Statistical analysis was not performed on Caballo Reservoir nests due to an insufficient sample size.

Hydrology

The soil was saturated throughout the nesting cycle under 75 percent of nests south of Caballo Reservoir (2013-2017, *n* = 157) and more than half of those nests were flooded throughout the nesting cycle. Conversely, the majority of nests in Caballo Reservoir were dry throughout the nesting cycle (60%, *n*= 20). There was not a significant difference in nest success or predation rates based on hydrology under the nest south of Caballo Reservoir (Pearson's Chi-squared test, *P*>0.1 for all tests). Nest predation rates were approximately 30 to 40 percent and nest success rates were approximately 50 to 55 percent at all nests, regardless of hydrology under the nest (Appendix 2). Moreover, an analysis of variance (ANOVA) found no significant difference in productivity of successful nests based on whether the soil under the nest was dry (*n*= 8), saturated (*n*= 60), or flooded (*n*= 36) throughout the nesting cycle (F= 0.54, Df= 2, *P*= 0.58). Productivity of all successful nests south of Caballo Reservoir ranged from approximately 2.6 to 2.9 offspring per nest (Appendix 2). Although increased sample sizes in future years will increase the power to detect small differences in nest success and productivity, current data suggest no significant differences based on nesting substrate, dominant territory vegetation, or hydrology under the nest.

Conclusions

WIFL surveys within the Lower Rio Grande have been spatially and temporally sporadic since the species was listed in 1995. During the past 18 years, a handful of territories have been documented and numbers have fluctuated markedly. Habitat reconnaissance, systematic surveys, and SWFL habitat mapping within the Caballo Reservoir delta have provided insight into the Lower Rio Grande SWFL population, habitat requirements and availability. SWFLs in the study area occupy relatively narrow strips and patches of predominately native habitat that may not be as attractive to breeding individuals. This is likely out of necessity as opposed to preference, as these are the only patches of suitable riparian habitat available. Surveys conducted since 2012 documented a sizeable, and previously largely unknown, population of SWFLs that has currently met the recovery goal for the Lower Rio Grande Management Unit. The 2017 survey and nest monitoring effort documented the fifth consecutive year of increasing territory numbers in the Lower Rio Grande, and provided insight into nesting variables and potential limiting factors to population growth. Additionally, although total numbers of nests remain low compared to the Middle Rio Grande population, the availability of suitable habitat is increasing, and both nest numbers and nest success have increased annually. These trends, if continued, could lead to further growth of the Lower Rio Grande SWFL population.

Recommendations

- Presence/absence surveys should continue within occupied reaches of the Lower Rio Grande to monitor the status of the SWFL population. These surveys will provide data regarding population trends and the distribution of territories within these sites.
- Nest monitoring should continue, to the degree possible, in areas where pairing activity is documented. These data will provide insight into factors limiting recruitment and population growth, such as parasitism and predation rates.
- Addling/removal of BHCO eggs from parasitized SWFL nests should continue, provided it can be done with minimal disturbance to the nest and the adult SWFLs.
- Habitat quality should be reassessed within the Las Cruces and Mesilla reaches every two to three years in order to ensure that no suitable habitat is overlooked.
- Hink and Ohmart vegetation mapping throughout the Lower Rio Grande should be conducted within the next two years to incorporate changes to habitat caused by drought, river maintenance and restoration activities.

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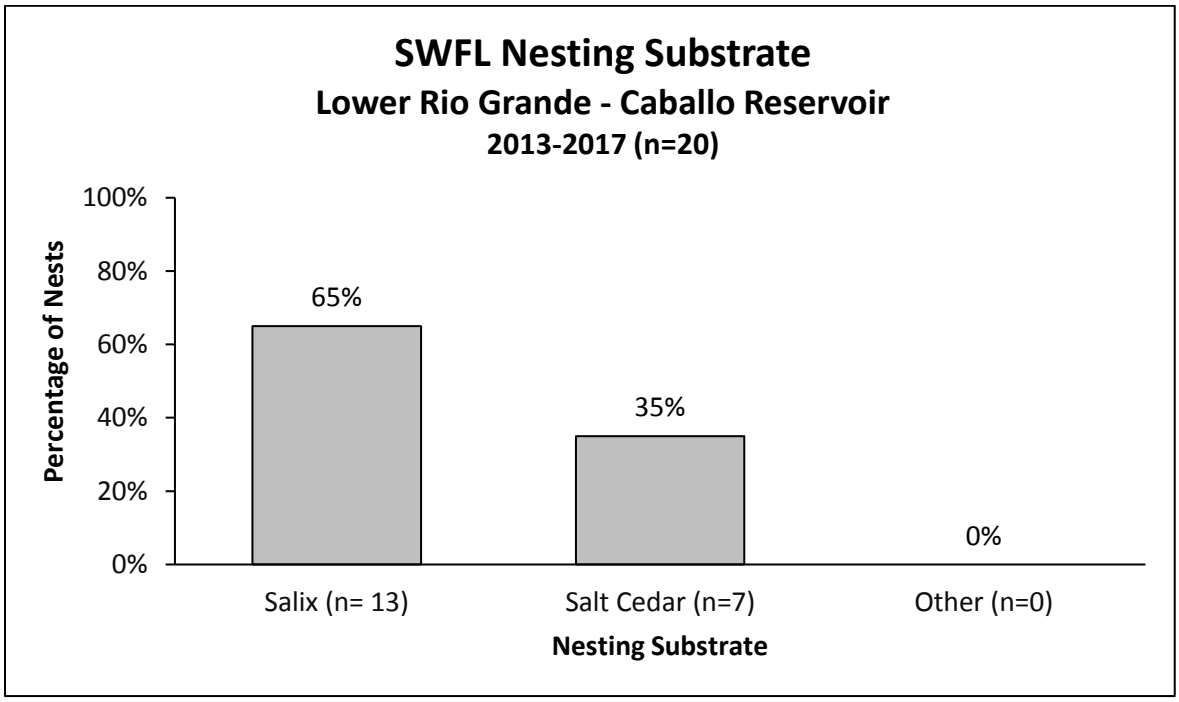
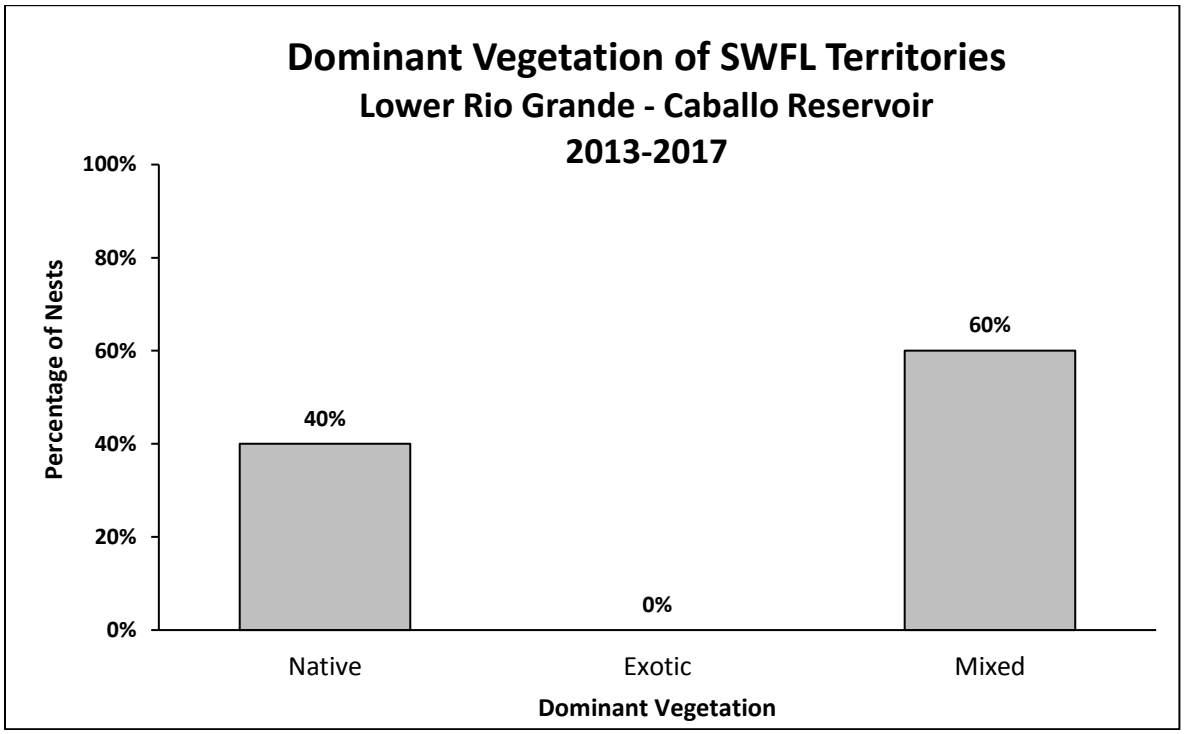
Attachment 1: SWFL Nests within Caballo Reservoir Delta 2013 - 2017

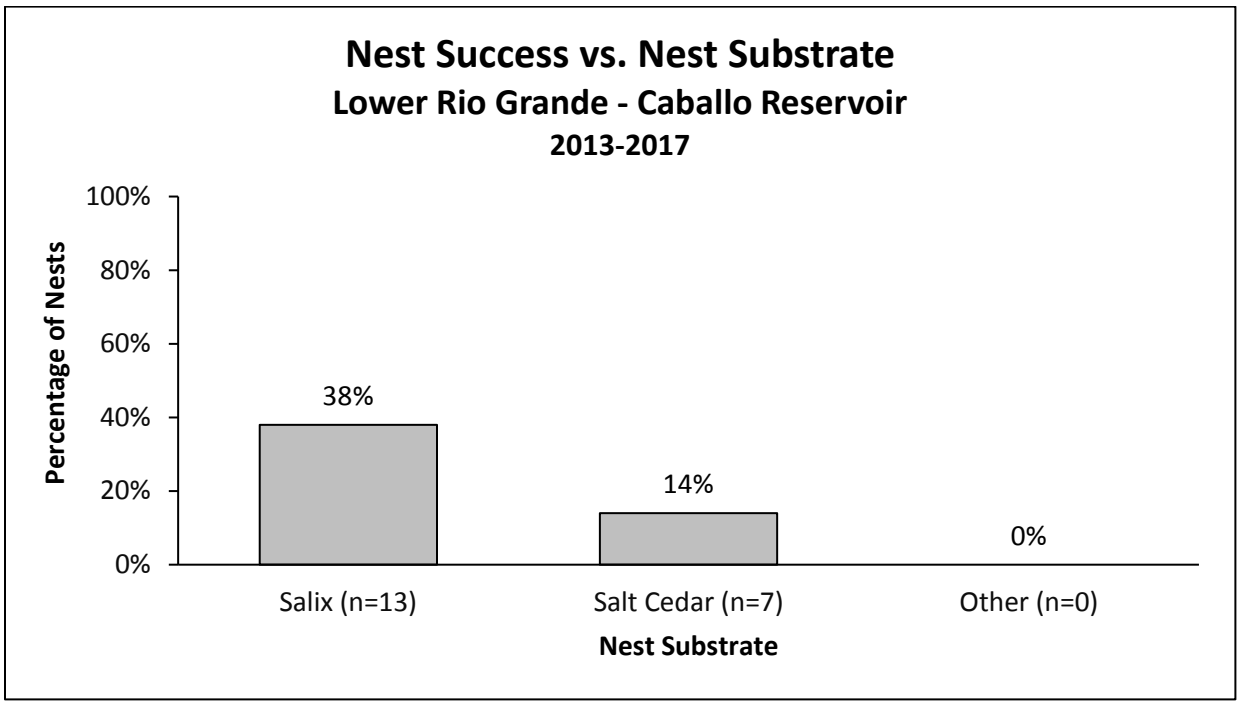
HYDROLOGY vs. NEST SUCCESS and PRODUCTIVITY SUMMARY LRG - CABALLO DELTA NEST SUMMARY 2013-2017			
Number of Total Nesting Attempts	20		
Number of First Nesting Attempts	16		
Number of Second/Third/Fourth Nesting Attempts	4		
Number of Successful Nesting Attempts	6		
Number of Failed Nesting Attempts	14		
Number of Nests (All Attempts) - Dry All Cycle	12		
Number of Nests (All Attempts) - Saturated/Flooded then Dry	0		
Number of Nests (All Attempts) - Saturated All Cycle	8		
Number of Nests (All Attempts) - Flooded All Cycle	4		
Number of Successful Nests (All Attempts) - Dry All Cycle	2		
Number of Successful Nests (All Attempts) -Saturated/Flooded then Dry	0		
Number of Successful Nests (All Attempts) - Saturated All Cycle	4		
Number of Successful Nests (All Attempts) - Flooded All Cycle	2		
Percent Successful Nests (All Attempts) - Dry All Cycle	17%	n=	12
Percent Successful Nests (All Attempts) - Saturated/Flooded then Dry	N/A	n=	0
Percent Successful Nests (All Attempts) - Saturated All Cycle	50%	n=	8
Percent Successful Nests (All Attempts) - Flooded All Cycle	50%	n=	4
Number of Predated Nests (All Attempts) -Dry All Cycle	9		
Number of Predated Nests (All Attempts) -Saturated/Flooded then Dry	0		
Number of Predated Nests (All Attempts) - Saturated All Cycle	3		
Number of Predated Nests (All Attempts) - Flooded All Cycle	2		
Percent Predated Nests (All Attempts) -Dry All Cycle	75%	n=	12
Percent Predated Nests (All Attempts) -Saturated/Flooded then Dry	N/A	n=	0
Percent Predated Nests (All Attempts) - Saturated All Cycle	38%	n=	8
Percent Predated Nests (All Attempts) - Flooded All Cycle	50%	n=	4
Number of Parastized Nests (All Attempts) -Dry All Cycle	6		
Number of Parastized Nests (All Attempts) -Saturated/Flooded then Dry	0		
Number of Parastized Nests (All Attempts) - Saturated All Cycle	1		
Number of Parastized Nests (All Attempts) - Flooded All Cycle	0		
Percent Parastized Nests (All Attempts) -Dry All Cycle	50%	n=	12
Percent Parastized Nests (All Attempts) -Saturated/Flooded then Dry	N/A	n=	0
Percent Parastized Nests (All Attempts) - Saturated All Cycle	13%	n=	8
Percent Parastized Nests (All Attempts) - Flooded All Cycle	0%	n=	4
COMPARISON OF NEST SUCCESS/ATTEMPTS (1ST OR 2ND)/HYDROLOGY			
Number of Nests (1st Attempts) - Dry All Cycle	9		
Number of Nests (1st Attempts) -Saturated/Flooded then Dry	0		
Number of Nests (1st Attempts) - Saturated All Cycle	7		
Number of Nests (1st Attempts) - Flooded All Cycle	4		
Number of Successful Nests (1st Attempts) - Dry All Cycle	0		
Number of Successful Nests (1st Attempts) -Saturated/Flooded then Dry	0		
Number of Successful Nests (1st Attempts) - Saturated All Cycle	4		
Number of Successful Nests (1st Attempts) - Flooded All Cycle	2		
Percent Successful Nests (1st Attempts) - Dry All Cycle	0%	n=	9
Percent Successful Nests (1st Attempts) - Saturated/Flooded then Dry	N/A	n=	0
Percent Successful Nests (1st Attempts) - Saturated All Cycle	57%	n=	7
Percent Successful Nests (1st Attempts) - Flooded All Cycle	50%	n=	4
Number of Nests (2-4 Attempts) - Dry All Cycle	3		
Number of Nests (2-4 Attempts) -Saturated/Flooded then Dry	0		
Number of Nests (2-4 Attempts) - Saturated All Cycle	1		
Number of Nests (2-4 Attempts) - Flooded All Cycle	0		
Number of Successful Nests (2-4 Attempts) - Dry All Cycle	2		
Number of Successful Nests (2-4 Attempts) -Saturated/Flooded then Dry	0		
Number of Successful Nests (2-4 Attempts) - Saturated All Cycle	0		
Number of Successful Nests (2nd Attempts) - Flooded All Cycle	0		
Percent Successful Nests (2-4 Attempts) - Dry All Cycle	67%	n=	3
Percent Successful Nests (2-4 Attempts) - Saturated/Flooded then Dry	N/A	n=	0
Percent Successful Nests (2-4 Attempts) - Saturated All Cycle	0%	n=	1
Percent Successful Nests (2-4 Attempts) - Flooded All Cycle	N/A	n=	0

