BUREAU OF RECLAMATION

Technical Report No. ENV-2025-059

2024 Middle Rio Grande Southwestern Willow Flycatcher Study Results

Middle Rio Grande Project, New Mexico
Upper Colorado Basin Region

U.S. Department of the Interior

April 2025

Mission Statements

The U.S. Department of the Interior protects and manages the Nation's natural resources and cultural heritage; provides scientific and other information about those resources; honors its trust responsibilities or special commitments to American Indians, Alaska Natives, Native Hawaiians, and affiliated Island Communities.

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.

Cover Image – Sunrise over the Low Flow Conveyance Channel West and adjacent ponds in the Middle Rio Grande, New Mexico (D. Moore/Reclamation).

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With funding by:

Bureau of Reclamation Albuquerque Area Office, Middle Rio Grande Conservancy District, and New Mexico Interstate Stream Commission

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Middle Rio Grande Project, New Mexico
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Acronyms and Abbreviations

ac	acres
BHCO	Brown-headed Cowbird
EBR	Elephant Butte Reservoir
Ft	feet
ha	hectares
LFCC	low flow conveyance channel
m	meter
MRG	Middle Rio Grande
NWR	National Wildlife Refuge
Reclamation	Bureau of Reclamation
RM	River mile
SWFL	Southwestern Willow Flycatcher
WIFL	Willow Flycatcher

Symbols

%	percent

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Executive Summary

Overview

During the summer of 2024, the Bureau of Reclamation (Reclamation) conducted surveys and nest monitoring of the federally endangered Southwestern Willow Flycatcher (SWFL). The surveys were completed in seven distinct reaches along approximately 99 river miles of the Rio Grande in New Mexico between the Isleta Pueblo and Elephant Butte Reservoir. Due to difficulties in hiring temporary employees, Reclamation only surveyed seven sites in the Belen reach. However, Tetra Tech Inc. was contracted to survey the remaining 29 sites in the Belen Reach. The survey efforts were selected to meet compliance needs for Reclamation, the Middle Rio Grande Conservancy District, and the New Mexico Interstate Stream Commission projects. Certain sites were also selected to contribute to current baseline population data, monitor population trends, and determine the current distribution of SWFLs along the Middle Rio Grande (MRG).

During 2024, 792 resident SWFLs were documented. These residents formed 368 pairs and established 424 territories and resulted in 56 unpaired males. As in previous years, the San Marcial Reach of the Rio Grande was the most productive supporting 340 territories and 293 pairs. However, comparisons to previous years' data are difficult due to previous years' reduced survey effort. The Bosque del Apache Reach supported 40 territories, an increase from 2022 and 2023 when 35 and 27 territories were recorded, respectively. Only 10 territories were recorded in the Belen Reach. However, the southern half of the reach, which contained more than 80 territories in 2022, was not surveyed by Reclamation in 2024. There were 18 territories documented in the Sevilleta/La Joya Reach, 17 of the 18 territories were confirmed as nesting pairs. In the Escondida Reach, 16 territories were detected and 12 were confirmed to be nesting pairs. The San Acacia and Tiffany Reaches were surveyed in their entirety, but no territories were documented in either reach. Overall, 60 more territories were documented in MRG sites during 2024 than during 2023, but this increase is likely due to the additional survey effort in 2024 as opposed to an actual increase in SWFL territories.

Additionally, nest searching and monitoring were conducted in occupied sites, and nest fates were often determined. Nests were monitored for success rates, productivity, depredation, abandonment, and Brown-headed Cowbird parasitism. The San Marcial Reach provided the most productive habitat, where 365 nests and 348 SWFL fledglings were documented. Overall nesting success for the MRG was 49 percent.

Survey Results by Reach

Belen – 10 territories, 10 pairs, 10 nests (60 percent nest success, 5 unknowns)

Sevilleta/La Joya – 18 territories, 17 pairs, 20 nests (56 percent nest success, 2 unknowns)

San Acacia – No SWFL territories detected

Escondida – 16 territories, 12 pairs, 14 nests (42 percent nest success, 2 unknowns)

Bosque del Apache (active floodplain) – 40 territories, 36 pairs, 52 nests (55 percent nest success, 10 unknowns)

Tiffany – No SWFL territories detected

San Marcial – 340 territories, 293 pairs, 365 nests (48 percent nest success, 81 unknowns)

Introduction

The Southwestern Willow Flycatcher (*Empidonax traillii extimus*; SWFL) is a State and federally listed endangered subspecies of the Willow Flycatcher (*Empidonax traillii*) or WIFL. It is an insectivorous, Neotropical migrant that nests in dense riparian or wetland vegetation in the Southwestern United States (figure 1). The SWFLs typically arrive at their Middle Rio Grande (MRG) breeding sites between mid-May and early June and depart for wintering areas in Mexico, Central America, and northern South America between late July and mid-August (Sogge et al. 2010, USFWS 2002).

Due to declining populations and habitat loss, the U.S. Fish and Wildlife Service (USFWS) officially listed the SWFL as endangered in February 1995 (USFWS 1995). Subsequent studies conducted during the late-1990s and early 2000s and detailed in the SWFL Recovery Plan (USFWS 2002) confirmed the population declines. The SWFL is also listed as endangered by the State of New Mexico (NMDGF 2022). A recovery plan for the SWFL was finalized in August 2002 (USFWS 2002). In October 2005, the USFWS designated critical habitat for the SWFL and the designation was revised in January of 2013. The designation within the MRG includes the Rio Grande floodplain from the southern boundary of the Isleta Pueblo downstream into the upper part of Elephant Butte Reservoir (EBR) about 9 miles below the overhead powerline crossing near Milligan Gulch (approximately 112 river miles [RMs]).

Presence/absence surveys, based on established survey protocols (Sogge et al. 2010), were conducted to determine the distribution and abundance of the endangered SWFL during the relatively 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. In 1994, the New Mexico Natural Heritage Program (NMNHP 1994) conducted presence/absence surveys and nest monitoring within portions of the San Marcial Reach under a contract with the U.S. Army Corps of Engineers (Corps).

The 2024 presence/absence surveys for SWFLs were conducted at selected sites along the Rio Grande between the Isleta Pueblo and EBR (figure 2). Surveys were performed between May 15 and July 19, 2024. Nest searches and monitoring of SWFL nests were conducted by permitted biologists in conjunction with surveys.

Figure 1.—Breeding range and critical habitat of the SWFL with 2024 Middle Rio Grande survey sites (adapted from Unitt 1987 and Browning 1993).

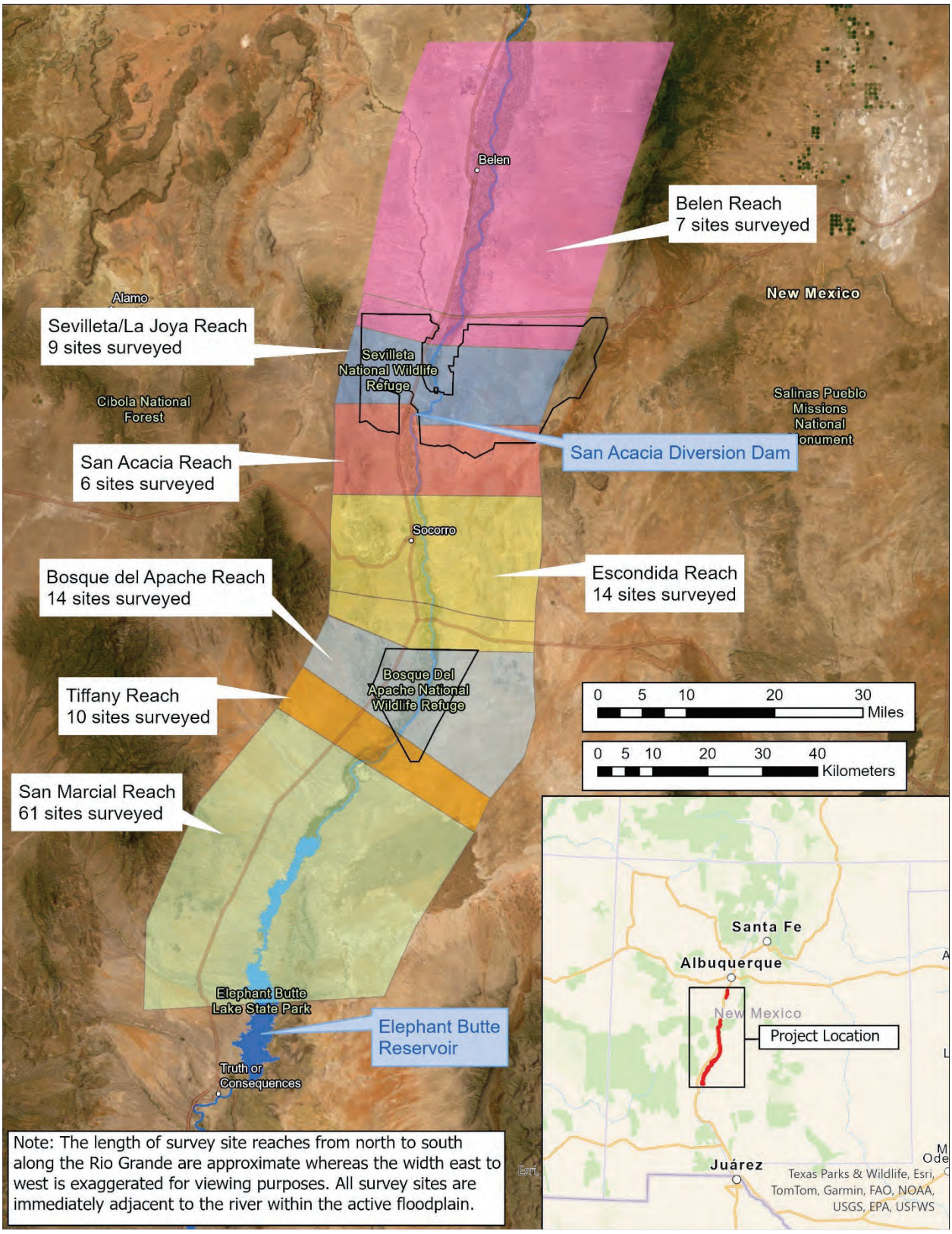


Figure 2.—General location of study reaches and number of sites surveyed in 2024.

Goals and Objectives

The primary goals of the field studies performed in 2024 were to:

- Meet Reclamation's, the Middle Rio Grande Conservancy District's (MRGCD), and the New Mexico Interstate Stream Commission's (NMISC) Endangered Species Act compliance and monitoring commitments for proposed, ongoing and completed projects in the MRG.
- Contribute to current understanding of the population status, distribution, and habitat requirements of the SWFL in the MRG.
- Inform efforts to avoid or minimize any potentially adverse project-related effects to breeding SWFLs or their habitat.
- Identify key habitat parameters and incorporate suitable habitat features into restoration planning.

The specific objectives included:

- Maintain project Endangered Species Act compliance in specific action areas by conducting five surveys per site annually.
- Inform impact analyses of river maintenance activities on specific subpopulations of SWFLs.
- Monitor SWFL nests to determine productivity, parasitism and depredation rates, population recruitment, and to identify limiting factors.
- Determine relationships between SWFL nesting and hydrologic parameters.

Methods

Study Area

Survey sites were selected based on environmental compliance requirements related to Reclamation, MRGCD, and NMISC projects, and a need to monitor SWFL population trends within the MRG. Sites consist of riparian habitat bounded by waterbodies, levees, or other physical features and are typically surveyed by one person in one day.

Reclamation's MRG study area encompasses approximately 129 RMs and covers the riparian corridor between the southern boundary of the Isleta Pueblo and EBR. It is divided into 7 river

reaches that include 154 survey sites. The 2024 survey area encompassed all seven reaches which included Belen, Sevilleta/La Joya, San Acacia, Escondida, Bosque del Apache, Tiffany and San Marcial Reaches (figure 2). The following is a reach-by-reach description of the study area.