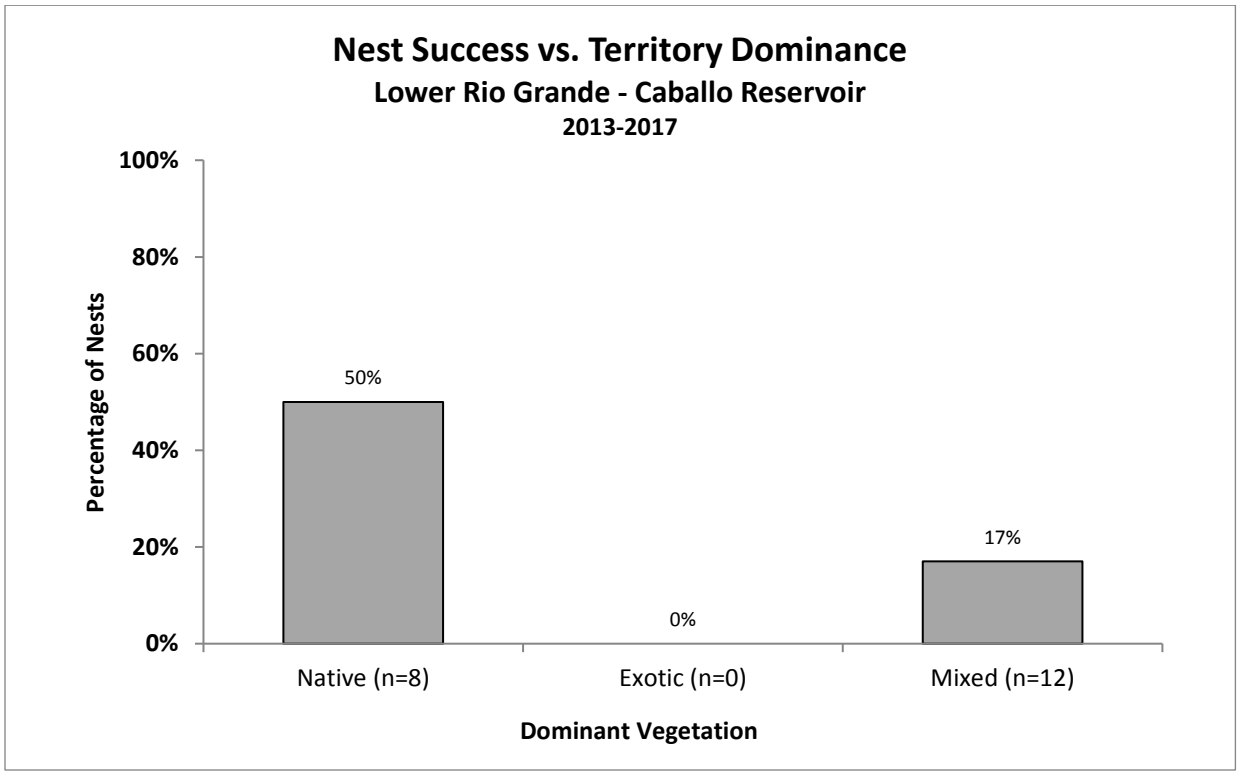
NOTE: Distance to Surface Water was considered over the entire breeding season and may have varied for individual nesting attempts.			
Number of Nests (All attempts) < or = to 100m from Surface Water	19		
Number of Successful Nests (All attempts) < or = to 100m from Surface Water	6		
Number of Unsuccessful Nests (All attempts) < or = to 100m from Surface Water	12		
Number of Nests (All attempts) > 100m from Surface Water	2		
Number of Successful Nests (All attempts) > 100m from Surface Water	0		
Number of Unsuccessful Nests (All attempts) > 100m from Surface Water	2		
Percent Successful Nests < or = to 100m from Surface water	32%	n=	19
Percent Successful Nests> 100m from Surface water	0%	n=	2
Percent of Total Nests < or = to 100m from Surface water	95%	n=	20
Number of Nests (All attempts) < or = to 50m from Surface Water	19		
Number of Successful Nests (All attempts) < or = to 50m from Surface Water	6		
Number of Unsuccessful Nests (All attempts) < or = to 50m from Surface Water	12		
Number of Nests (All attempts) > 50m from Surface Water	2		
Number of Successful Nests (All attempts) > 50m from Surface Water	0		
Number of Unsuccessful Nests (All attempts) > 50m from Surface Water	2		
Percent Successful Nests < or = to 50m from Surface water	32%	n=	19
Percent Successful Nests> 50m from Surface water	0%	n=	2
Percent of Total Nests < or = to 50m from Surface water	95%	n=	20
Productivity of Successful Nests under various Hydrologic Conditions			
Productivity of Successful Nests (All Attempts) that were Dry All Cycle	1.50	n=	2
Productivity of Successful Nests (All Attempts) that were Sat./Flooded then Dry	N/A	n=	0
Productivity of Successful Nests (All Attempts) that were Saturated All Cycle	2.75	n=	4
Productivity of Successful Nests (All Attempts) that were Flooded All Cycle	2.50	n=	2
Productivity of Successful Nests that were < 50m from Surface Water	2.33	n=	6
Productivity of Successful Nests that were > 50m from Surface Water	N/A	n=	0
Productivity of Successful Nests that were < 100m from Surface Water	2.33	n=	6
Productivity of Successful Nests that were >100m from Surface Water	N/A	n=	0

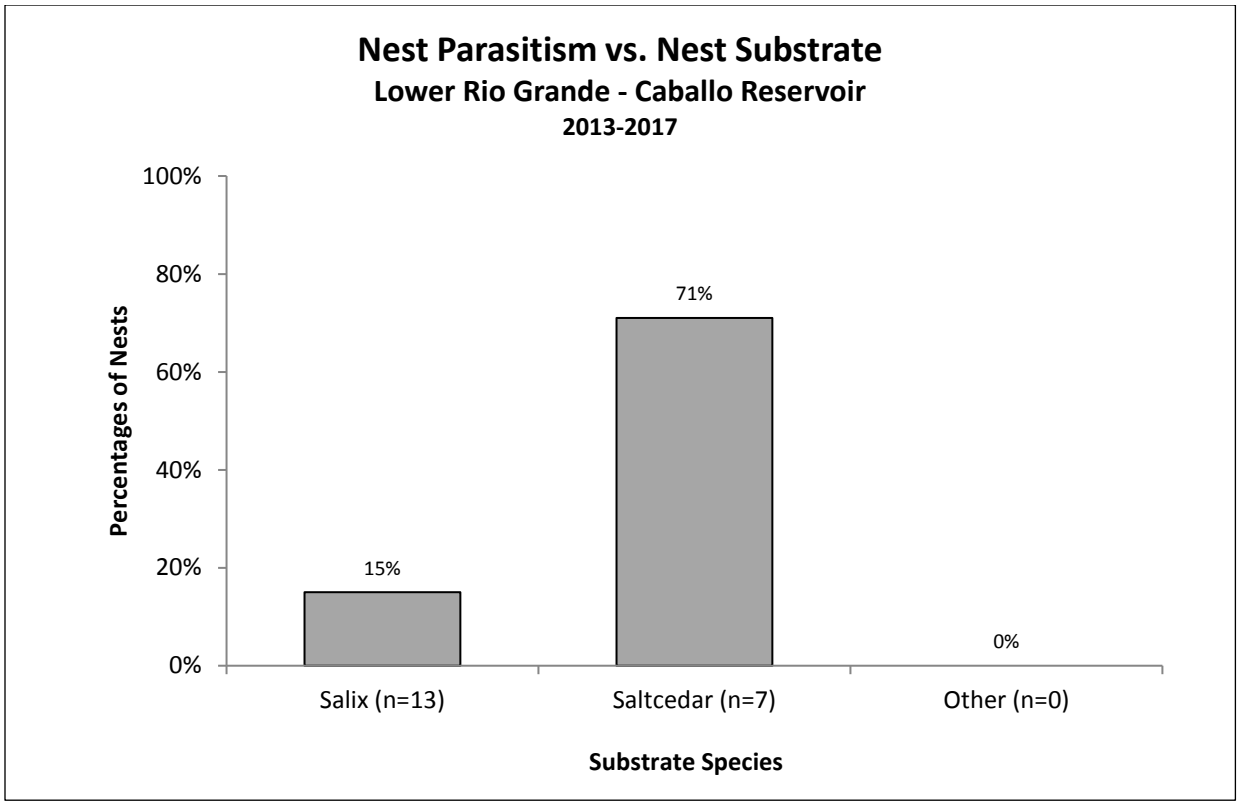
2013-2017 - SUBSTRATE USE, NESTING PARAMETERS AND NESTING SUCCESS - LRG Caballo Delta Nest Summary											
Parasitism Rate	**35.0%**	7	out of	20	nests						
Predation Rate	**60.0%**	12	out of	20	nests						
Abandonment	**0.0%**	0	out of	20	nests						
Infertile	**0.0%**	0	out of	20	nests						
Nest Success	**30.0%**	6	out of	20	nests						
Total Number of Nests		**20**									
Number of Nests in Exotic Dominated Territories					0	0.0%	20	total nests			
Number of Nests in Native. Dominated Territories					8	40.0%	20	total nests			
Number of Nests in Mixed Dominance Territories					12	60.0%	20	total nests			
Number of Nests in Salix sp. Substrate					13	65.0%	20	total nests			
Number of Nests in Salt Cedar Substrate					7	35.0%	20	total nests			
Number of Nests in Russian Olive Substrate					0	0.0%	20	total nests			
Number of Nests in Other (Seepwillow/Cottonwood) Substrate					0	0.0%	20	total nests			
Number of Nests in Salt Cedar Substrate within Native. Dominated Territories					0	0.0%	8	total nests			
Number of Nests in Salix sp. Substrate within Exotic or Mixed Dominated Territories					5	41.7%	12	total nests			
2013 to 2017 -- FOLLOWING DATA INCLUDES ONLY NESTS WITH ONLY KNOWN OUTCOMES (n=20)											
Percentage of Succesful Nests in Salix sp. Substrate					38.5%	5		out of	13		
Percentage of Succesful Nests in Salt Cedar Substrate					14.3%	1		out of	7		
Percentage of Succesful Nests in Russian Olive Substrate.					N/A	0		out of	0		
Percentage of Succesful Nests in Other (Seepwillow/Cottonwood) Substrate.					N/A	0		out of	0		
Percentage of Succesful Nests in Native. Dominated Territories					50.0%	4		out of	8		
Percentage of Succesful Nests in Exotic Dominated Territories					N/A	0		out of	0		
Percentage of Succesful Nests in Mixed Dominance Territories					16.7%	2		out of	12		
Percentage of Nests Parasitized in Salix sp. Substrate					15.4%	2		out of	13		
Percentage of Nests Parasitized in Salt Cedar Substrate					71.4%	5		out of	7		
Percentage of Nests Parasitized in Russian Olive Substrate					N/A	0		out of	0		
Percentage of Nests Parastized in Other (Seepwillow/Cottonwood) Substrate.					N/A	0		out of	0		
Percentage of Nests Parasitized in Native Dominated Territories					12.5%	1		out of	8		
Percentage of Nests Parasitized in Exotic Dominated Territories					N/A	0		out of	0		
Percentage of Nests Parasitized in Mixed Dominance Territories					50.0%	6		out of	12		
Productivity of all Nests found in Native Dominated Territories					1.38	/nest		11	young from	8	nests
Productivity of all Nests found in Exotic Dominated Territories					N/A	/nest		0	young from	0	nests
Productivity of all Nests found in Mixed Dominance Territories					0.25	/nest		3	young from	12	nests
Productivity of all Nests found in Salix sp. Substrate					0.92	/nest		12	young from	13	nests
Productivity of all Nests found in Salt Cedar Substrate					0.29	/nest		2	young from	7	nests
Productivity of all Nests found in Russian Olive Substrate					N/A	/nest		0	young from	0	nests
Productivity of all Nests found in Other (Seepwillow/Cottonwood) Substrate					N/A	/nest		0	young from	0	nests
Productivity of Nests in Salix substrate within Native Dominated Territories					1.38	/nest		11	young from	8	nests
Productivity of Nests in Salt Cedar substrate within Native Dominated Territories					N/A	/nest		0	young from	0	nests
Productivity of Nests in Salt Cedar substrate within Exotic Dominated Territories					N/A	/nest		0	young from	0	nests
Productivity of Successful Nests in Salix substrate within Native Dominated Territories					2.75	/nest		11	young from	4	nests
Productivity of SuccessfulNests in Salt Cedar substrate within Native Dominated Territories					N/A	/nest		0	young from	0	nests
Productivity of Successful Nests in Salt Cedar substrate within Exotic Dominated Territories					N/A	/nest		0	young from	0	nests
Productivity of Successful Nests found in Native Dominated Territories					2.75	/nest		11	young from	4	nests
Productivity of Successful Nests found in Exotic Dominated Territories					N/A	/nest		0	young from	0	nests
Productivity of Successful Nests found in Mixed Dominance Territories					1.50	/nest		3	young from	2	nests
Productivity of Successful Nests found in Salix sp. Substrate					2.40	/nest		12	young from	5	nests
Productivity of Successful Nests found in Salt Cedar Substrate					2.00	/nest		2	young from	1	nests
Productivity of Successful Nests found in Russian Olive Substrate					N/A	/nest		0	young from	0	nests