Belen Reach

The Belen Reach is the northernmost reach, extending 39.5 RM downstream from the south boundary of the Isleta Pueblo (RM 166) to the confluence of the Rio Grande and Rio Puerco (RM 126.5) and covering 7,138 acres (ac) (2,889 hectares [ha]). Native-dominated overstory covers approximately 63 percent of the total survey area, mostly open cottonwood galleries (*Populus deltoides*) with sparse saltcedar (*Tamarix* spp.), Russian olive (*Eleagnus angustifolia*) and/or coyote willow (*Salix exigua*) understory. Much of the reach lacks annual overbank flooding and remains dry throughout the breeding season, bounded by the Rio Grande on one side and an extensive levee system on the other. However, several stands of coyote willow have developed on sand bars and islands in recent years. This reach provided 1,548 ac (626 ha) of suitable SWFL breeding habitat, 26 percent of the total area, in 2021 (figure 3; Siegle and Moore 2022a). In 2024, Reclamation surveyed 7 of the 36 sites within the Belen Reach and Tetra Tech Inc. (Tetra Tech) surveyed the remaining 29 sites.

Sevilleta/La Joya Reach

The Sevilleta Reach extends 10.5 RMs from the confluence of the Rio Grande and Rio Puerco (RM 126.5) to San Acacia Diversion Dam (RM 116) and encompasses 3,580 ac (1,449 ha). Lands within this reach are managed by the New Mexico Department of Game and Fish (La Joya Wildlife Management Area) and U.S. Fish and Wildlife Service (Sevilleta National Wildlife Refuge). Monotypic stands of saltcedar or Russian olive are common with occasional cottonwood stands and coyote willow and Russian olive along the banks of the river. On lower terraces and river bars, moderate overbank flooding occurs during high flow events. The San Acacia Diversion Dam within the downstream portion of this reach backs up water, allowing the portion immediately upstream of the dam to aggrade. This reach provided 449 ac (182 ha) of suitable SWFL breeding habitat, 13 percent of the total area, in 2021 (figure 3; Siegle and Moore 2022a). The entire Sevilleta Reach was surveyed in 2024.

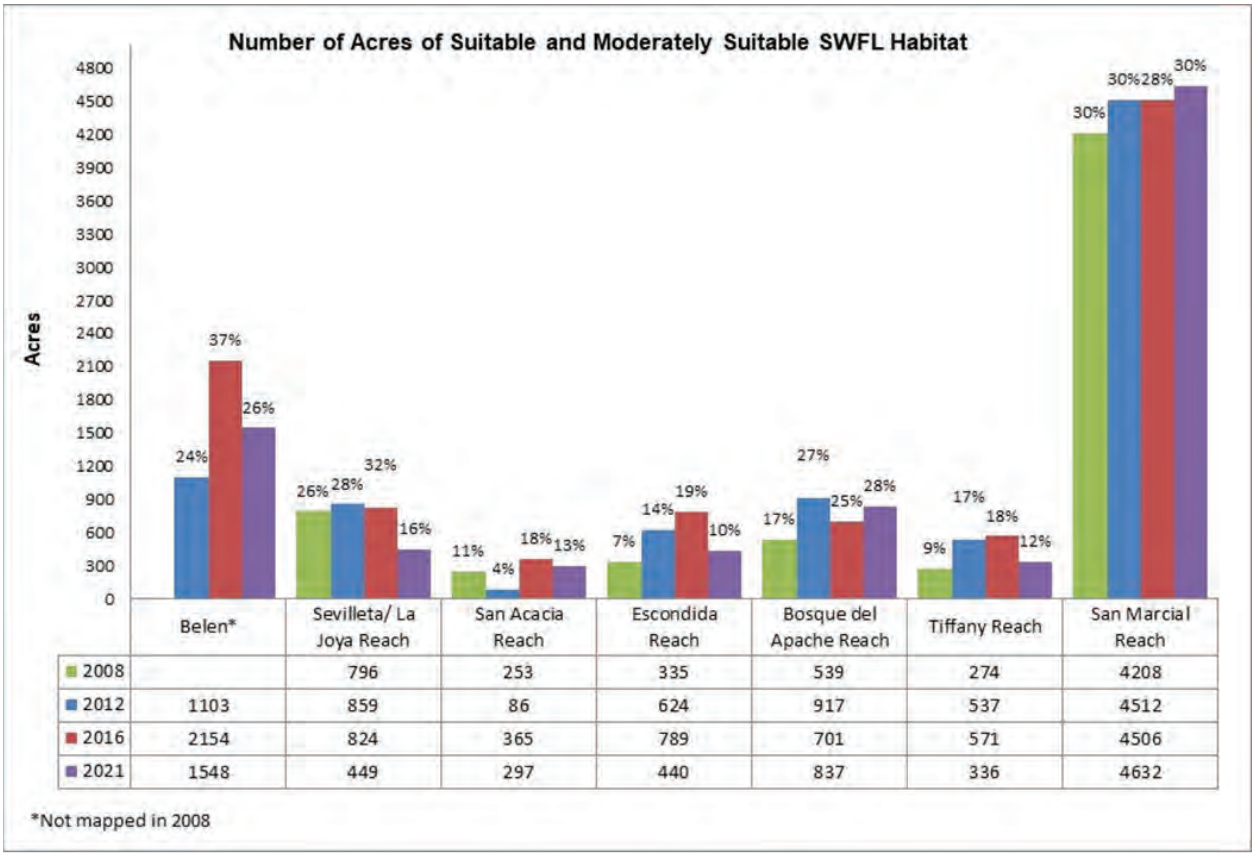


Figure 3.—The number of acres of suitable and moderately suitable SWFL habitat mapped in 2008, 2012, 2016, and 2021 by river reach. The percentage associated with each column is the percent of suitable and moderately suitable habitat out of all potential habitat.

San Acacia Reach

The San Acacia Reach extends downstream approximately 12 RMs from San Acacia Diversion Dam (RM 116) to Escondida Bridge (RM 104) comprising 2,767 ac (1,120 ha). The active floodplain within the San Acacia reach is relatively narrow and constrained by uplands to the east and levees along the low flow conveyance channel (LFCC) to the west. River dynamics in the reach are limited by the San Acacia Diversion Dam, with infrequent flooding only on lower terraces. Habitat within this reach is varied and consists of a mixture of gallery cottonwood, saltcedar of various ages and structures, and patchy coyote willow and Russian olive along the river. The highly degraded river channel in this reach has reduced overbank flooding and limited understory growth in many areas. This reach holds the smallest amount of suitable habitat of any study reach providing 297 ac (120 ha) of suitable SWFL breeding habitat, 11 percent of the total area, in 2021 (figure 3; Siegle and Moore 2022a). The entire San Acacia Reach was surveyed in 2024.

Escondida Reach

The Escondida Reach extends 20 RMs downstream from Escondida Bridge (RM 104) to the north boundary of the Bosque del Apache National Wildlife Refuge (NWR) (RM 84) and encompasses 5,944 ac (2,405 ha). Similar to the San Acacia Reach, river dynamics in the reach are limited by the San Acacia Diversion Dam. The river in this reach is incised and does not experience regular overbank flooding except during high flow events. Persistent drought and frequent river drying have stressed the native habitat and decreased habitat suitability. Vegetation includes sparse, shrubby saltcedar and seep willow (*Baccharis salicifolia)* with intermittent cottonwood overstory in the drier areas and smaller patches of native willows along the river. This reach provided 440 ac (178 ha) of suitable SWFL breeding habitat, 8 percent of the total area, in 2021 (figure 3; Siegle and Moore 2022a). This reach has only been partially surveyed between 2019 and 2023. In 2024, the Escondida Reach was surveyed in its entirety.

Bosque del Apache Reach

The Bosque del Apache Reach comprises 3,984 ac (1,612 ha) within the active floodplain of the Bosque del Apache NWR (RMs 84 to 74). Habitat within this reach varies widely from decadent, dense saltcedar to large, mature cottonwood and Goodding's willow (*Salix gooddingii*) stands to dense patches of coyote willow and Russian olive. Extensive overbank flooding occurs in this reach during high river flows, which recently occurred during the 2017, 2019, and 2023 breeding seasons. In 2020, due to the risk posed to refuge infrastructure and water delivery by a sediment plug, the river was realigned to the east to bypass the plug. Habitat adjacent to the former alignment and sediment plug has become dry and decadent. Ideally, this habitat will be replaced by developing habitat adjacent to the new river alignment. However, the river regularly dries during low-flow periods in the summer. This reach provided 837 ac (339 ha) of suitable SWFL breeding habitat, 21 percent of the total area, in 2021 (figure 3; Siegle and Moore 2022a). All of the Bosque del Apache Reach was surveyed in 2024.

Tiffany Reach

The Tiffany Reach extends from the southern boundary of the Bosque del Apache NWR to the San Marcial railroad trestle (RMs 74 to 69). The 2017 Tiffany Fire severely burned most of the vegetation within this reach. However, some native canopy patches have partially or fully recovered. Of the 3,772 ac (1,527 ha) within this reach, 24 percent is still open and considered non-habitat due to fire and 56 percent of the area is young saltcedar. A sediment plug has historically formed in this reach, however, in its absence very little overbank flooding occurs without high river flows. This reach provided 336 ac (136 ha) of suitable SWFL breeding habitat, 21 percent of the total area, in 2021 (figure 3; Siegle and Moore 2022a). All of the 10 sites within the Tiffany Reach were surveyed in 2024.

San Marcial Reach

The San Marcial Reach extends from the San Marcial railroad trestle (RM 69) to the Elephant Butte Reservoir Delta (RM 37) and has both the largest expanse of any reach in the study area (21,878 ac [8,854 ha]) and the greatest abundance of suitable avian habitat. Vegetation in the upstream portion of the reach (RM 60 to 69) has become increasingly decadent and dominated by saltcedar and overbank flooding is nearly nonexistent. The Tiffany (2018), Fort Craig (2020) and RM 60 (2022) fires burned large tracts of habitat west of the river between RM 60 and 69. Vegetation in these areas is in various states of recovery.

As Elephant Butte Reservoir receded, several hundred hectares of Goodding's and coyote willow habitat developed within the exposed pool south of RM 60, some of which continues to provide avian habitat. Monotypic saltcedar stands developed where hydrology became unsuitable for native vegetation. Habitat along the LFCC West, a channel south and west of RM60, was more frequently flooded or wetted by flows and supports native and occupied habitat. Prolonged drought has impacted high quality habitat within the Elephant Butte Reservoir pool and, over time, saltcedar has expanded in this stretch. Much of the native habitat within the upper pool has begun to show signs of stress, resulting in a reduction in foliage density and subsequently a decline in habitat suitability. This reach has been surveyed annually since 2006, with subtle increases in the extent of the survey area downstream as the reservoir receded over the past several years. This reach contains the most suitable habitat of any study reach providing 4,632 ac (1,875 ha) of suitable SWFL breeding habitat, 21 percent of the total area, in 2021 (figure 3; Siegle and Moore 2022a). All 61 sites in the San Marcial Reach were surveyed in 2024.

Presence/Absence Surveys

All sites were surveyed five times using the repeated call-playback method in accordance with the protocols established in Sogge et al. (2010). This protocol, modified from earlier versions, specifies three surveys for general purposes and five surveys for project-related purposes (where habitat may be potentially impacted). Surveys in individual sites were conducted a minimum of 5 days apart; generally, between 5:30 a.m. and 10:30 or 11 a.m. MDT (depending on weather conditions), by trained and permitted personnel. Survey forms were completed daily for each respective site.

The first survey is conducted in late May to increase 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 or *extimus* subspecies that are passing through and not actively defending territories) would also be detected. For sites with only a three-survey requirement, the second and third surveys were conducted between early June and mid-July 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. In sites with a five-survey requirement, the second and third surveys were conducted during June and the fourth and fifth surveys were conducted from late June to mid-July. The additional two surveys were initiated in 2000 to derive a greater degree of

confidence regarding the breeding status, habitat association, and presence/absence of SWFLs at the selected sites. The WIFLs documented on or after June 10 were typically considered resident birds (i.e., SWFLs) for reporting purposes, however several were determined to be late migrants based on their behavior and were not included as residents. Each site was surveyed as thoroughly as conditions would allow.