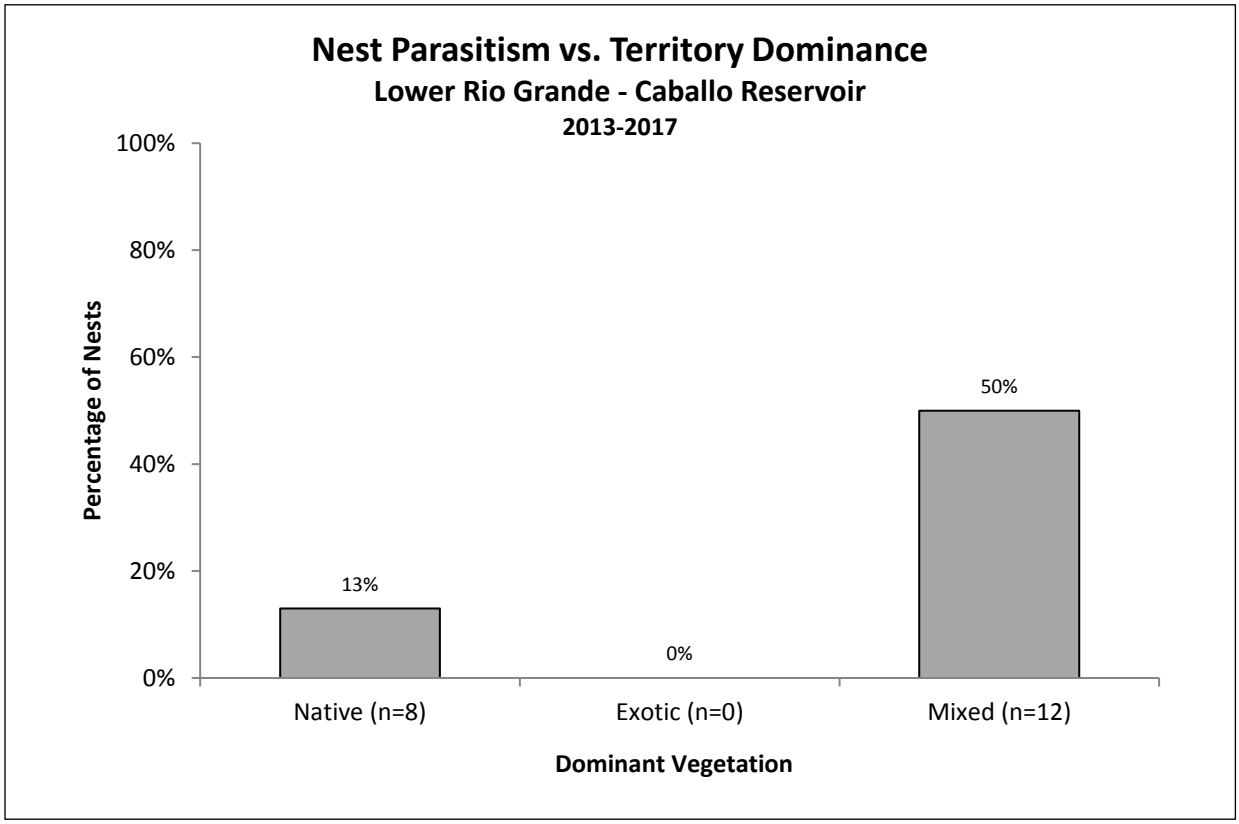

SWFL Nesting Substrate
Lower Rio Grande - Caballo Reservoir
2013-2017 (n=20)
Percentage of Nests
100%
80%
60%
40%
20%
0%
65%
35%
0%
Salix (n= 13)
Salt Cedar (n=7)
Other (n=0)
Nesting Substrate

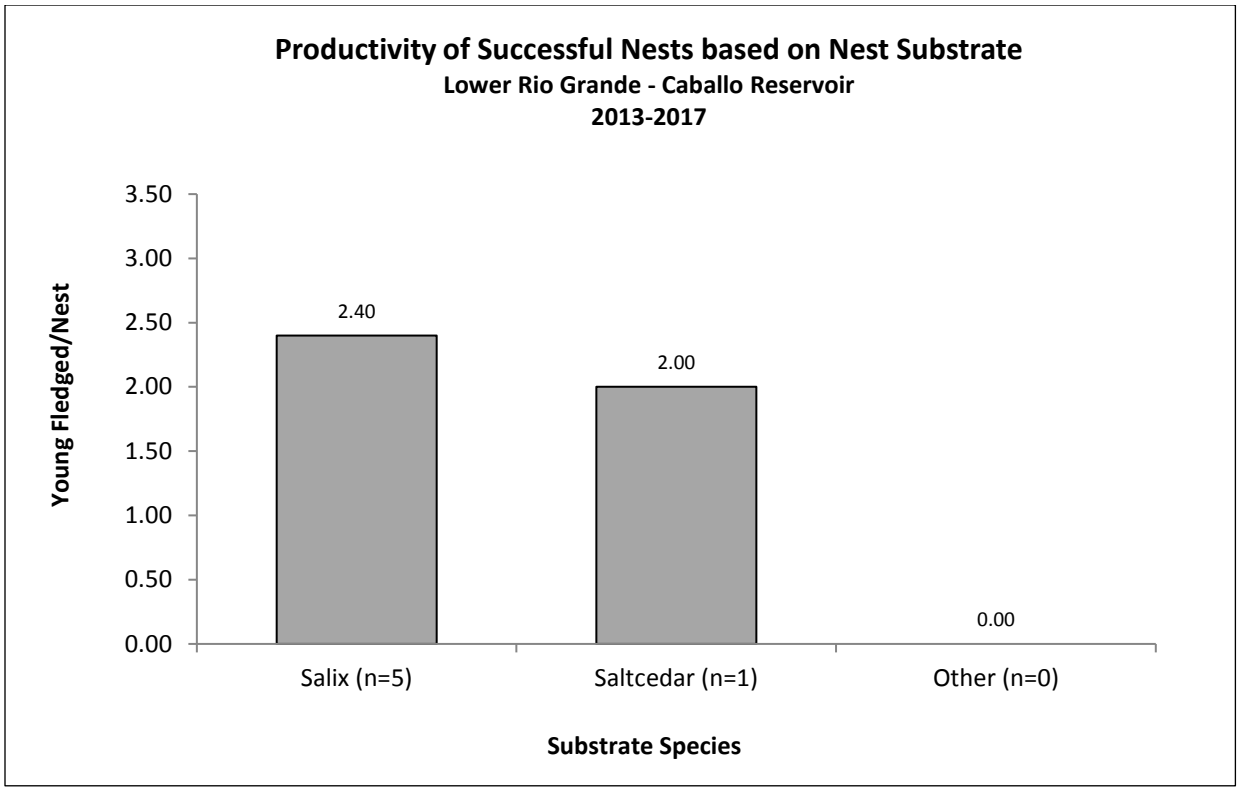

Dominant Vegetation of SWFL Territories
Lower Rio Grande - Caballo Reservoir
2013-2017
Percentage of Nests
100%
80%
60%
40%
20%
0%
40%
0%
60%
Native
Exotic
Mixed
Dominant Vegetation

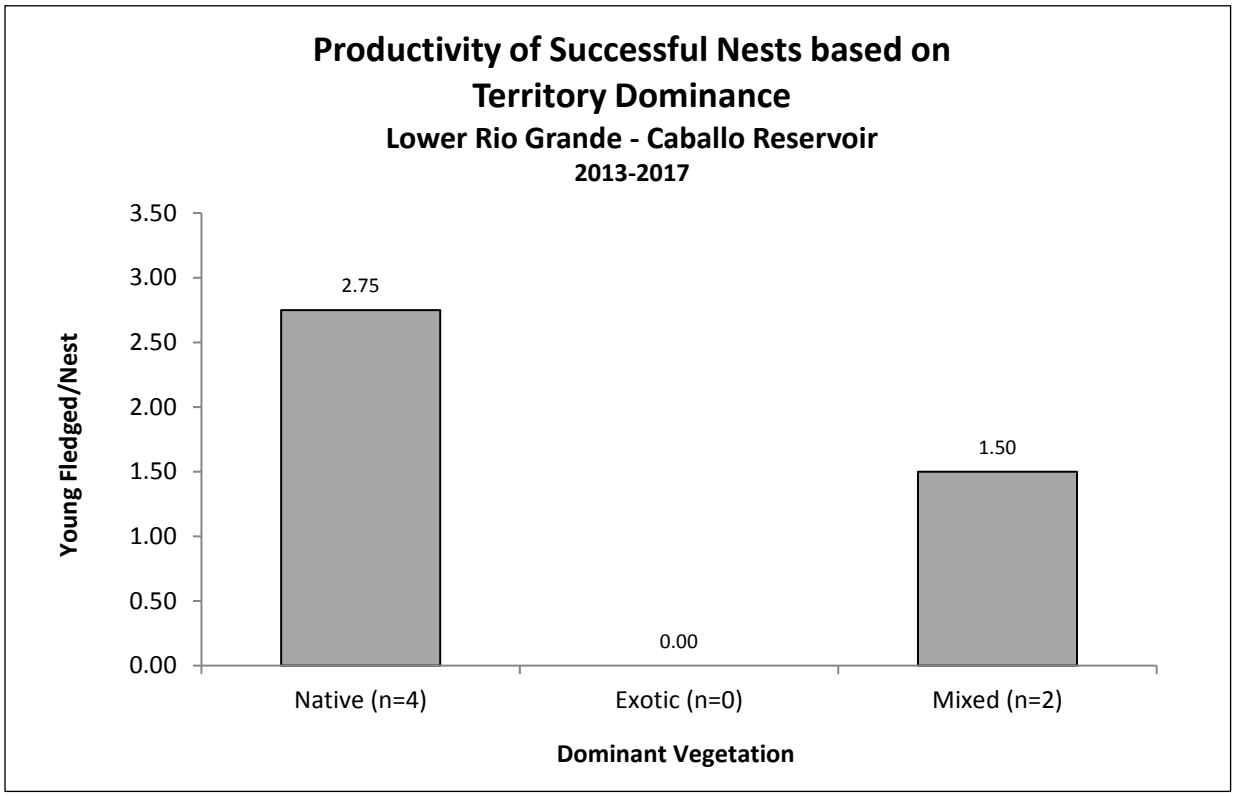

Nest Success vs. Nest Substrate
Lower Rio Grande - Caballo Reservoir
2013-2017
Percentage of Nests
100%
80%
60%
40%
20%
0%
38%
14%
0%
Salix (n=13)
Salt Cedar (n=7)
Other (n=0)
Nest Substrate

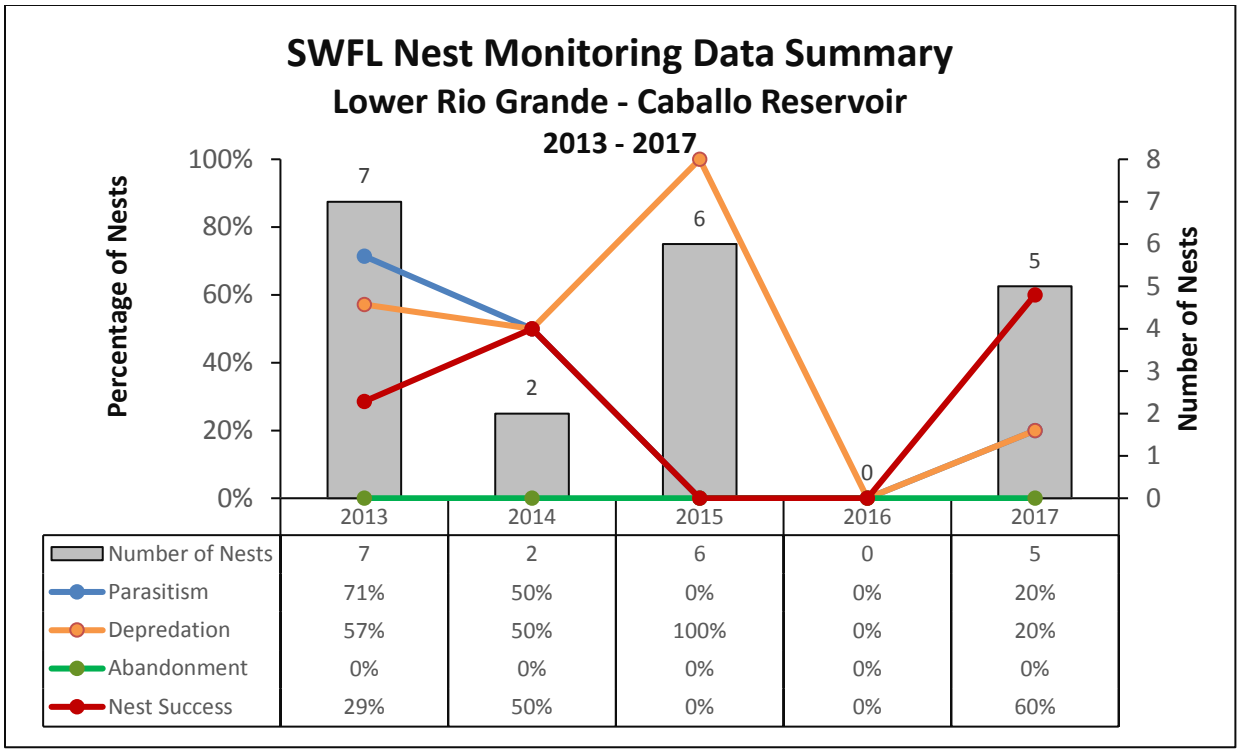

Nest Success vs. Territory Dominance
Lower Rio Grande - Caballo Reservoir
2013-2017
Percentage of Nests
100%
80%
60%
40%
20%
0%
50%
0%
17%
Native (n=8)
Exotic (n=0)
Mixed (n=12)
Dominant Vegetation

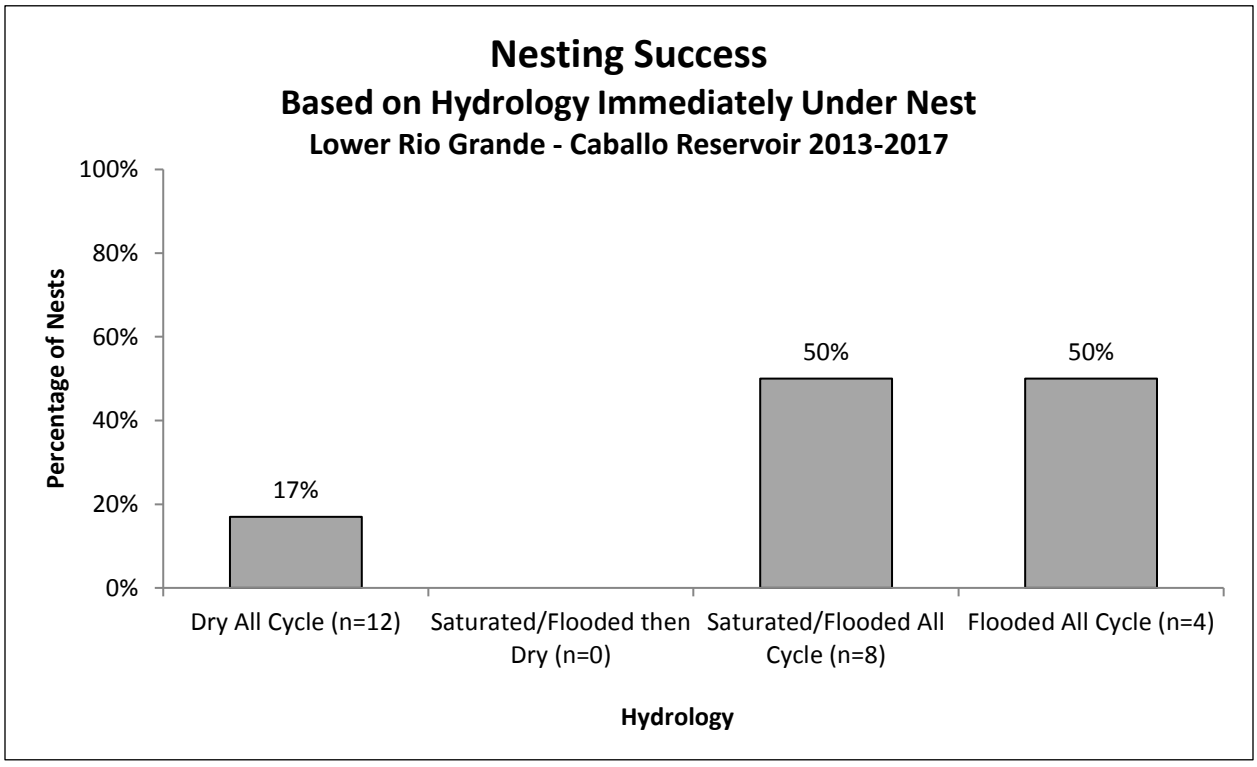

Nest Parasitism vs. Nest Substrate
Lower Rio Grande - Caballo Reservoir
2013-2017
100%
80%
60%
40%
20%
0%
Percentages of Nests
15%
71%
0%
Salix (n=13)
Saltcedar (n=7)
Other (n=0)
Substrate Species

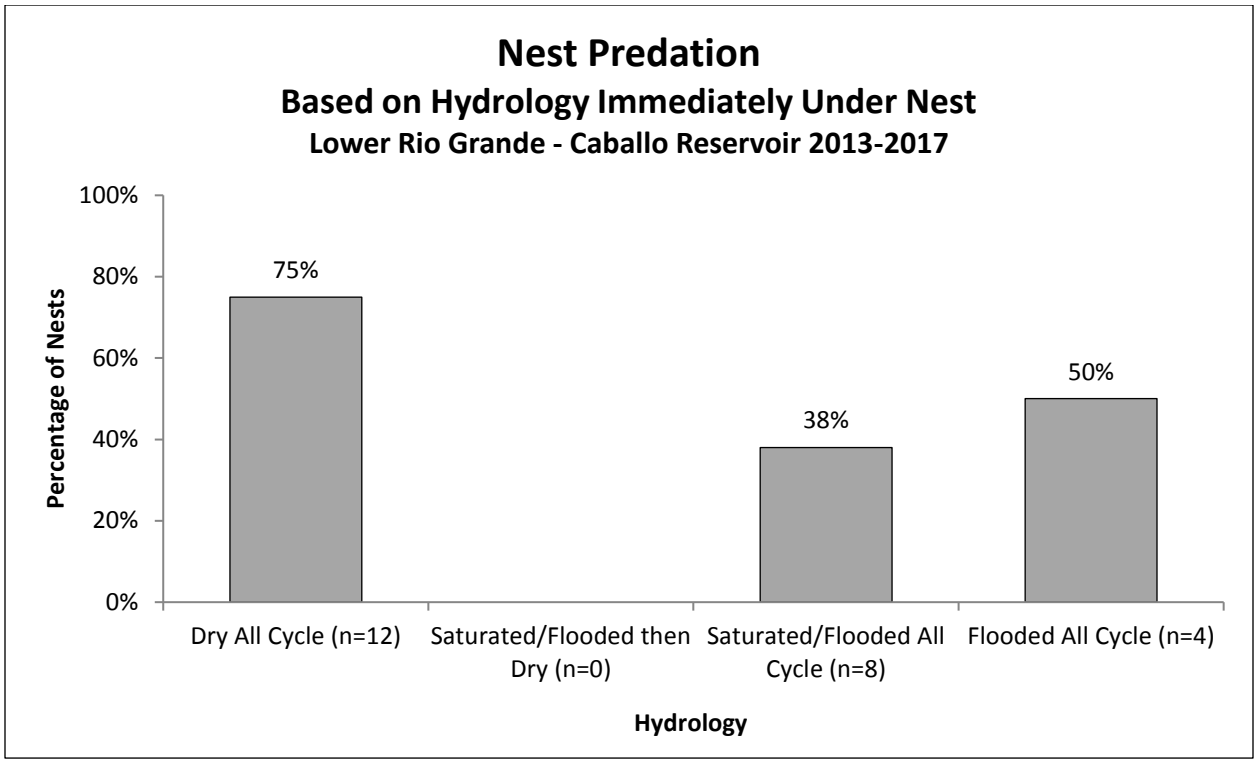

Nest Parasitism vs. Territory Dominance
Lower Rio Grande - Caballo Reservoir
2013-2017
100%
80%
60%
40%
20%
0%
Percentage of Nests
13%
0%
50%
Native (n=8)
Exotic (n=0)
Mixed (n=12)
Dominant Vegetation

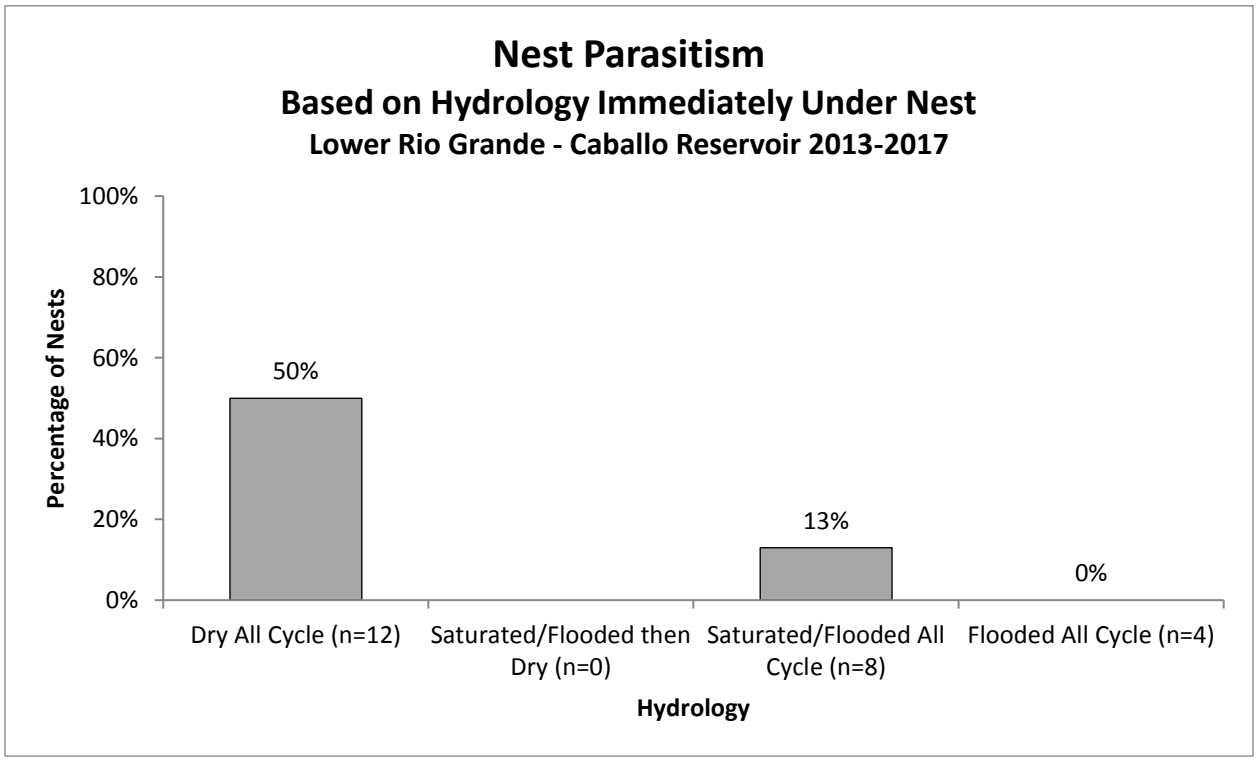

Productivity of Successful Nests based on Nest Substrate
Lower Rio Grande - Caballo Reservoir
2013-2017
Young Fledged/Nest
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
2.40
2.00
0.00
Salix (n=5)
Saltcedar (n=1)
Other (n=0)
Substrate Species

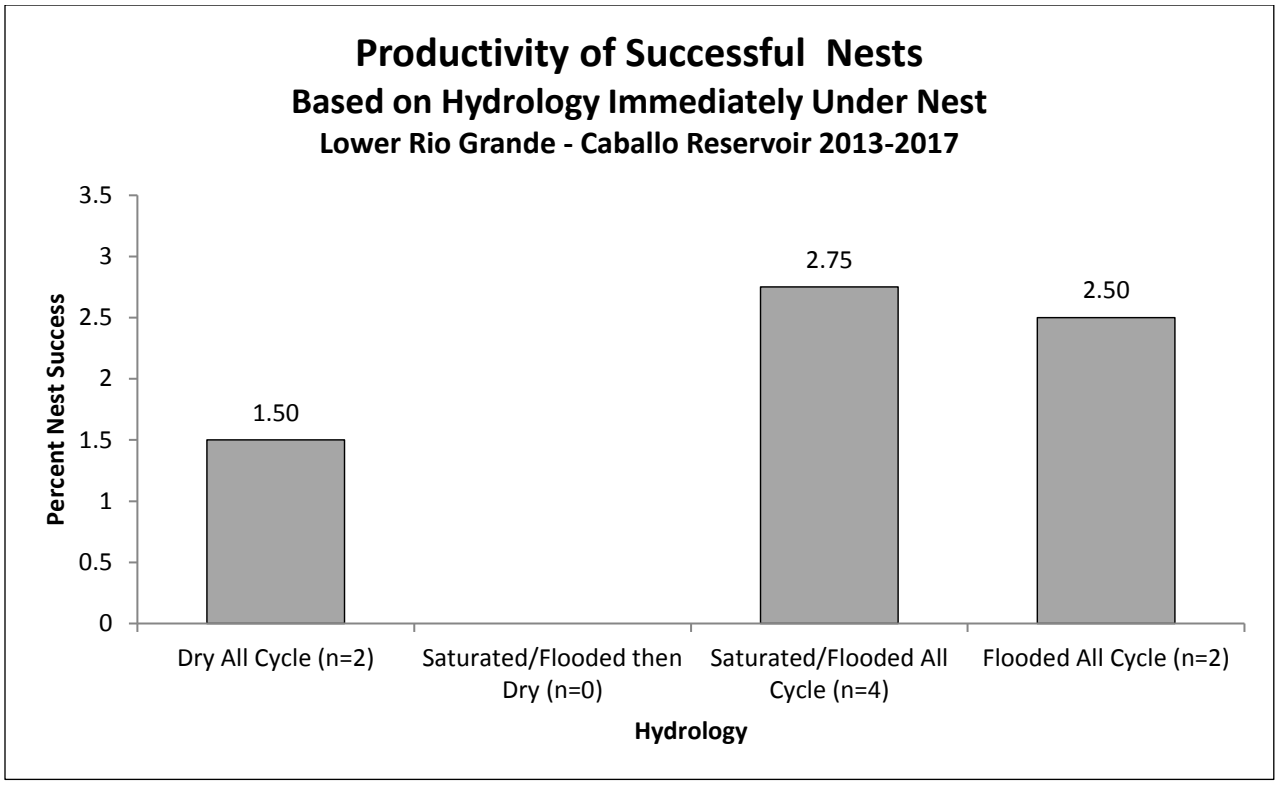

Productivity of Successful Nests based on Territory Dominance
Lower Rio Grande - Caballo Reservoir
2013-2017
Young Fledged/Nest
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
2.75
0.00
1.50
Native (n=4)
Exotic (n=0)
Mixed (n=2)
Dominant Vegetation