Nest Searches/Monitoring

Within occupied sites, nest searches were conducted by a permitted biologist and/or technician under the direct supervision of a permitted biologist upon discovery of a breeding or suspected breeding 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 Rourke et al. (1999). Nest areas were located by observing diagnostic SWFL breeding behavior and listening for calls within the habitat patch. Once located, the nest sites were approached cautiously with minimum disturbance to vegetation. Typically, adult SWFLs did not immediately reveal nest locations. All suitable mid-story 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 approximately 8 to 10 meters (m) or 26 to 33 feet (ft) away from the nest, to minimize attraction of predators. 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, again to minimize disturbance and reduce predator attraction.

At all nest sites, physical data required by the Willow Flycatcher Nest Record Form were recorded. Nest contents were not monitored during the nest building/egg laying stages—the period when disturbance is most likely to cause adults to abandon the nest—or as the suspected fledging date approached when nestlings are likely to be force-fledged as a result of disturbance. 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. Physical and monitoring data were ultimately entered into a master spreadsheet for ease of query and analysis.

At the conclusion of 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. Then, if logistically possible, a re-nest/second brood search was performed. A re-nest is a nesting attempt that occurs after a nest fails while a second brood is a nesting attempt following an initial successful nesting attempt. When possible, nests were monitored through completion. However, certain nests that were not monitored to completion were considered successful if they had nestlings at least 8 days old at the last visit.

In 2002, the practice of addling - shaking an egg during incubation to render the embryo inside unviable - or removing Brown-headed Cowbird (BHCO) eggs from parasitized nests was initiated when necessary and possible. This activity continued annually through 2024. The 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. In these cases, the BHCO egg(s) was left untouched, and the nests were monitored normally to minimize disturbance.

Hydrology Monitoring

Beginning in 2004 and continuing through 2024, hydrological conditions below the nest were recorded on each nest visit. These data were collected to make informed management decisions regarding SWFL nesting habitat, and to maximize the benefits from and use of available water. One of three possible hydrologic conditions was recorded–dry soil, saturated soil, or flooded site–and daily data were compiled for each nest at season's end to determine the hydrologic regime throughout the nesting cycle. Four hydrological scenarios emerged, including: (1) Dry all cycle, (2) Saturated/flooded then dry, (3) Saturated/flooded all cycle, and (4) Flooded all cycle. Distance to water was also recorded at each visit and average distance throughout the nest cycle was computed following the breeding season.

Results

Presence/Absence Surveys

During presence/absence surveys conducted between May 15 and July 19, 2024, there were 1,178 WIFLs detected (table 1). Based on detections prior to June 10 and/or the birds' lack of territorial behavior, 386 were believed to have been migrants. The remaining 792 birds comprised 368 pairs and 56 unpaired male territories. A total of 424 SWFL territories were documented within the MRG study area during the 2024 season (figures 4 through 13). WIFL detection results are summarized by reach in table 1. Site-by-site WIFL detection summaries can be found in appendix A. In the Belen Reach, Tetra Tech was contracted to survey the remaining 29 survey sites and documented 96 SWFL territories (RJH Consultants and Tetra Tech Inc. 2024).

Table 1.—2024 Willow Flycatcher survey detections by reach within the Middle Rio Grande

Site Name	WIFLs Observed[1]	Est. Number of Pairs	Est. Number of *E.t. extimus*[2]	Est. Number of Territories	Comments
Belen Reach	30	10	20	10	10 migrants; 10 pairs
Sevilleta/La Joya Reach	84	17	35	18	49 migrants; 1 unpaired male; 17 pairs
San Acacia Reach	26	0	0	0	26 migrants
Escondida Reach	99	12	28	16	71 migrants; 4 unpaired males; 12 pairs
Bosque del Apache Reach	121	36	76	40	45 migrants; 4 unpaired males; 36 pairs
Tiffany Reach	28	0	0	0	28 migrants
San Marcial Reach	789	293	633	340	157 migrants; 47 unpaired males; 293 pairs
Middle Rio Grande Summary	**1,177**	**368**	**792**	**424**	**386 migrants; 56 unpaired males; 368 pairs**

[1] When a single WIFL responded to the tape playback, and there was no evidence of pairing, it was considered an unpaired male.

[2] A resident SWFL is a WIFL documented on or after June 10 that exhibits territorial behavior or for which nesting is confirmed.

SWFL pairs often produced more than one nest either following a nest failure (re-nest) or successful fledging (second brood).

Migrant – any WIFL that does not exhibit territorial behavior and is typically detected only during the period prior to June 10th.

Unpaired Male – a resident SWFL that 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.

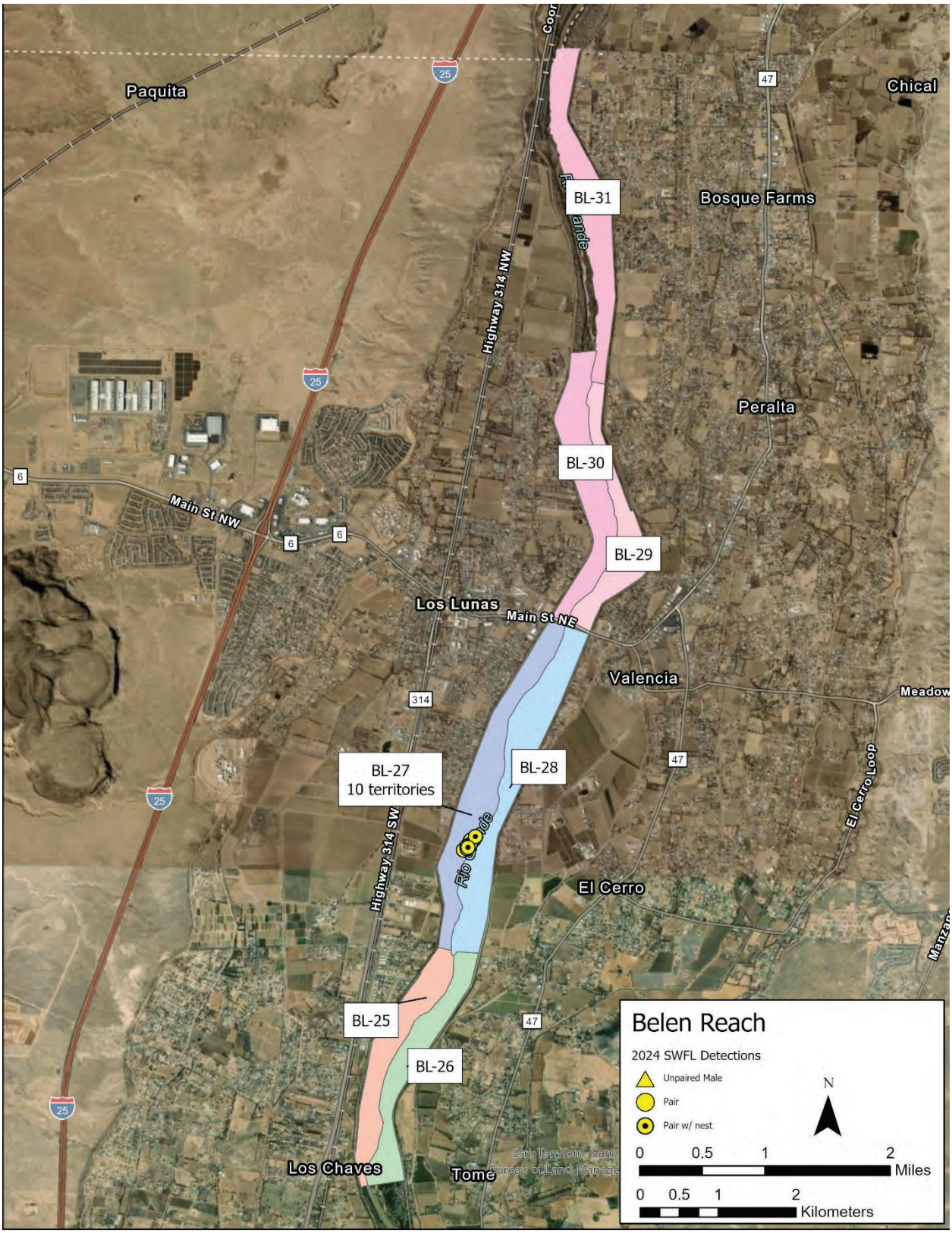


Figure 4.—Overview of SWFL territories within the northern Belen Reach survey sites.

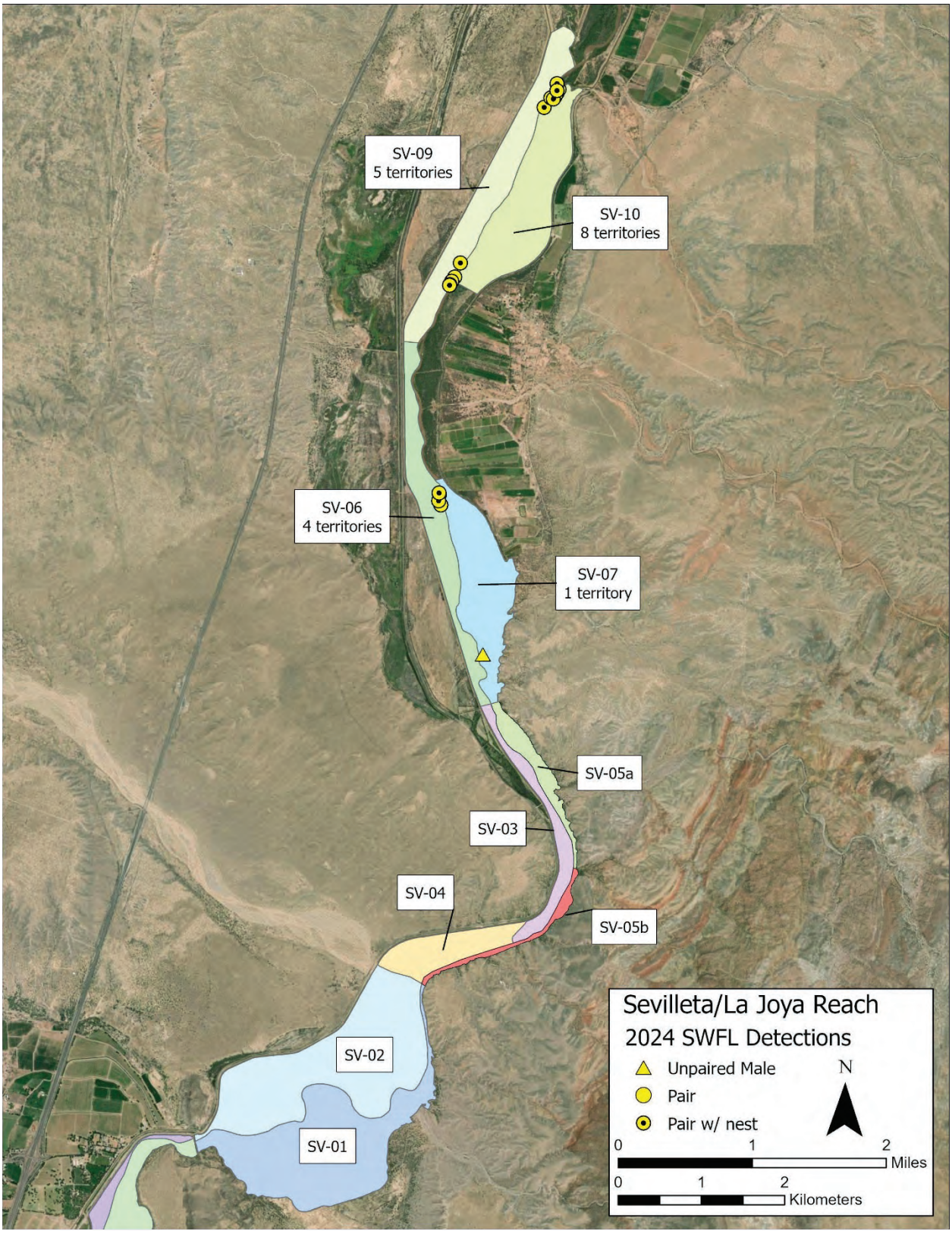


Figure 5.—Overview of SWFL territories within the Sevilleta/La Joya Reach survey sites.