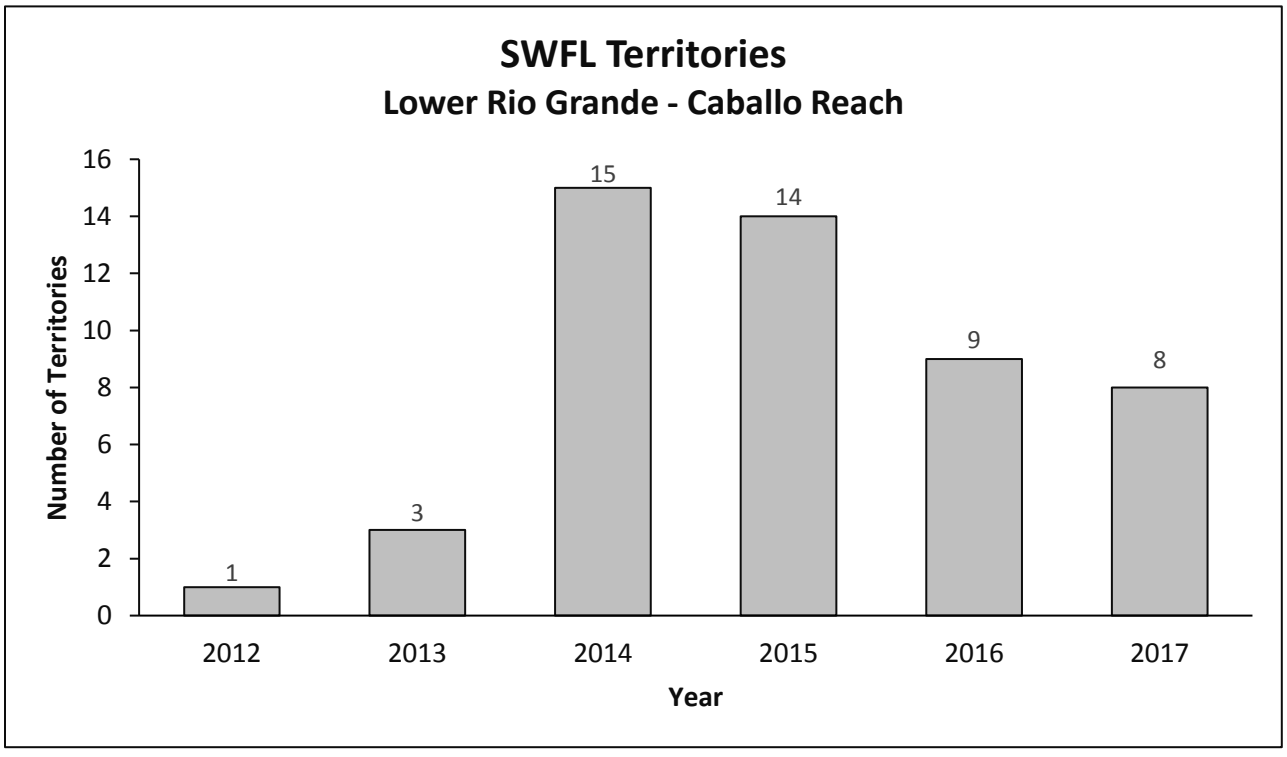

SWFL Nest Monitoring Data Summary
Lower Rio Grande - Caballo Reservoir
2013 - 2017
Percentage of Nests
Number of Nests
100%
80%
60%
40%
20%
0%
8
7
6
5
4
3
2
1
0
7
2
6
0
5
2013
2014
2015
2016
2017
Number of Nests 7 2 6 0 5
Parasitism 71% 50% 0% 0% 20%
Depredation 57% 50% 100% 0% 20%
Abandonment 0% 0% 0% 0% 0%
Nest Success 29% 50% 0% 0% 60%


Nesting Success
Based on Hydrology Immediately Under Nest
Lower Rio Grande - Caballo Reservoir 2013-2017
Percentage of Nests
100%
80%
60%
40%
20%
0%
17%
50%
50%
Dry All Cycle (n=12)
Saturated/Flooded then Dry (n=0)
Saturated/Flooded All Cycle (n=8)
Flooded All Cycle (n=4)
Hydrology


Nest Predation
Based on Hydrology Immediately Under Nest
Lower Rio Grande - Caballo Reservoir 2013-2017
100%
80%
60%
40%
20%
0%
Percentage of Nests
75%
38%
50%
Dry All Cycle (n=12)
Saturated/Flooded then Dry (n=0)
Saturated/Flooded All Cycle (n=8)
Flooded All Cycle (n=4)
Hydrology


Nest Parasitism
Based on Hydrology Immediately Under Nest
Lower Rio Grande - Caballo Reservoir 2013-2017
100%
80%
60%
40%
20%
0%
Percentage of Nests
50%
13%
0%
Dry All Cycle (n=12)
Saturated/Flooded then Dry (n=0)
Saturated/Flooded All Cycle (n=8)
Flooded All Cycle (n=4)
Hydrology


Productivity of Successful Nests
Based on Hydrology Immediately Under Nest
Lower Rio Grande - Caballo Reservoir 2013-2017
Percent Nest Success
3.5
3
2.5
2
1.5
1
0.5
0
1.50
2.75
2.50
Dry All Cycle (n=2)
Saturated/Flooded then Dry (n=0)
Saturated/Flooded All Cycle (n=4)
Flooded All Cycle (n=2)
Hydrology


SWFL Territories
Lower Rio Grande - Caballo Reach
Number of Territories
16
14
12
10
8
6
4
2
0
1
3
15
14
9
8
2012
2013
2014
2015
2016
2017
Year

Attachment 2: SWFL Nests Downstream of Caballo Dam 2013 - 2017

Attachment 2: Nests Downstream of Caballo Dam

HYDROLOGY vs. NEST SUCCESS and PRODUCTIVITY SUMMARY LRG - HATCH TO LEASBURG DAM NEST SUMMARY 2013-2017			
Number of Total Nesting Attempts	157		
Number of First Nesting Attempts	104		
Number of Second/Third/Fourth Nesting Attempts	53		
Number of Successful Nesting Attempts	82		
Number of Failed Nesting Attempts	75		
Number of Nests (All Attempts) - Dry All Cycle	17		
Number of Nests (All Attempts) - Saturated/Flooded then Dry	3		
Number of Nests (All Attempts) - Saturated All Cycle	117		
Number of Nests (All Attempts) - Flooded All Cycle	66		
Number of Successful Nests (All Attempts) - Dry All Cycle	8		
Number of Successful Nests (All Attempts) -Saturated/Flooded then Dry	0		
Number of Successful Nests (All Attempts) - Saturated All Cycle	60		
Number of Successful Nests (All Attempts) - Flooded All Cycle	36		
Percent Successful Nests (All Attempts) - Dry All Cycle	47%	n=	17
Percent Successful Nests (All Attempts) - Saturated/Flooded then Dry	0%	n=	3
Percent Successful Nests (All Attempts) - Saturated All Cycle	51%	n=	117
Percent Successful Nests (All Attempts) - Flooded All Cycle	55%	n=	66
Number of Predated Nests (All Attempts) -Dry All Cycle	5		
Number of Predated Nests (All Attempts) -Saturated/Flooded then Dry	3		
Number of Predated Nests (All Attempts) - Saturated All Cycle	49		
Number of Predated Nests (All Attempts) - Flooded All Cycle	25		
Percent Predated Nests (All Attempts) -Dry All Cycle	29%	n=	17
Percent Predated Nests (All Attempts) -Saturated/Flooded then Dry	100%	n=	3
Percent Predated Nests (All Attempts) - Saturated All Cycle	42%	n=	117
Percent Predated Nests (All Attempts) - Flooded All Cycle	38%	n=	66
Number of Parastized Nests (All Attempts) -Dry All Cycle	3		
Number of Parastized Nests (All Attempts) -Saturated/Flooded then Dry	0		
Number of Parastized Nests (All Attempts) - Saturated All Cycle	7		
Number of Parastized Nests (All Attempts) - Flooded All Cycle	4		
Percent Parastized Nests (All Attempts) -Dry All Cycle	18%	n=	17
Percent Parastized Nests (All Attempts) -Saturated/Flooded then Dry	0%	n=	3
Percent Parastized Nests (All Attempts) - Saturated All Cycle	6%	n=	117
Percent Parastized Nests (All Attempts) - Flooded All Cycle	6%	n=	66
COMPARISON OF NEST SUCCESS/ATTEMPTS (1ST OR 2ND)/HYDROLOGY			
Number of Nests (1st Attempts) - Dry All Cycle	13		
Number of Nests (1st Attempts) -Saturated/Flooded then Dry	2		
Number of Nests (1st Attempts) - Saturated All Cycle	74		
Number of Nests (1st Attempts) - Flooded All Cycle	46		
Number of Successful Nests (1st Attempts) - Dry All Cycle	5		
Number of Successful Nests (1st Attempts) -Saturated/Flooded then Dry	0		
Number of Successful Nests (1st Attempts) - Saturated All Cycle	37		
Number of Successful Nests (1st Attempts) - Flooded All Cycle	26		
Percent Successful Nests (1st Attempts) - Dry All Cycle	38%	n=	13
Percent Successful Nests (1st Attempts) - Saturated/Flooded then Dry	0%	n=	2
Percent Successful Nests (1st Attempts) - Saturated All Cycle	50%	n=	74
Percent Successful Nests (1st Attempts) - Flooded All Cycle	57%	n=	46
Number of Nests (2-4 Attempts) - Dry All Cycle	4		
Number of Nests (2-4 Attempts) -Saturated/Flooded then Dry	1		
Number of Nests (2-4 Attempts) - Saturated All Cycle	43		
Number of Nests (2-4 Attempts) - Flooded All Cycle	20		
Number of Successful Nests (2-4 Attempts) - Dry All Cycle	3		
Number of Successful Nests (2-4 Attempts) -Saturated/Flooded then Dry	0		
Number of Successful Nests (2-4 Attempts) - Saturated All Cycle	23		
Number of Successful Nests (2nd Attempts) - Flooded All Cycle	10		
Percent Successful Nests (2-4 Attempts) - Dry All Cycle	75%	n=	4
Percent Successful Nests (2-4 Attempts) - Saturated/Flooded then Dry	0%	n=	1
Percent Successful Nests (2-4 Attempts) - Saturated All Cycle	53%	n=	43
Percent Successful Nests (2-4 Attempts) - Flooded All Cycle	50%	n=	20

NOTE: Distance to Surface Water was considered over the entire breeding season and may have varied for individual nesting attempts.			
Number of Nests (All attempts) < or = to 100m from Surface Water	157		
Number of Successful Nests (All attempts) < or = to 100m from Surface Water	82		
Number of Unsuccessful Nests (All attempts) < or = to 100m from Surface Water	75		
Number of Nests (All attempts) > 100m from Surface Water	0		
Number of Successful Nests (All attempts) > 100m from Surface Water	0		
Number of Unsuccessful Nests (All attempts) > 100m from Surface Water	0		
Percent Successful Nests < or = to 100m from Surface water	52%	n=	157
Percent Successful Nests> 100m from Surface water	N/A	n=	0
Percent of Total Nests < or = to 100m from Surface water	100%	n=	157
Number of Nests (All attempts) < or = to 50m from Surface Water	157		
Number of Successful Nests (All attempts) < or = to 50m from Surface Water	82		
Number of Unsuccessful Nests (All attempts) < or = to 50m from Surface Water	75		
Number of Nests (All attempts) > 50m from Surface Water	0		
Number of Successful Nests (All attempts) > 50m from Surface Water	0		
Number of Unsuccessful Nests (All attempts) > 50m from Surface Water	0		
Percent Successful Nests < or = to 50m from Surface water	52%	n=	157
Percent Successful Nests> 50m from Surface water	N/A	n=	0
Percent of Total Nests < or = to 50m from Surface water	100%	n=	157
Productivity of Successful Nests under various Hydrologic Conditions			
Productivity of Successful Nests (All Attempts) that were Dry All Cycle	2.63	n=	8
Productivity of Successful Nests (All Attempts) that were Sat./Flooded then Dry	N/A	n=	0
Productivity of Successful Nests (All Attempts) that were Saturated All Cycle	2.70	n=	60
Productivity of Successful Nests (All Attempts) that were Flooded All Cycle	2.86	n=	36
Productivity of Successful Nests that were < 50m from Surface Water	2.73	n=	82
Productivity of Successful Nests that were > 50m from Surface Water	N/A	n=	0
Productivity of Successful Nests that were < 100m from Surface Water	2.73	n=	82
Productivity of Successful Nests that were >100m from Surface Water	N/A	n=	0

Attachment 2: Nests Downstream of Caballo Dam

2013-2017 - SUBSTRATE USE, NESTING PARAMETERS AND NESTING SUCCESS - LRG Hatch to Leasburg Dam Nest Summary

Parasitism Rate	**7.0%**	11	out of	157	nests
Predation Rate	**40.1%**	63	out of	157	nests
Abandonment	**4.5%**	7	out of	157	nests
Infertile	**1.3%**	2	out of	157	nests
Nest Success	**52.2%**	82	out of	157	nests

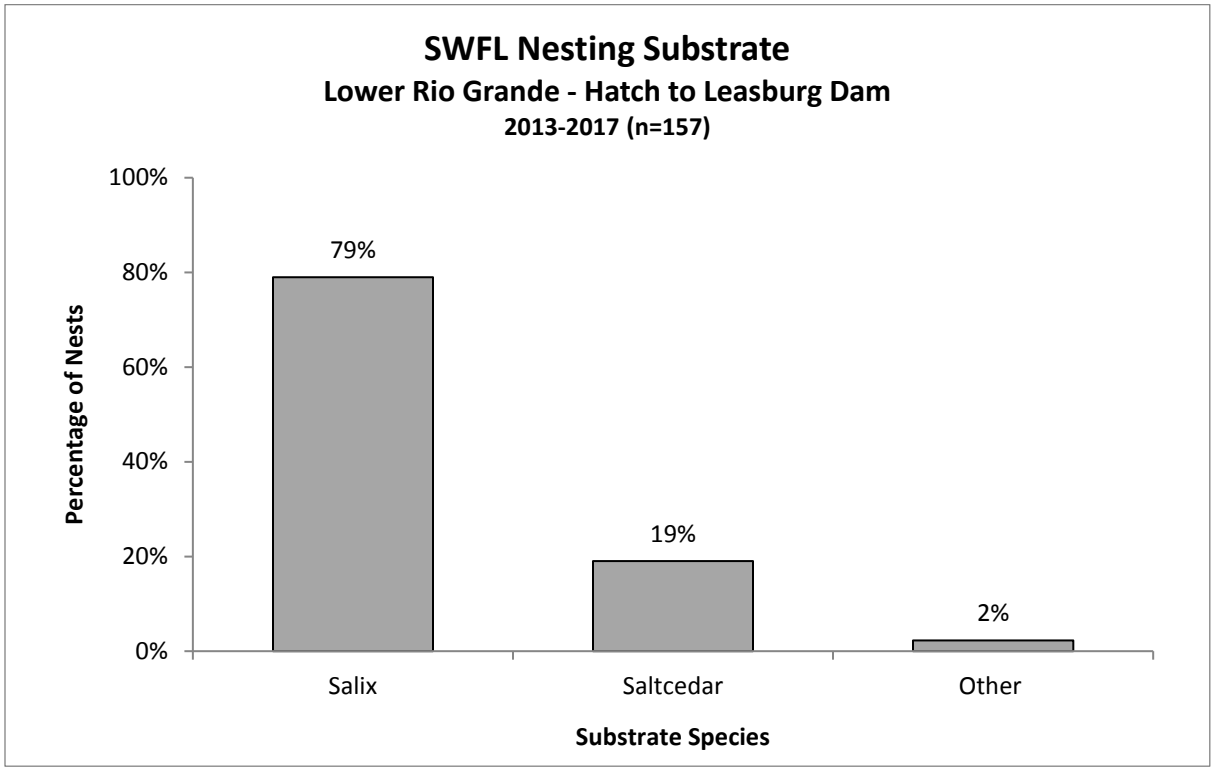
Total Number of Nests **157**

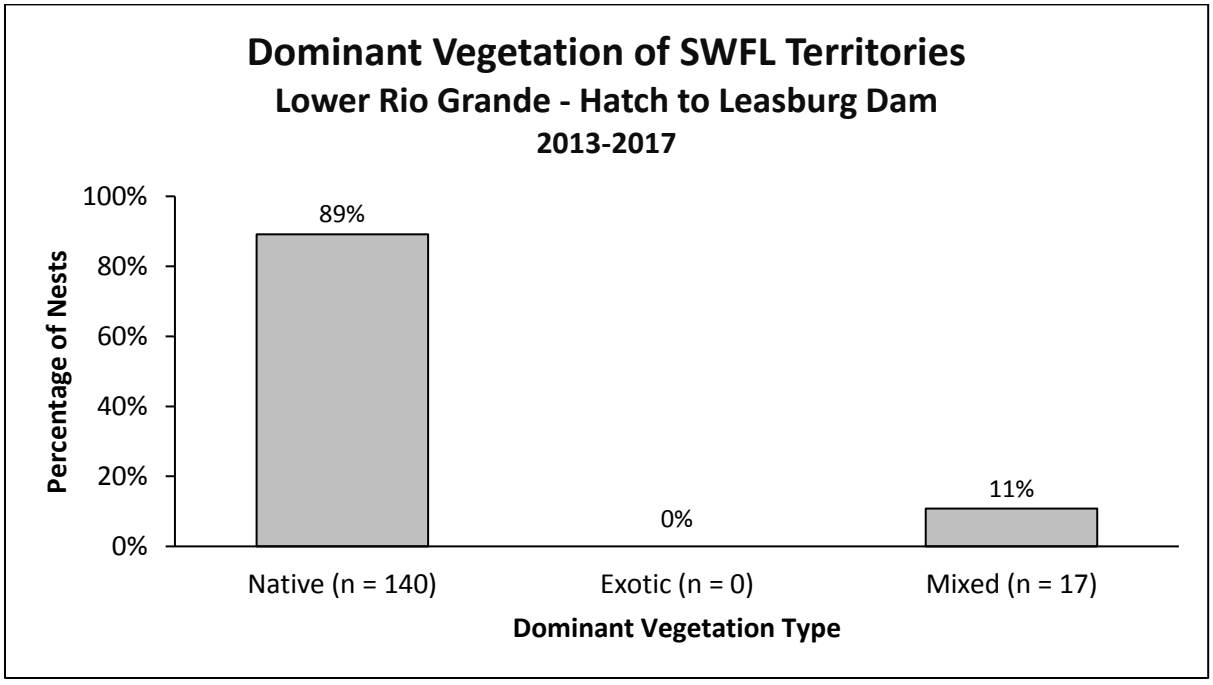
Number of Nests in Exotic Dominated Territories	0	0.0%	157	total nests
Number of Nests in Native. Dominated Territories	140	89.2%	157	total nests
Number of Nests in Mixed Dominance Territories	17	10.8%	157	total nests
Number of Nests in Salix sp. Substrate	124	79.0%	157	total nests
Number of Nests in Salt Cedar Substrate	30	19.1%	157	total nests
Number of Nests in Russian Olive Substrate	0	0.0%	157	total nests
Number of Nests in Other (Seepwillow/Cottonwood) Substrate	3	1.9%	157	total nests
Number of Nests in Salt Cedar Substrate within Native. Dominated Territories	17	12.1%	140	total nests
Number of Nests in Salix sp. Substrate within Exotic or Mixed Dominated Territories	4	23.5%	17	total nests

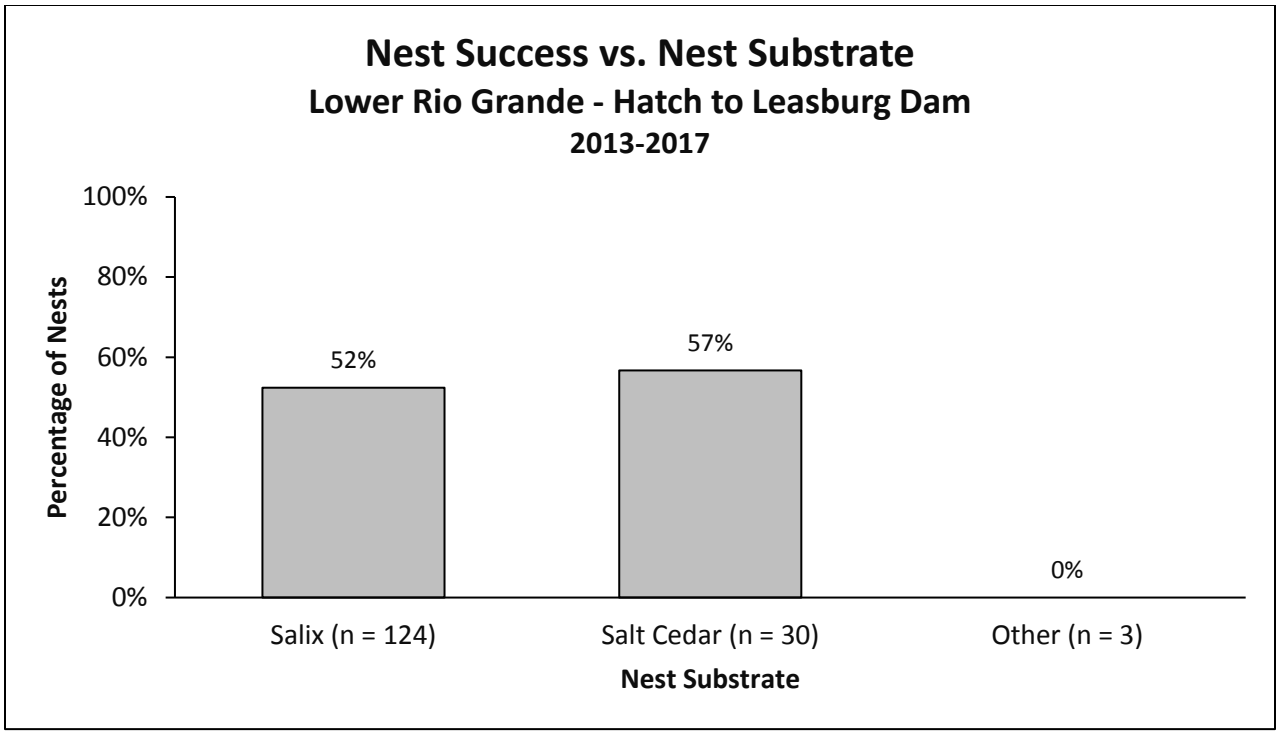
2013 to 2017 -- FOLLOWING DATA INCLUDES ONLY NESTS WITH ONLY KNOWN OUTCOMES

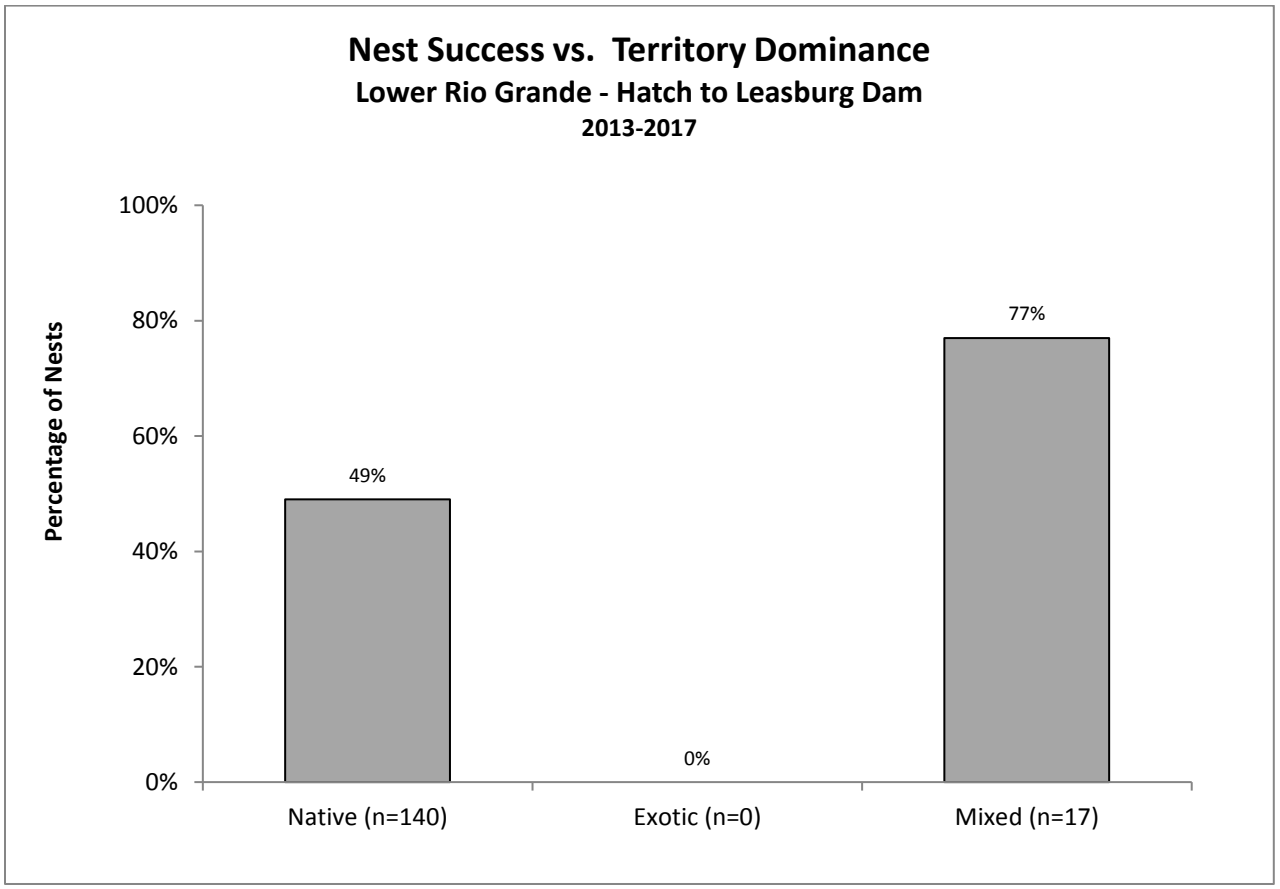
Percentage of Succesful Nests in Salix sp. Substrate	52.4%	65	out of	124
Percentage of Succesful Nests in Salt Cedar Substrate	56.7%	17	out of	30
Percentage of Succesful Nests in Russian Olive Substrate.	N/A	0	out of	0
Percentage of Succesful Nests in Other (Seepwillow/Cottonwood) Substrate.	0.0%	0	out of	3
Percentage of Succesful Nests in Native. Dominated Territories	49.3%	69	out of	140
Percentage of Succesful Nests in Exotic Dominated Territories	N/A	0	out of	0
Percentage of Succesful Nests in Mixed Dominance Territories	76.5%	13	out of	17
Percentage of Nests Parasitized in Salix sp. Substrate	6.5%	8	out of	124
Percentage of Nests Parasitized in Salt Cedar Substrate	10.0%	3	out of	30
Percentage of Nests Parasitized in Russian Olive Substrate	N/A	0	out of	0
Percentage of Nests Parastized in Other (Seepwillow/Cottonwood) Substrate.	N/A	0	out of	3
Percentage of Nests Parasitized in Native Dominated Territories	6.4%	9	out of	140
Percentage of Nests Parasitized in Exotic Dominated Territories	N/A	0	out of	0
Percentage of Nests Parasitized in Mixed Dominance Territories	11.8%	2	out of	17

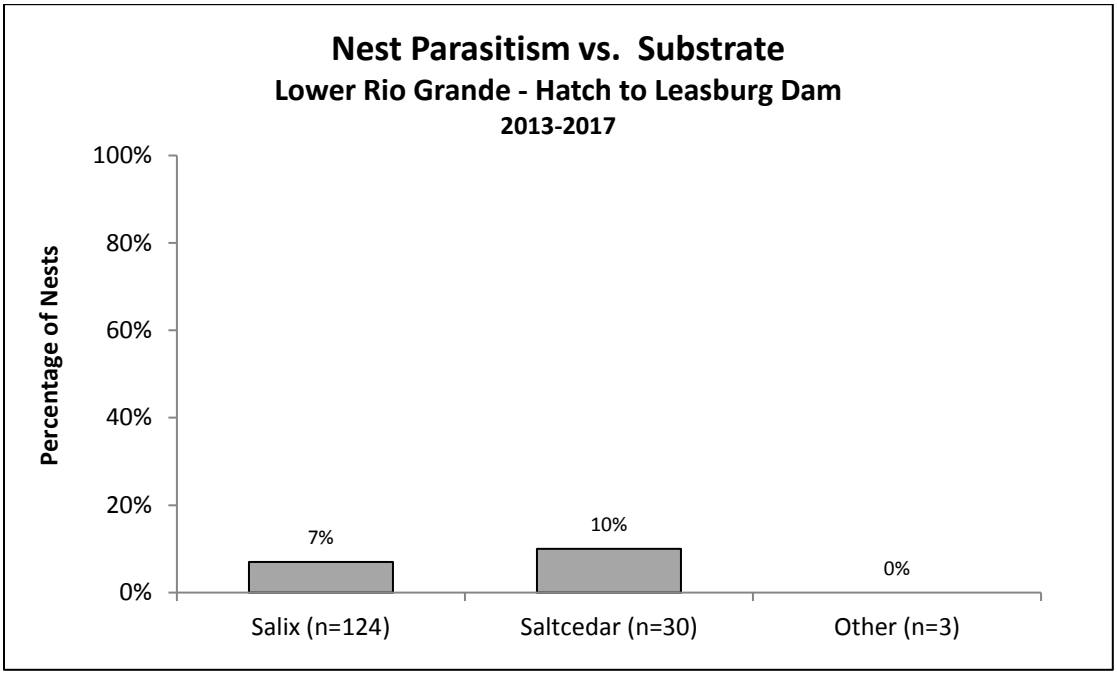
Productivity of all Nests found in Native Dominated Territories	1.36	/nest	191	young from	140	nests
Productivity of all Nests found in Exotic Dominated Territories	N/A	/nest	0	young from	0	nests
Productivity of all Nests found in Mixed Dominance Territories	1.94	/nest	33	young from	17	nests
Productivity of all Nests found in Salix sp. Substrate	1.47	/nest	182	young from	124	nests
Productivity of all Nests found in Salt Cedar Substrate	1.40	/nest	42	young from	30	nests
Productivity of all Nests found in Russian Olive Substrate	N/A	/nest	0	young from	0	nests
Productivity of all Nests found in Other (Seepwillow/Cottonwood) Substrate	N/A	/nest	0	young from	3	nests
Productivity of Nests in Salix substrate within Native Dominated Territories	1.44	/nest	173	young from	120	nests
Productivity of Nests in Salt Cedar substrate within Native Dominated Territories	1.06	/nest	18	young from	17	nests
Productivity of Nests in Salt Cedar substrate within Exotic Dominated Territories	N/A	/nest	0	young from	0	nests
Productivity of Successful Nests in Salix substrate within Native Dominated Territories	2.79	/nest	173	young from	62	nests
Productivity of SuccessfulNests in Salt Cedar substrate within Native Dominated Territories	2.57	/nest	18	young from	7	nests
Productivity of Successful Nests in Salt Cedar substrate within Exotic Dominated Territories	N/A	/nest	0	young from	0	nests
Productivity of Successful Nests found in Native Dominated Territories	2.77	/nest	191	young from	69	nests
Productivity of Successful Nests found in Exotic Dominated Territories	N/A	/nest	0	young from	0	nests
Productivity of Successful Nests found in Mixed Dominance Territories	2.54	/nest	33	young from	13	nests
Productivity of Successful Nests found in Salix sp. Substrate	2.80	/nest	182	young from	65	nests
Productivity of Successful Nests found in Salt Cedar Substrate	2.47	/nest	42	young from	17	nests
Productivity of Successful Nests found in Russian Olive Substrate	N/A	/nest	0	young from	0	nests