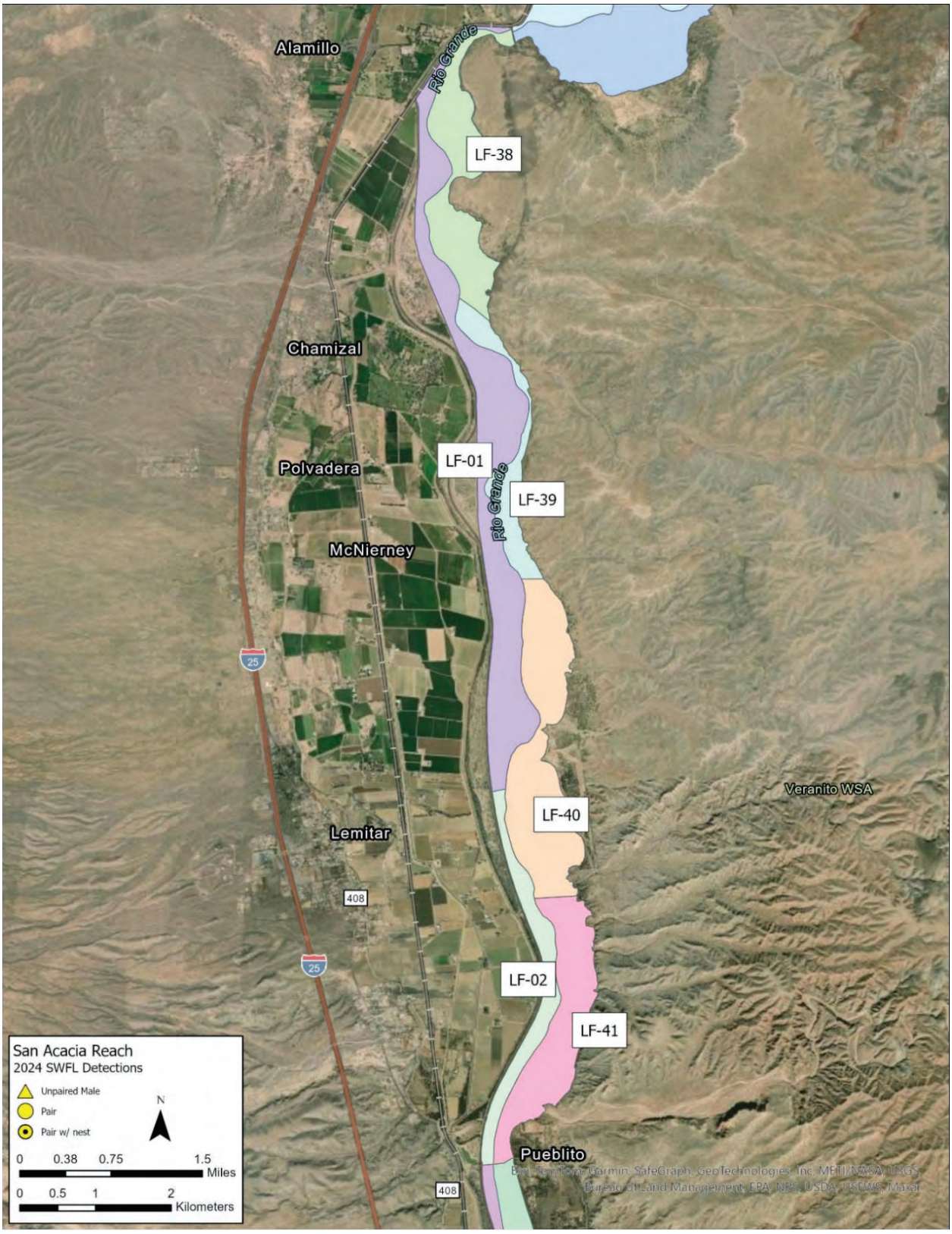


Figure 6.—Overview of SWFL territories within the San Acacia Reach.

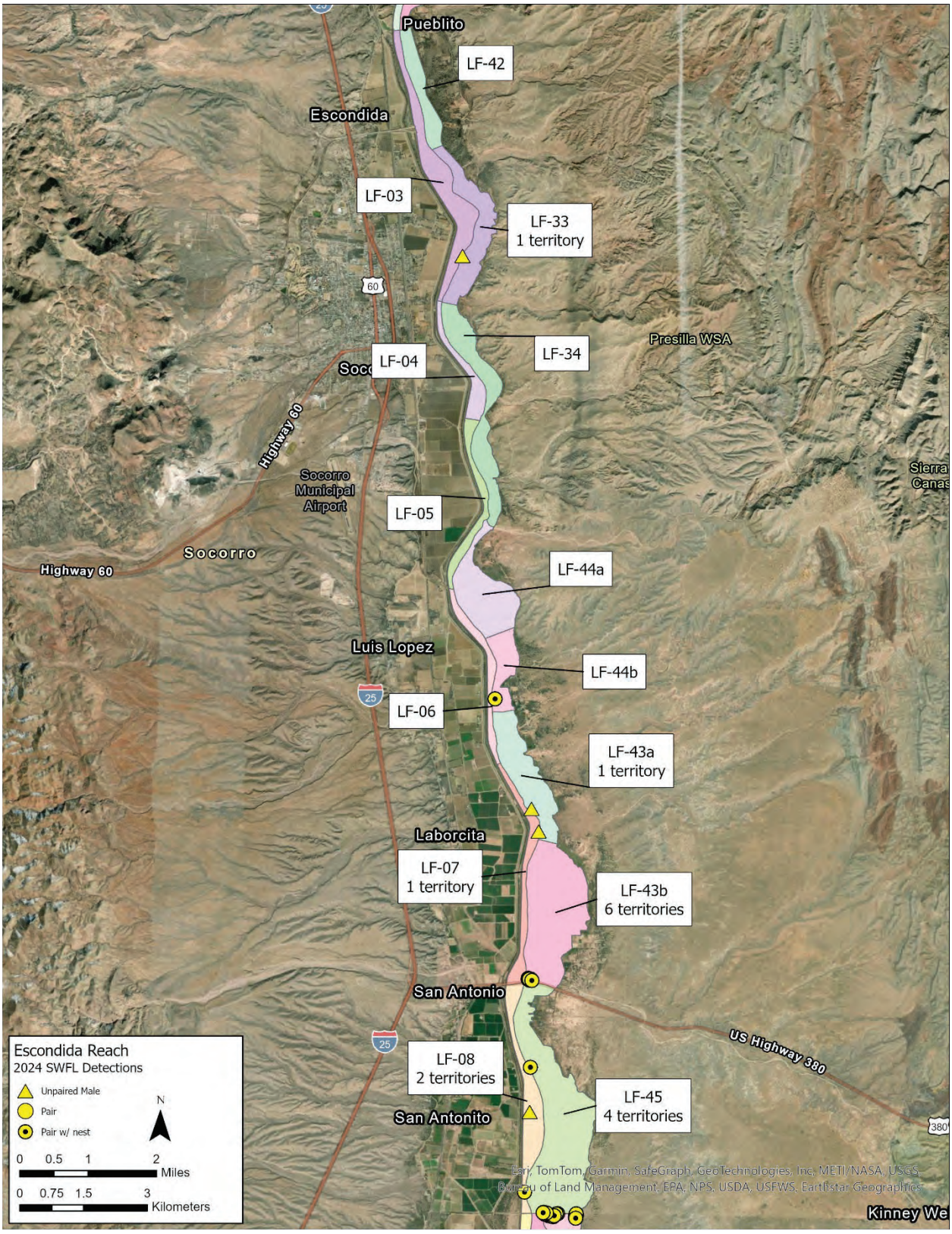


Figure 7.—Overview of SWFL territories within the Escondida Reach.

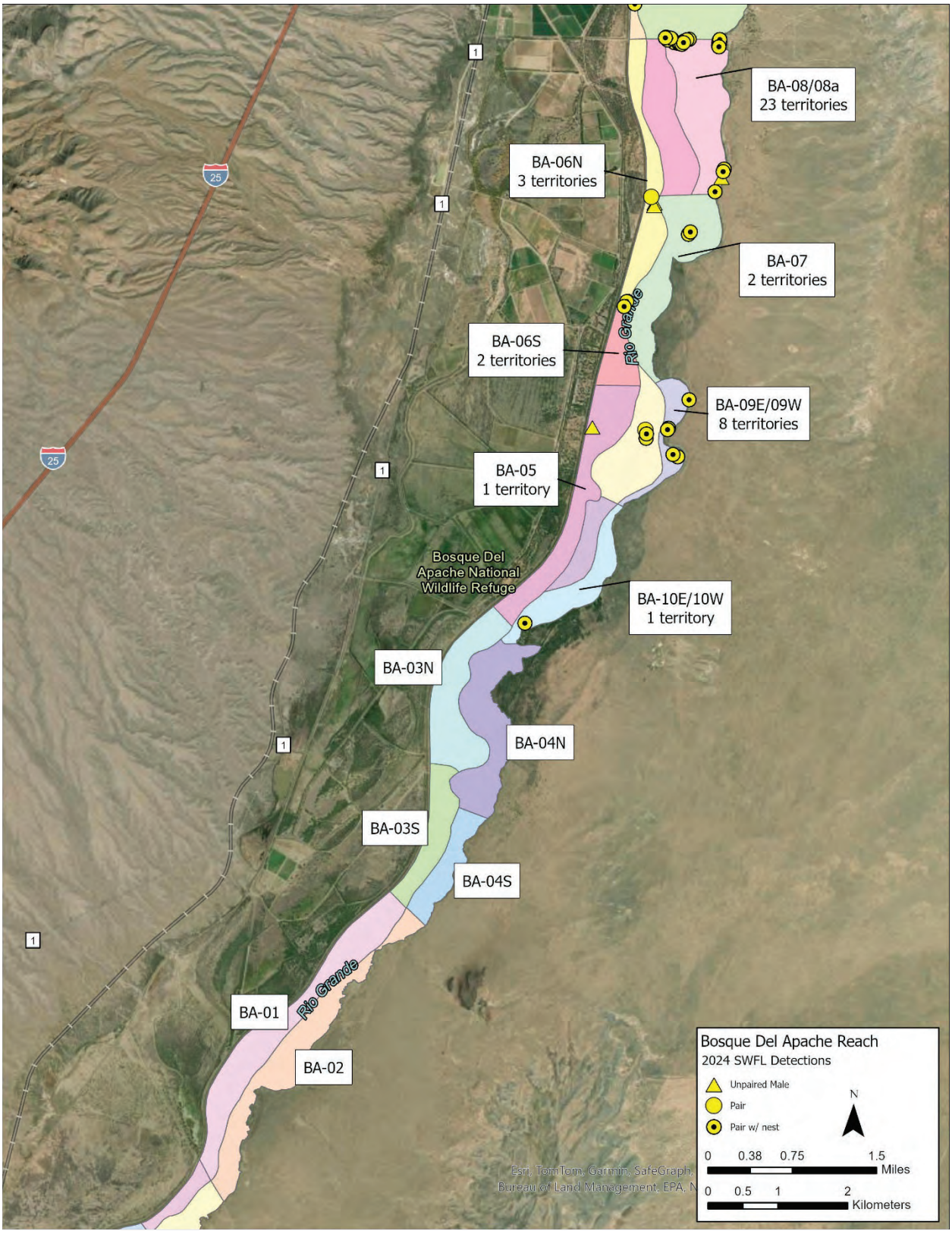


Figure 8.—Overview of SWFL territories within the Bosque Del Apache Reach.