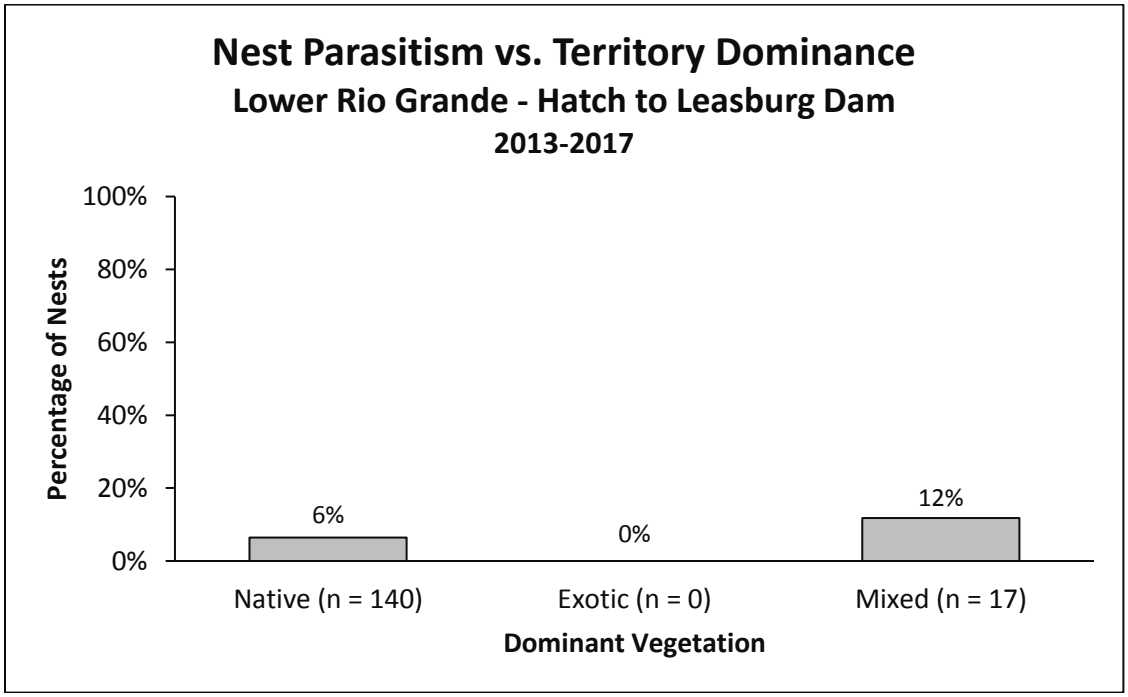

SWFL Nesting Substrate
Lower Rio Grande - Hatch to Leasburg Dam
2013-2017 (n=157)
100%
80%
60%
40%
20%
0%
Percentage of Nests
79%
19%
2%
Salix
Saltcedar
Other
Substrate Species

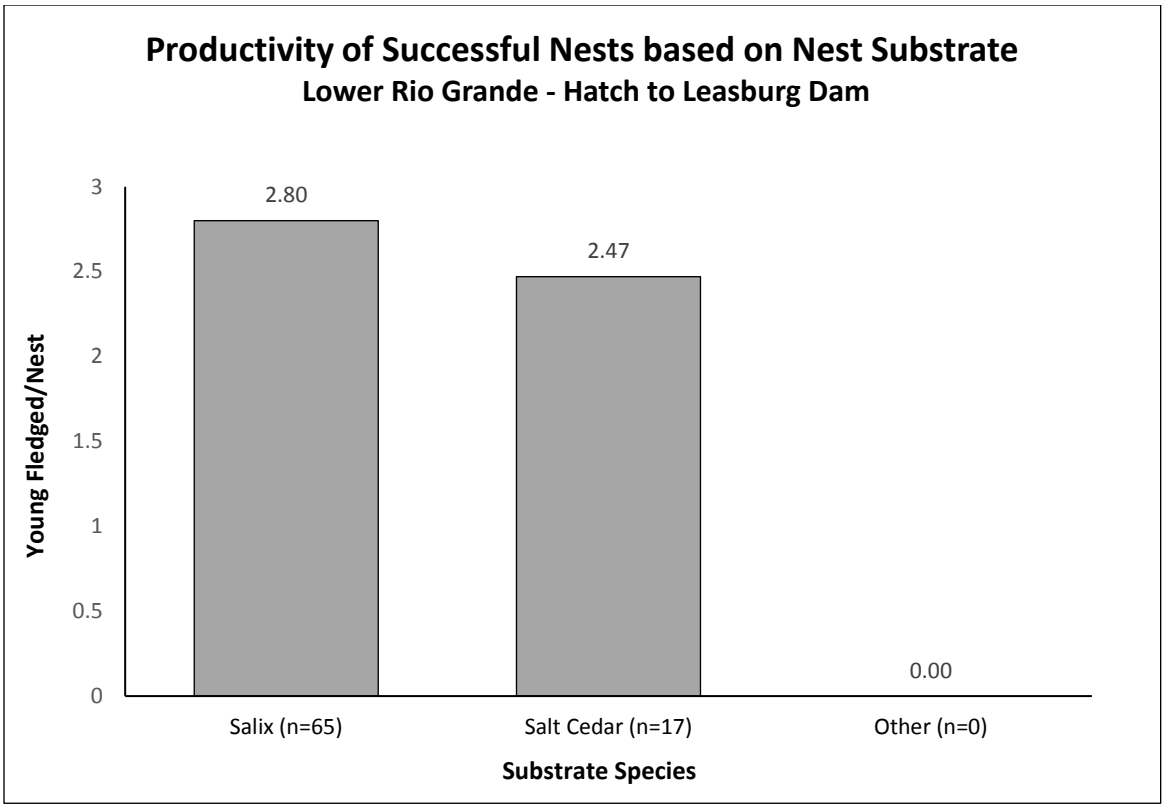

Dominant Vegetation of SWFL Territories
Lower Rio Grande - Hatch to Leasburg Dam
2013-2017
100%
80%
60%
40%
20%
0%
Percentage of Nests
89%
0%
11%
Native (n = 140)
Exotic (n = 0)
Mixed (n = 17)
Dominant Vegetation Type

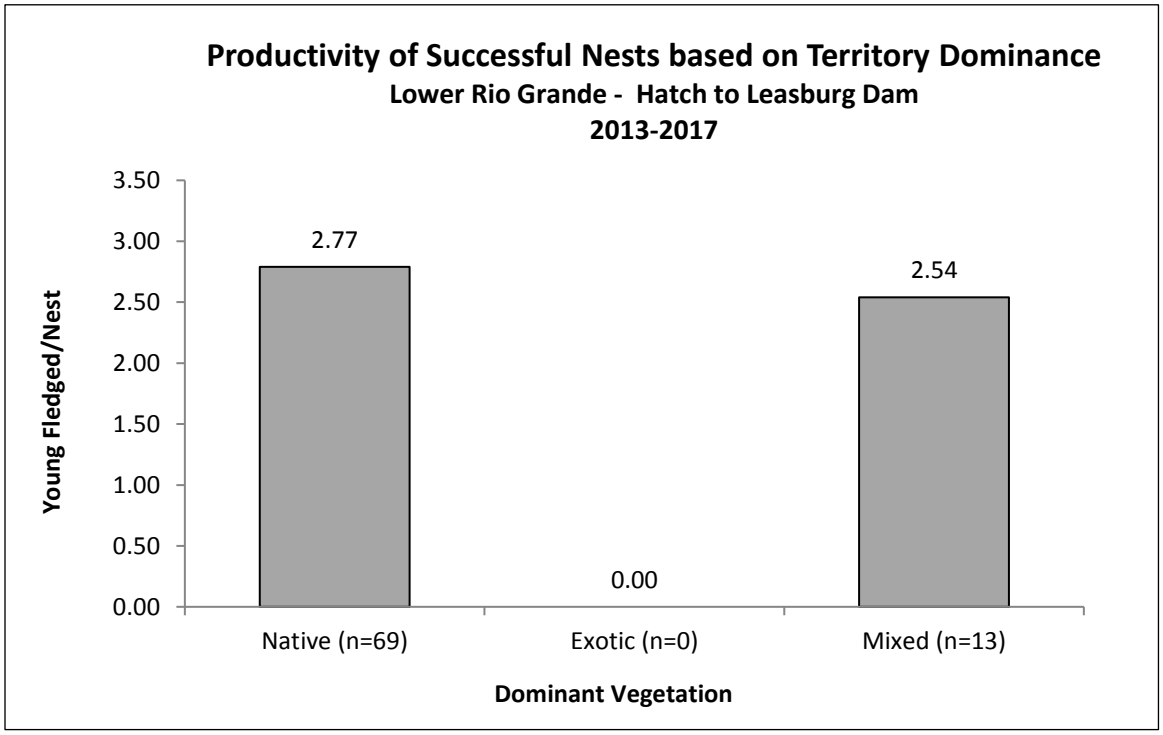

Nest Success vs. Nest Substrate
Lower Rio Grande - Hatch to Leasburg Dam
2013-2017
Percentage of Nests
100%
80%
60%
40%
20%
0%
52%
57%
0%
Salix (n = 124)
Salt Cedar (n = 30)
Other (n = 3)
Nest Substrate

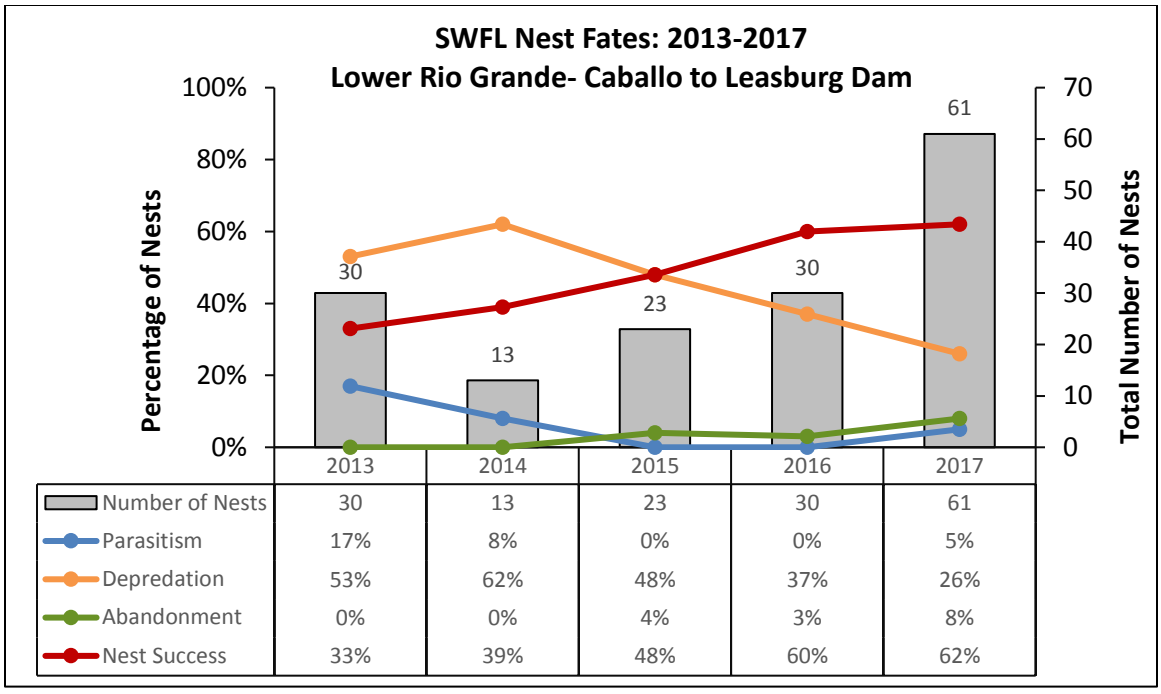

Nest Success vs. Territory Dominance
Lower Rio Grande - Hatch to Leasburg Dam
2013-2017
Percentage of Nests
100%
80%
60%
40%
20%
0%
49%
0%
77%
Native (n=140)
Exotic (n=0)
Mixed (n=17)

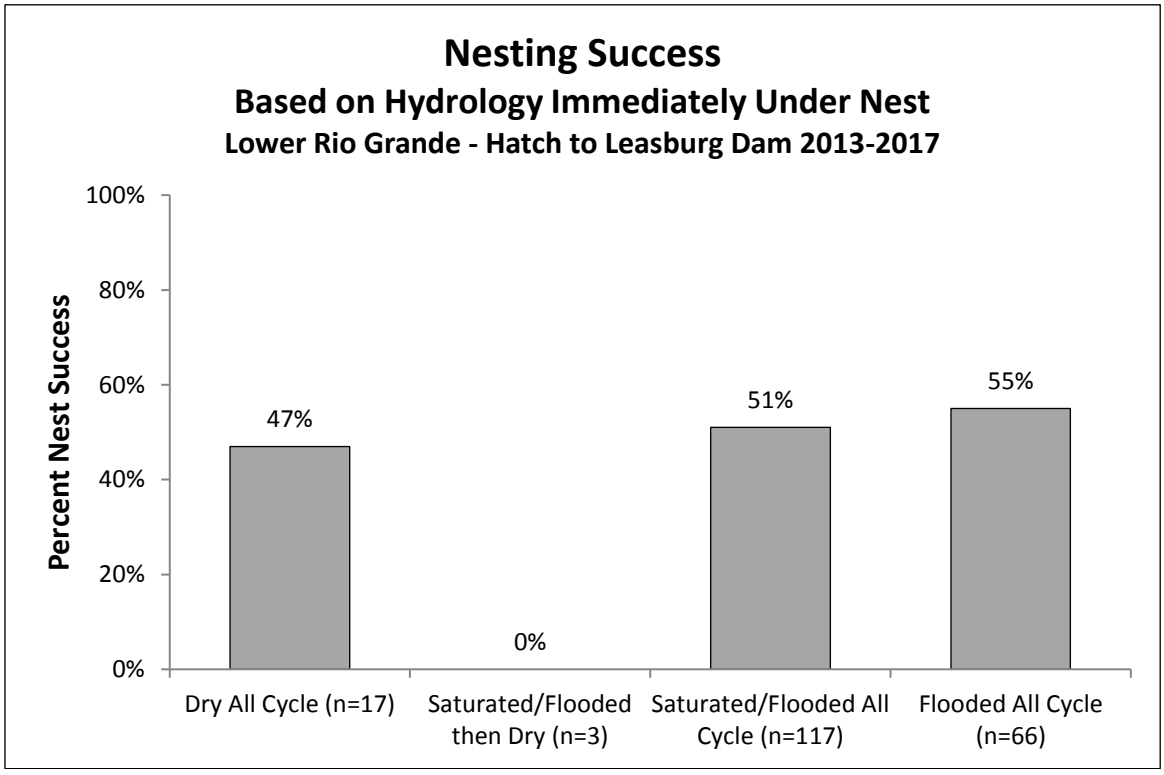

Nest Parasitism vs. Substrate
Lower Rio Grande - Hatch to Leasburg Dam
2013-2017
Percentage of Nests
100%
80%
60%
40%
20%
0%
7%
10%
0%
Salix (n=124)
Saltcedar (n=30)
Other (n=3)

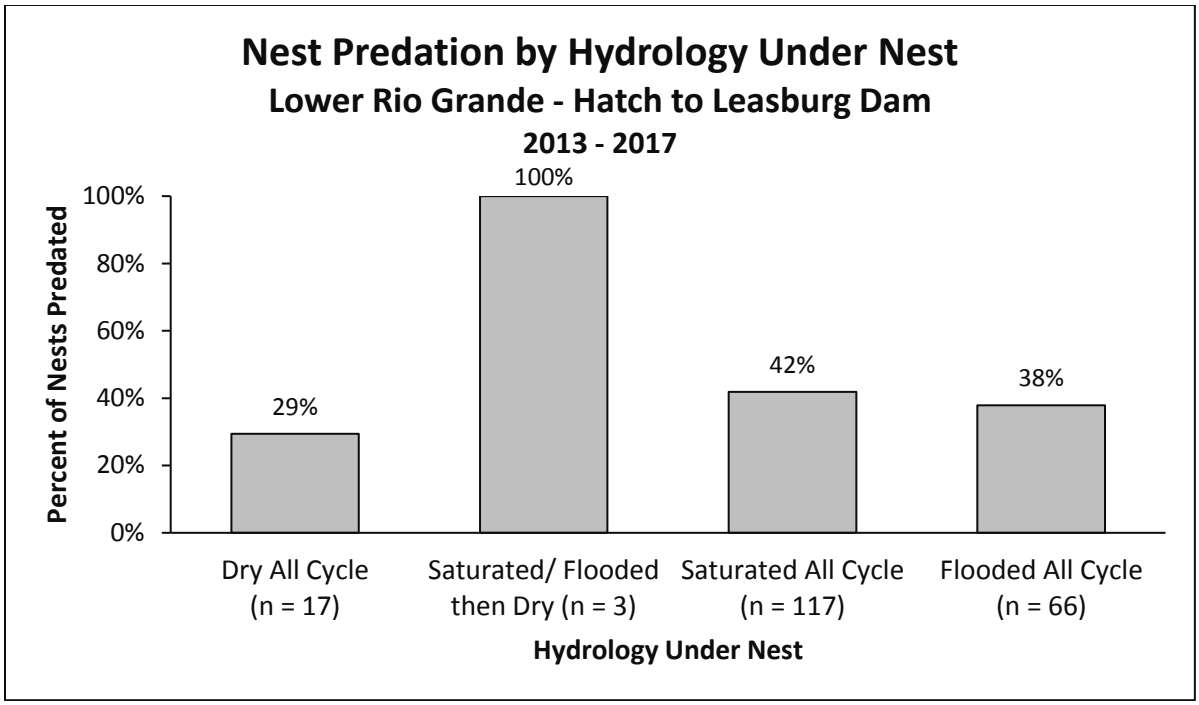

Nest Parasitism vs. Territory Dominance
Lower Rio Grande - Hatch to Leasburg Dam
2013-2017
Percentage of Nests
100%
80%
60%
40%
20%
0%
6%
0%
12%
Native (n = 140)
Exotic (n = 0)
Mixed (n = 17)
Dominant Vegetation

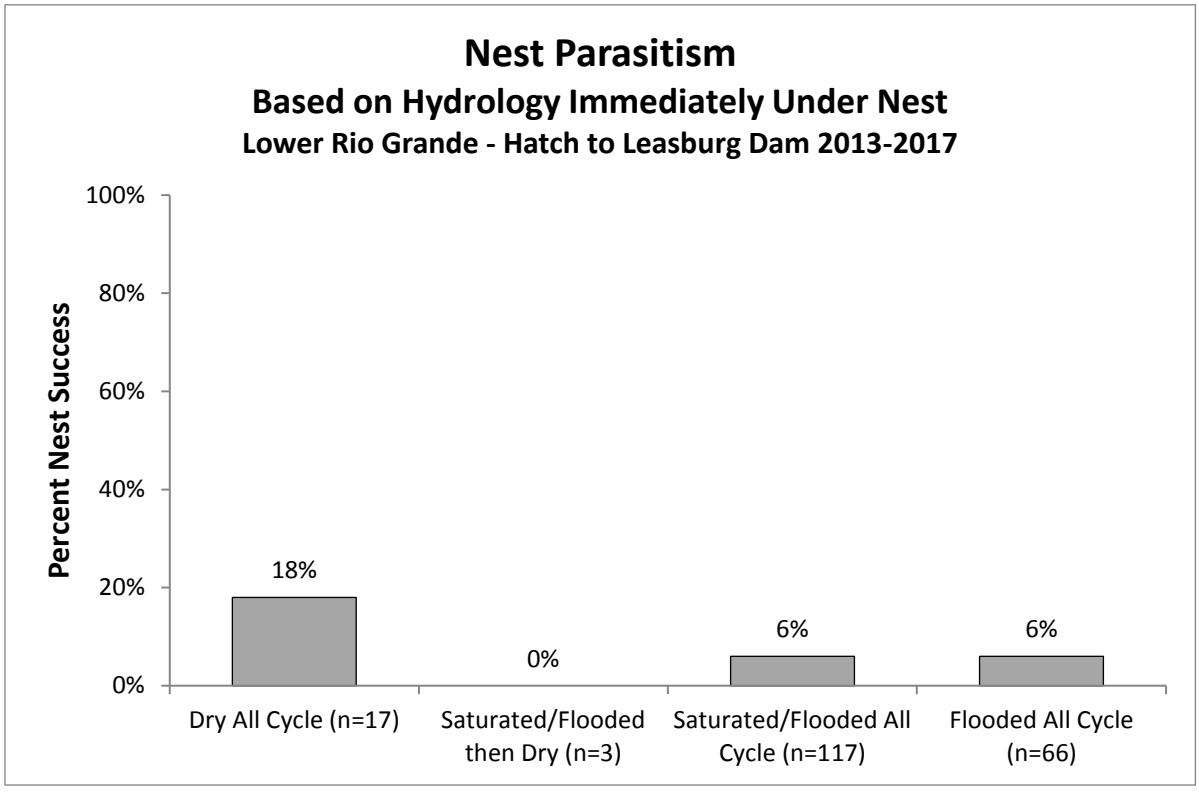

Productivity of Successful Nests based on Nest Substrate
Lower Rio Grande - Hatch to Leasburg Dam
Young Fledged/Nest
3
2.5
2
1.5
1
0.5
0
2.80
2.47
0.00
Salix (n=65)
Salt Cedar (n=17)
Other (n=0)
Substrate Species

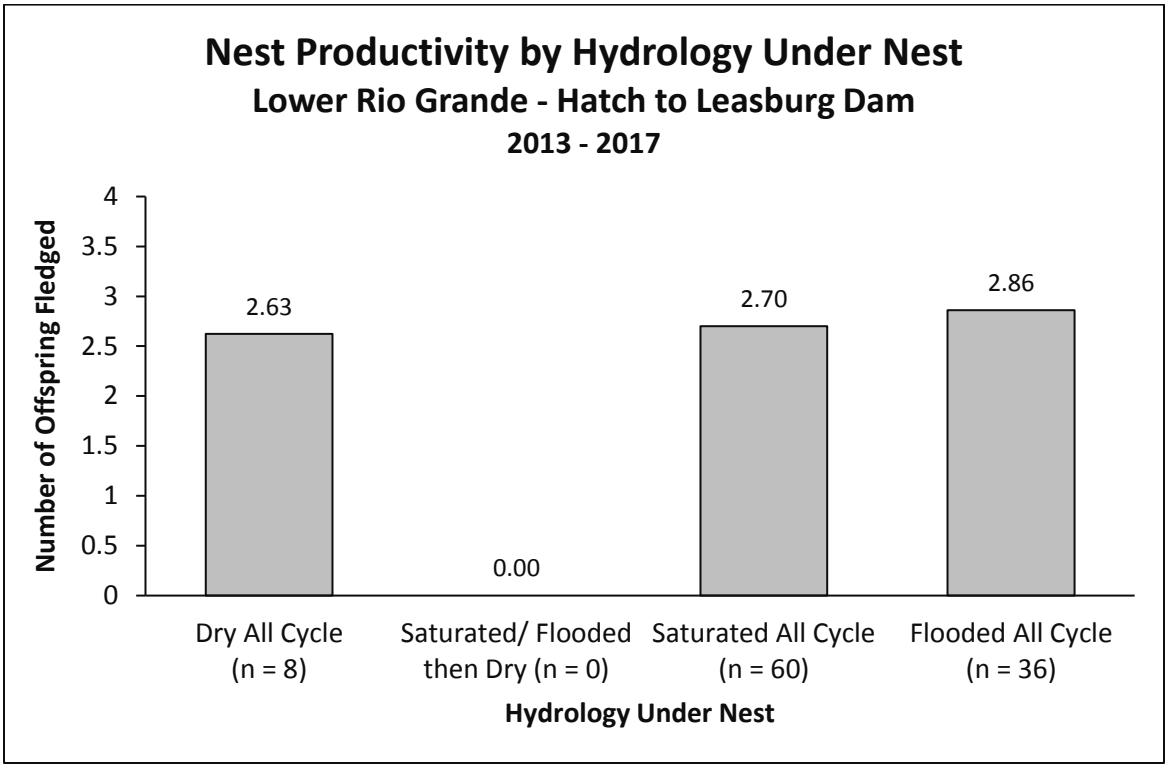

Productivity of Successful Nests based on Territory Dominance
Lower Rio Grande - Hatch to Leasburg Dam
2013-2017
Young Fledged/Nest
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
2.77
0.00
2.54
Native (n=69)
Exotic (n=0)
Mixed (n=13)
Dominant Vegetation


SWFL Nest Fates: 2013-2017
Lower Rio Grande- Caballo to Leasburg Dam
Percentage of Nests
Total Number of Nests
100%
80%
60%
40%
20%
0%
70
60
50
40
30
20
10
0
30
13
23
30
61
2013
2014
2015
2016
2017
Number of Nests 30 13 23 30 61
Parasitism 17% 8% 0% 0% 5%
Depredation 53% 62% 48% 37% 26%
Abandonment 0% 0% 4% 3% 8%
Nest Success 33% 39% 48% 60% 62%


Nesting Success
Based on Hydrology Immediately Under Nest
Lower Rio Grande - Hatch to Leasburg Dam 2013-2017
Percent Nest Success
100%
80%
60%
40%
20%
0%
47%
0%
51%
55%
Dry All Cycle (n=17)
Saturated/Flooded then Dry (n=3)
Saturated/Flooded All Cycle (n=117)
Flooded All Cycle (n=66)


Nest Predation by Hydrology Under Nest
Lower Rio Grande - Hatch to Leasburg Dam
2013 - 2017
Percent of Nests Predated
100%
80%
60%
40%
20%
0%
29%
100%
42%
38%
Dry All Cycle (n = 17)
Saturated/ Flooded then Dry (n = 3)
Saturated All Cycle (n = 117)
Flooded All Cycle (n = 66)
Hydrology Under Nest


Nest Parasitism
Based on Hydrology Immediately Under Nest
Lower Rio Grande - Hatch to Leasburg Dam 2013-2017
Percent Nest Success
100%
80%
60%
40%
20%
0%
18%
0%
6%
6%
Dry All Cycle (n=17)
Saturated/Flooded then Dry (n=3)
Saturated/Flooded All Cycle (n=117)
Flooded All Cycle (n=66)


Nest Productivity by Hydrology Under Nest
Lower Rio Grande - Hatch to Leasburg Dam
2013 - 2017
Number of Offspring Fledged
4
3.5
3
2.5
2
1.5
1
0.5
0
2.63
0.00
2.70
2.86
Dry All Cycle (n = 8)
Saturated/ Flooded then Dry (n = 0)
Saturated All Cycle (n = 60)
Flooded All Cycle (n = 36)
Hydrology Under Nest

PEER REVIEW DOCUMENTATION

PROJECT AND DOCUMENT INFORMATION

Project Name Southwestern Willow Flycatcher Surveys WOID FA418

Document 2017 Lower Rio Grande Southwestern Willow Flycatcher Study Results: Selected sites within the Rio Grande Basin from Elephant Butte Dam, NM to El Paso, TX

Document Date March 2018

Team Leader Darrell Ahlers, 86-68290, Wildlife Biologist

Document Author(s)/Preparer(s) M. Bullard, K. Dillon, and S. Moore

Peer Reviewer Mike Horn, 86-68290, Fisheries and Wildlife Resources Group Manager

Peer Reviewer _____

REVIEW REQUIREMENT

Part A: Document Does Not Require Peer Review

Explain _____

Part B: Document Requires Peer Review: SCOPE OF PEER REVIEW

Peer Review restricted to the following Items/Section(s):	Reviewer:
Complete Document Subject to Review	Mike Horn

REVIEW CERTIFICATION

Peer Reviewer - I have reviewed the assigned Items/Section(s) noted for the above document and believe them to be in accordance with the project requirements, standards of the profession, and Reclamation policy.

Reviewer: Mike Horn Review Date: 2/28/18 Signature: [signature]

Reviewer: _____ Review Date: _____ Signature: _____

I have discussed the above document and review requirements with the Peer Reviewer and believe that this review is completed, and that the document will meet the requirements of the project.

Team Leader: Darrell Ahlers Date: 2/20/18 Signature: [signature]