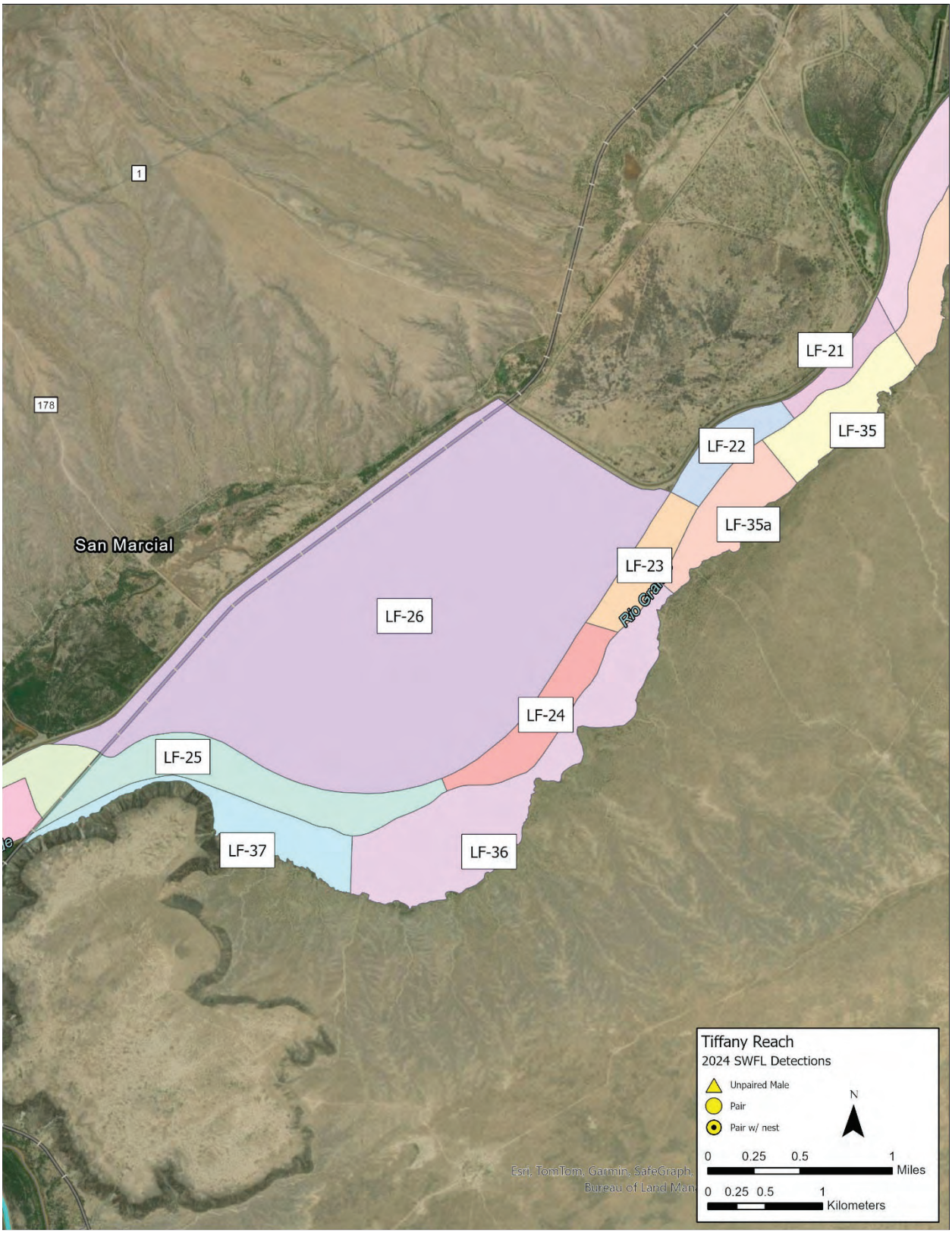


Figure 9.—Overview of SWFL territories within the Tiffany Reach.

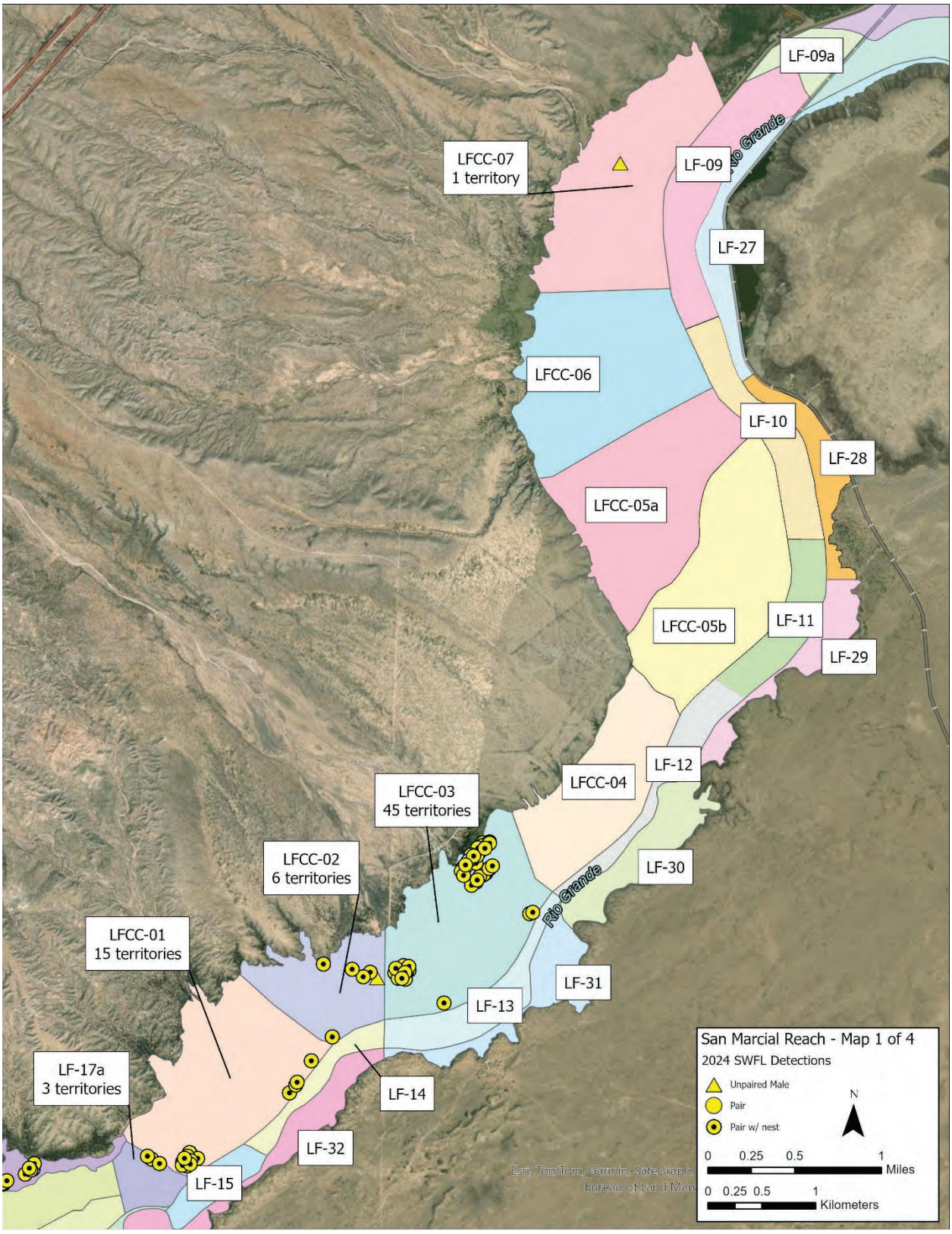


Figure 10.—Overview of SWFL territories within the San Marcial Reach – Map 1 of 4.

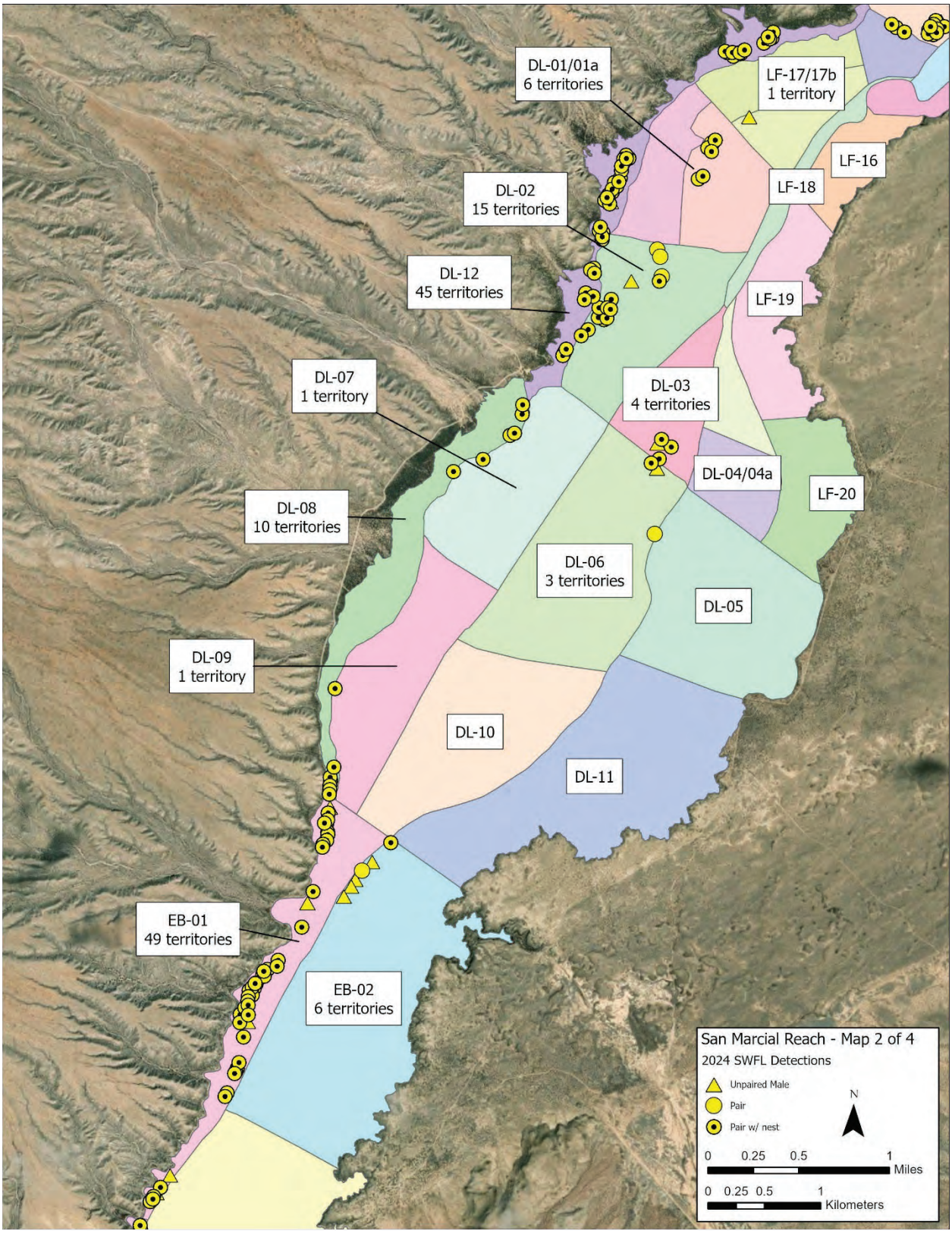


Figure 11.—Overview of SWFL territories within the San Marcial Reach – Map 2 of 4.

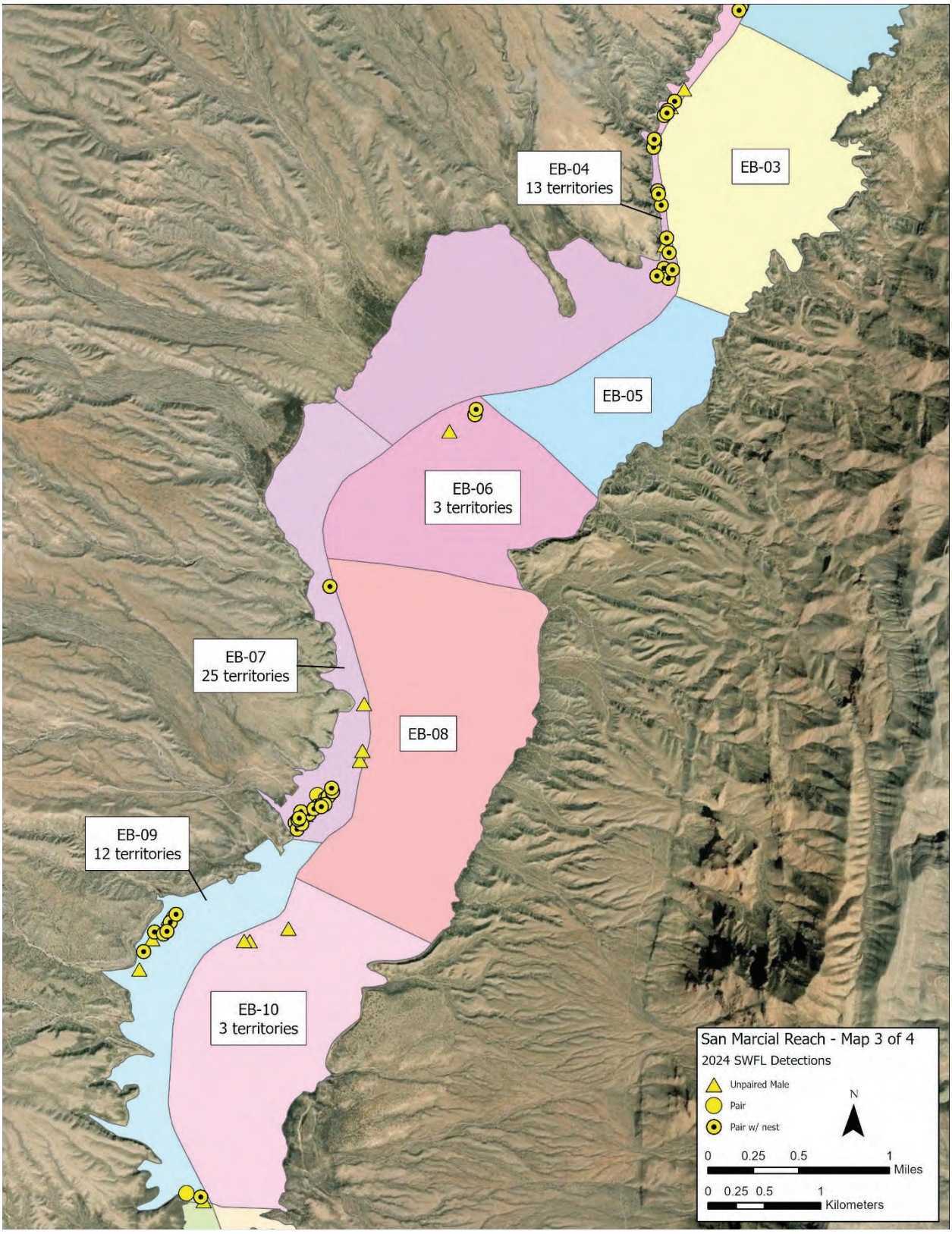


Figure 12.—Overview of SWFL territories within the San Marcial Reach – Map 3 of 4.

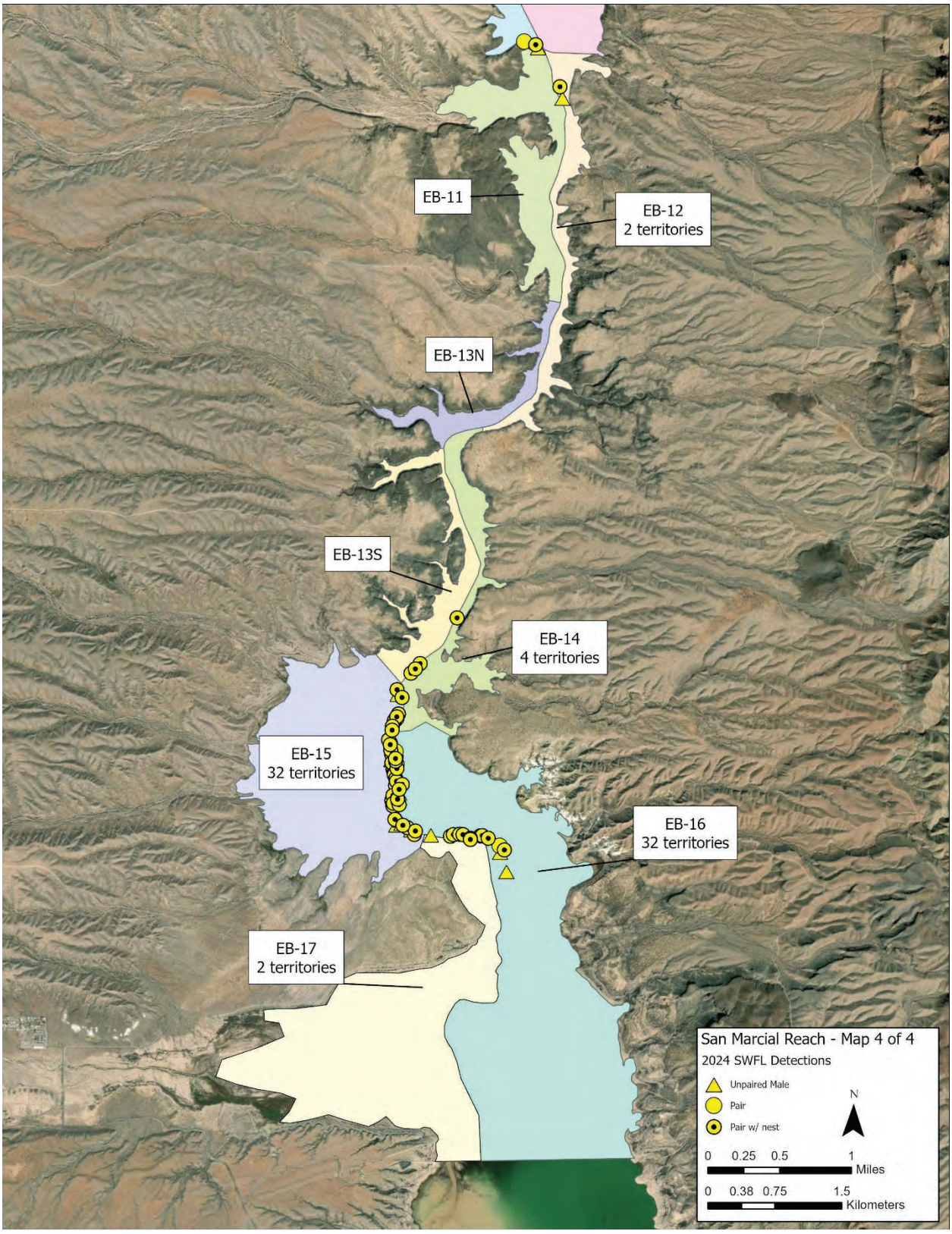


Figure 13.—Overview of SWFL territories within the San Marcial Reach – Map 4 of 4.

Nest Searches/Monitoring

In 2024, 461 SWFL nests were located within the MRG (table 2). Fates were determined for 361 nests (table 3). Of these, 177 nests were successful and 184 failed. An estimated 453 SWFL young fledged during the 2024 breeding season. Documented nesting attempts confirmed the existence of 350 pairs; 16 additional pairs were observed and, although nesting was suspected, nests were not located in any of these territories. Successful nests include those which fledged young or supported chicks at least 8 days old on the last nest visit and every effort was made to monitor nests until nestlings were at least 10 days old.

Table 2.—Summary of 2024 SWFL nest monitoring by reach within the Middle Rio Grande

Reach	Territories	Pairs	Nests Found*	Nests Parasitized (%)**	Nests Depredated (%)**	Nests Abandoned (%)**	Unknown Success	Successful Nests (%)	Estimated Total # Chicks Fledged	Estimated Productivity (# Chicks Per Successful Nest)
Belen	10	10	10	0	2 (40%)	0	5 (50%)	3 (60%)	9	3.0
Sevilleta/La Joya	18	17	20	5 (25%)	7 (35%)	0	2 (10%)	10 (56%)	22	2.2
San Acacia	0	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Escondida	16	12	14	6 (50%)	1 (8%)	0	2 (14%)	5 (42%)	13	2.6
Bosque del Apache	40	36	52	14 (33%)	16 (38%)	0	10 (19%)	23 (55%)	58	2.5
Tiffany	0	0	0	N/A	N/A	N/A	0	N/A	N/A	N/A
San Marcial	340	293	365	22 (8%)	120 (42%)	7 (2%)	81 (22%)	136 (48%)	348	2.6
Total	**424**	**368**	**461**	**22 (7%)**	**139 (38%)**	**7 (2%)**	**100 (22%)**	**177 (49%)**	**453**	**2.6**

Unknowns not included in nest variable calculation.
*Some pairs re-nested after failed attempt or attempted a second, third, or fourth brood.
**Totals may not add up to the number of total nests found. Some nests were parasitized, depredated, and/or abandoned.

Table 3.—Summary of SWFL nest monitoring data in the Middle Rio Grande 2024

General Nest Data 2024		
Parasitism Rate 5% (47 out of 361 nests)		
Depredation Rate 49% (146 out of 361 nests)		
Abandonment Rate 5% (7 out of 361 nests)		
Nest Success 39% (177 out of 361 nests)		
Territory Vegetation Type		
Number of nests in exotic-dominated territories	62	17% of total
Number of nests in *Salix*-dominated territories	127	35% of total
Number of nests in mixed dominance territories	172	48% of total
Nest Substrate Species		
Number of nests in *Salix* substrate	128	35% of total
Number of nests in saltcedar substrate	221	61% of total
Number of nests in Russian olive substrate	5	1% of total
Number of nests in other (*Baccharis*, cottonwood) substrate	7	2% of total
Nest Substrate/Territory Vegetation Combination		
Number of nests in saltcedar substrate within *Salix*-dominated territories	11	(9% of 127 nests)
Number of nests in *Salix* substrate within exotic or mixed dominance territories	20	(9% of 234 nests)
Nest Success Per Nest Substrate Species		
Percentage of successful nests in *Salix* substrate	51%	(65 out of 128 nests)
Percentage of successful nests in saltcedar substrate	49%	(109 out of 221 nests)
Percentage of successful nests in Russian olive substrate	20%	(1 out of 5 nests)
Percentage of successful nests in other (*Baccharis*, cottonwood) substrate	29%	(2 out of 7 nests)
Nest Success Per Territory Vegetation Type		
Percentage of successful nests in *Salix*-dominated territories	46%	(58 out of 127 nests)
Percentage of successful nests in exotic-dominated territories	61%	(38 out of 62 nests)
Percentage of successful nests in mixed dominance territories	47%	(81 out of 172 nests)
Cowbird Parasitism Per Nest Substrate Species		
Percentage of nests parasitized in *Salix* substrate	7%	(9 out of 128 nests parasitized)
Percentage of nests parasitized in saltcedar substrate	16%	(35 out of 221 nests parasitized)
Percentage of nests parasitized in Russian olive substrate	40%	(2 out of 5 nests parasitized)
Percentage of nests parasitized in other (*Baccharis*, cottonwood) substrate	14%	(1 out of 7 nests parasitized)
Cowbird Parasitism Per Territory Vegetation Type		
Percentage of nests parasitized in *Salix*-dominated territories	9%	(11 out of 127 nests)
Percentage of nests parasitized in exotic-dominated territories	15%	(9 out of 62 nests)
Percentage of nests parasitized in mixed dominance territories	16%	(27 out of 172 nests)
Productivity[(1)] Per Nest Substrate Species		
Productivity of nests found in *Salix* substrate	2.52/nest	(164 young from 65 nests)
Productivity of nests found in saltcedar substrate	2.56/nest	(279 young from 109 nests)
Productivity of nests found in Russian Olive substrate	3.00/nest	(3 young from 1 nests)
Productivity[(1)] Per Territory Vegetation Type		
Productivity of nests found in *Salix*-dominated territories	2.53/nest	(147 young from 58 nests)
Productivity of nests found in exotic-dominated territories	2.53/nest	(96 young from 38 nests)
Productivity of nests found in mixed dominance territories	2.56/nest	(207 young from 81 nests)

Productivity[1] Compared to Nest Substrate Species and Territory Vegetation Type		
Productivity of nests in *Salix* substrate within *Salix* dominated territories	2.54/nest	(142 young from 56 nests)
Productivity of nests in saltcedar substrate within *Salix* dominated territories	3.00/nest	(3 young from 1 nests)
Productivity of nests in saltcedar substrate within exotic dominated territories	2.57/nest	(95 young from 37 nests)
Total SWFL nests of known outcomes monitored during 2024	**361**	

Note: Summary data only from nests with known outcomes.
[1] Productivity is defined as the number of SWFL young fledged per successful nest.

The following is a reach-by-reach summary of SWFL nest monitoring within 2024 survey sites (historical data by reach can be found in appendix B). It is important to note that the number of nests found per site or reach should not be used as a direct measure of breeding activity because nest monitoring efforts varied by site and oftentimes nests were not found, or multiple nests were recorded for a single breeding pair. Therefore, the number of pair territories found within each reach or site should be used in lieu of nests.

Belen Reach

The limited surveys conducted in the Belen Reach in 2024 documented 10 breeding SWFL pairs. These pairs produced 10 nests throughout the breeding season. Of these, 3 successfully fledged, 2 were depredated and the fates of 5 were unknown. A total of nine SWFLs were documented fledging from this reach in 2024 (table 2). Tetra Tech also documented an additional 57 SWFL nests in the remaining 29 survey sites in the Belen Reach. Their nest data is outlined in their annual report (RJH Consultants and Tetra Tech Inc. 2024).

Sevilleta/La Joya Reach

In 2024, Reclamation confirmed 17 nesting pairs in the Sevilleta/ La Joya Reach. The pairs produced 20 nests throughout the summer. Of these 20 nests, 10 successfully fledged, 5 were parasitized, 7 were depredated and 2 had unknown fates. A total of 22 SWFLs were documented fledging from this reach in 2024 (table 2).

Escondida Reach

In 2024, 12 breeding SWFL pairs were documented in the Escondida Reach. Those pairs produced 14 nests. Of those, five successfully fledged, six were parasitized, one was depredated and two had unknown fates. A total of 13 SWFLs were documented fledging from this reach in 2024 (table 2).

Bosque del Apache Reach

In 2024, 36 pairs produced 52 nests. Of these, 23 successfully fledged, 14 were parasitized, 16 was depredated and the fates of 10 were unknown. A total of 58 SWFLs were documented fledging from this reach in 2024 (table 2).

San Marcial Reach

A total of 293 pairs and 365 nests (including renests and second broods) were documented within this reach in 2024 (table 2). All but 59 pairs (those in the LFCC sites) were located within the conservation pool of EBR. Of the 365 nests monitored in 2024, 136 successfully fledged, 22 nests were parasitized, 120 were depredated and 7 nests were abandoned. A total of 348 SWFLs were assumed to have fledged from this reach in 2024.

Hydrology Monitoring

To investigate microscale impacts of hydrology on SWFL reproduction, hydrology data were statistically compared to SWFL nest variables (i.e., success, productivity, depredation, and BHCO parasitism) when possible. Details and graphical representations of these comparisons are presented in appendix C. In 2024, 81 percent of nests with known outcomes (n = 361) were within 100 m of surface water and 70 percent were within 50 m of surface water. Distance to water was not analyzed due to small sample sizes. Four classes were used to analyze nesting variables based on hydrology immediately under each nest: dry all season, saturated/flooded then dry, saturated/flooded all season, and flooded all season (a subset of saturated all season). In 2024, 34 percent of MRG nests were above either saturated soil or flooded conditions the entire nesting cycle, 57 percent were above dry ground, and 9 percent were saturated or flooded then dried. Only the categories dry all cycle, saturated/flooded all cycle, and flooded all cycle were analyzed due to the small sample size of nests that were saturated or flooded and then dried. Hydrologic conditions under the nest did not significantly impact nest variables in 2024.

Figure 14 shows the current elevational distribution of SWFL territories within EBR. In 2024, 27 percent of SWFL territories were within seven feet of the spillway elevation within the historic floodplain. This abundance of territories reflects the population growth observed along the western upper periphery of the reservoir pool. It is unlikely that habitat within this elevational range would be negatively impacted by reservoir water even at full pool. Annual fluctuation of reservoir elevations, even during average water years, would likely be enough to remove water from this habitat and prevent vegetative mortality. Conversely, much of the formerly occupied habitat in this elevational range has become decadent and lost suitability due to its age and the aforementioned flood and drought cycles. Reservoir levels in 2024 rose throughout May, peaking at just over 4,338 ft. At this elevation, a small percentage of nests in the southern extent of the MRG survey sites would have experienced some flooding. It would have been brief enough that permanent impacts to the native habitat would not be expected.

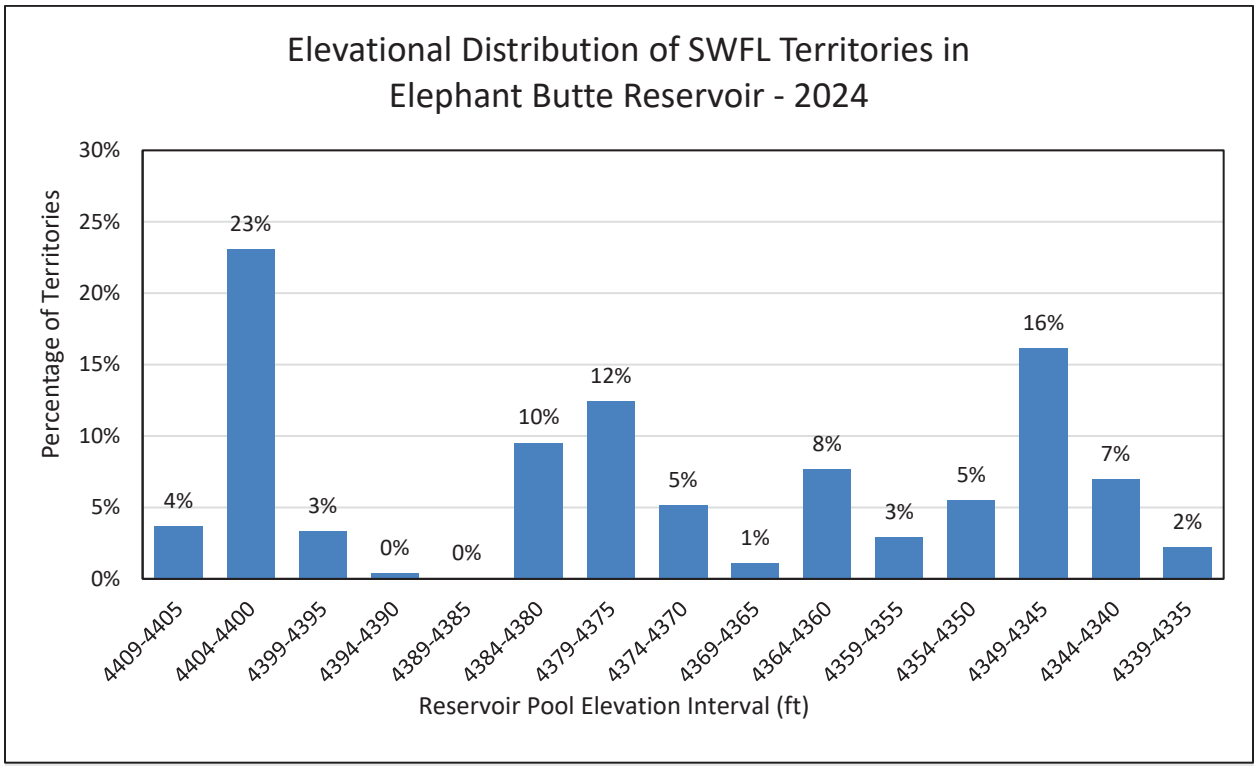


Figure 14.—Elevational distribution of SWFL territories within Elephant Butte Reservoir in 2024. Twenty-seven percent of territories were within seven feet of reservoir spillway elevation (i.e., top of conservation pool – 4,407 feet).

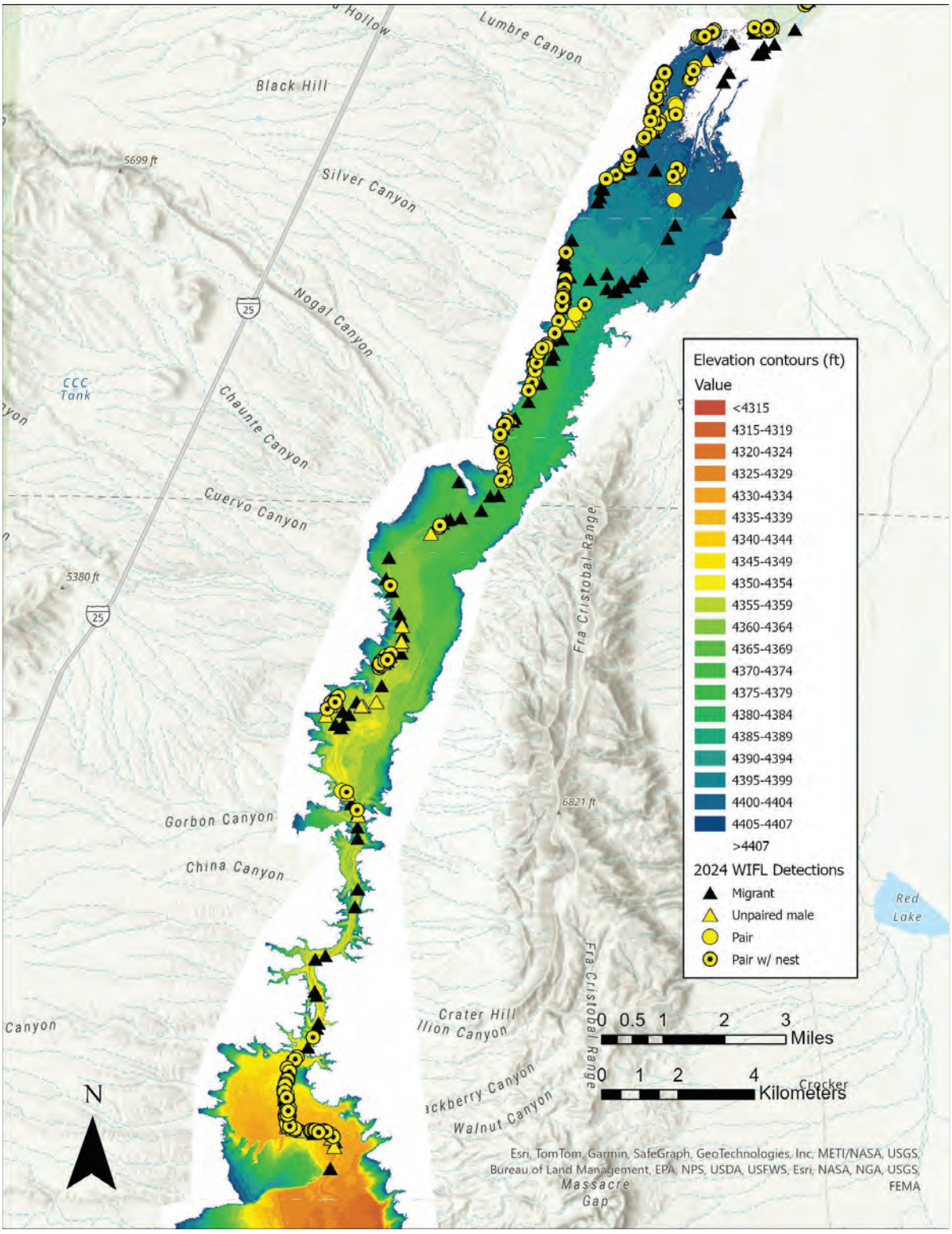


Figure 15.—Elevation contours within the delta of Elephant Butte Reservoir. Reservoir levels ranged from 4,307 to 4,338 feet in elevation during the 2024 SWFL survey season. Spillway elevation/top of conservation pool is 4,407 feet.

Discussion

Presence/Absence Surveys

Overview of Middle Rio Grande Surveys

As shown in figure 16 and table 4, the number of SWFL territories within Reclamation survey sites has dramatically increased since 1999. The majority of these territories (64 percent) have been found within the exposed pool of EBR. Suitable SWFL habitat developed within the exposed reservoir pool in conjunction with the receding reservoir from the late-1990s to 2005 (figure 15). This habitat continued to develop into the largest expanse of suitable, native SWFL habitat in the range of the subspecies. And, although much of this original SWFL habitat has declined in quality due to various factors (age, flooding, drought), the most recent habitat mapping/modeling effort (Siegle and Moore 2022a) mapped over 4,600 acres of suitable and moderately suitable SWFL habitat within the San Marcial Reach, most of which was in the conservation pool of EBR. Due to favorable hydrologic conditions, habitat lost is regularly replaced by newly developed suitable habitat which has allowed the SWFL population in the San Marcial Reach to persist. Additionally, the MRG population has been bolstered in recent years by subpopulations in the Bosque del Apache Reach and, most recently, the Belen Reach, which experienced explosive growth in 2021. Many of these subpopulations, including newly occupied sites in the San Marcial Reach, typically occupy patches of coyote willow mixed with Russian olive and/or saltcedar that develop on river bars, lower terraces or other areas with a shallower water table. This pattern of habitat creation and loss, and the flycatcher's ability to follow the movement of suitable habitat, is how the species has been able to persist in the ephemeral systems of the desert Southwest.

The SWFL recovery plan (USFWS 2002) established a recovery goal of 100 territories for the MRG Management Unit which is one of six Management Units within the larger Rio Grande Recovery Unit. This goal was achieved in 2003 and has been exceeded every year since (figure 16). In 2024, 424 SWFL territories were documented within Reclamation surveyed sites along the MRG. The remaining portion of this section discusses the number, trends, and distribution of SWFL territories within each of the surveyed reaches since surveys were initiated.

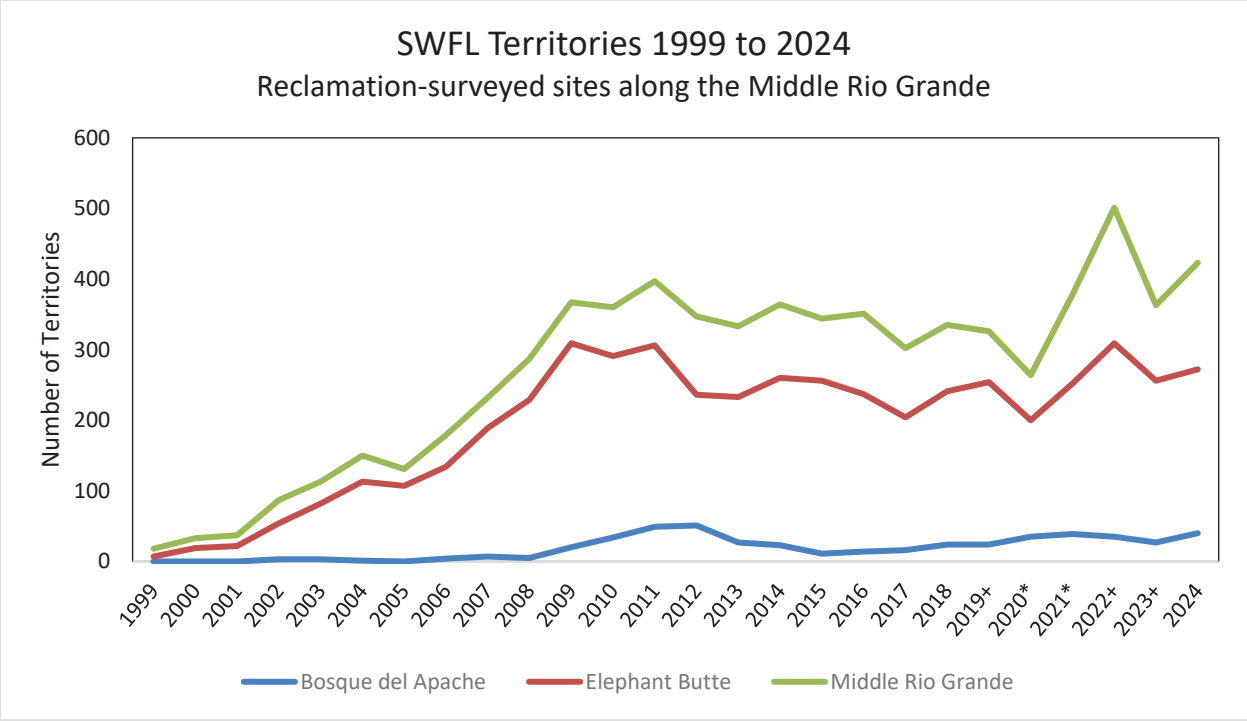


Figure 16.—Overview of SWFL territory numbers within the Middle Rio Grande – 1999 to 2024.

[+] Not all sites/reaches surveyed.

[*] Survey effort reduced by COVID-related hiring restrictions.

Table 4.—Number of SWFL territories/pairs within the active floodplain of the Rio Grande by reach between 1995 and 2024

Reach	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Belen	n/s	n/s	n/s	n/s	n/s	n/s	n/s	1 T 0 P	n/s	0	4 T 1 P	1 T 0 P	10 T 1 P	4 T 1 P	3 T 3 P
Sevilleta/ La Joya	n/s	n/s	n/s	n/s	4 T 4 P	8 T 5 P	11 T 10 P	13 T 10 P	17 T 9 P	19 T 18 P	17 T 10 P	21 T 15 P	14 T 8 P	31 T 18 P	18 T 14 P
San Acacia	n/s	0	0	0	0	0	0	0	0	0	0	0	0	2 T 0 P	1 T 0 P
Escondida	n/s	n/s	0	0	0	0	0	4 T 0 P	0	0	0	1 T 0 P	0	1 T 0 P	0
Bosque del Apache	n/s	n/s	n/s	1 T 0 P	0	0	0	3 T 0 P	3 T 1 P	1 T 1 P	0	4 T 1 P	7 T 6 P	5 T 3 P	20 T 16 P
Tiffany*	11 T 7 P	4 T 0 P	n/s	n/s	n/s	n/s	n/s	3 T 2 P	4 T 3 P	16 T 13 P	3 T 2 P	9 T 2 P	4 T 3 P	8 T 3 P	5 T 4 P
San Marcial	3 T 0 P	13 T 3 P	10 T 4 P	11 T 4 P	12 T 5 P	23 T 20 P	25 T 25 P	63 T 52 P	86 T 70 P	113 T 92 P	107 T 77 P	142 T 117 P	197 T 153 P	235 T 168 P	319 T 224 P
Total	14 T 7 P	17 T 3 P	10 T 4 P	12 T 4 P	16 T 9 P	31 T 25 P	36 T 35 P	87 T 64 P	110 T 83 P	149 T 124 P	131 T 90 P	178 T 135 P	232 T 171 P	286 T 193 P	366 T 261 P
Reach	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020⁺**	**2021⁺**	**2022⁺**	**2023⁺**	**2024**
Belen	6 T 4 P	9 T 4 P	14 T 9P	23 T 17 P	18 T 16 P	17 T 16 P	20 T 13 P	17 T 16 P	20 T 17 P	n/s	25 T 20 P	85 T 71 P	95 T 80 P	12 T 11 P	10 T 10 P
Sevilleta/ La Joya	13 T 9 P	9 T 7 P	6 T 5 P	4 T 4 P	4 T 0 P	8 T 0 P	5 T 4 P	4 T 3 P	12 T 7 P	n/s	n/s	n/s	17 T 16 P	n/s	18 T 17 P
San Acacia	0	0	0	0	0	0	0	0	0	0	n/s	n/s	0	n/s	0
Escondida	4 T 0 P	8 T 2 P	23 T 8 P	8 T 5 P	4 T 0 P	7 T 1 P	5 T 4 P	8 T 6 P	4 T 4 P	9 T 5 P	3 T 2 P	2 T 2 P	5 T 1 P	2 T 1 P	16 T 12 P
Bosque del Apache	34 T 22 P	49 T 30 P	51 T 29 P	27 T 19 P	23 T 13 P	11 T 6 P	17 T 13 P	16 T 11 P	24 T 21 P	24 T 16 P	35 T 34 P	39 T 29 P	35 T 25 P	27 T 21 P	40 T 36 P
Tiffany*	5 T 2 P	4 T 0 P	1 T 0 P	4 T 0 P	8 T 0 P	1 T 0 P	5 T 2 P	0	0	0	n/s	n/s	n/s	1 T 1 P	0
San Marcial	298 T 235 P	318 T 237 P	252 T 181 P	266 T 182 P	307 T 205 P	300 T 224 P	303 T 209 P	257 T 223 P	277 T 240 P	293 T 243 P	200 T 184 P	252 T 225 P	352 T 302 P	321 T 268 P	340 T 293 P
Total	360 T 272 P	397 T 280 P	347 T 232 P	332 T 227 P	364 T 234 P	344 T 247 P	355 T 245 P	302 T 259 P	337 T 289 P	326 T 264 P	263 T 240 P	378 T 327 P	504 T 424 P	363 T 302 P	424 T 368 P

n/s = not surveyed, T = territory, P = pair.

* Survey results from 1995 and 1996 in the Tiffany Reach are a combination of Reclamation and NMNHP surveys. The Tiffany Reach, except for sites LF-21 and LF-22 (surveyed in 2002 and 2003), was not surveyed during the years 1997–2003.

⁺ Within surveyed reaches, only selected sites were surveyed.

Belen Reach

This reach was first surveyed in 2002, and one SWFL territory was detected. For the following 11 years, SWFL territories and pair numbers slowly increased and then remained relatively stable between 2014 and 2020. In 2021, territory numbers more than tripled and in 2022, 95 territories were recorded in the Belen Reach (table 4). Unfortunately, due to the limited survey effort in 2024, only 10 territories were located. Historically, many of the territories (and all breeding pairs until 2011) in this reach were located within site SV-11 which is the southernmost site within this reach and immediately upstream of the once sizeable breeding population in site SV-09. The territories in SV-11 were all either on or immediately adjacent to lower terraces, bank-attached-bars, or high flow channels occupied by younger age class coyote willow, saltcedar, and Russian olive. During recent years, SV-11 has not been regularly occupied while territory numbers in upstream sites including BL-05 through 10 and BL-27 have increased. The SWFL territories in these newly occupied sites are located almost exclusively in young coyote willow, Russian olive and/or saltcedar habitat on bank-attached bars and islands. Given the availability of suitable habitat in this reach [1,540 ac were mapped in 2021 (Siegle and Moore 2022a)], it is possible that this population will continue to grow over the next several years. All 10 territories in this reach were documented in BL-27 and all were confirmed pairs.

Sevilleta/La Joya Reach

This reach extends from the confluence of the Rio Grande and Rio Puerco downstream to San Acacia Diversion Dam, encompassing 11 sites within the active floodplain (figure 5). Lands within this reach are managed by the New Mexico Department of Game and Fish (La Joya State Waterfowl Area) and U.S. Fish and Wildlife Service (Sevilleta National Wildlife Refuge). All sites in this reach, with the exception of SV-08, were surveyed five times in 2024. Habitat within this reach ranges from highly suitable SWFL habitat composed of coyote willow and Russian olive along the banks of the river to overstory cottonwood gallery and sparse, decadent saltcedar. On lower terraces and river bars, moderate overbank flooding occurs during high flow events. The river channel within the downstream portion of this reach is not degraded due to the San Acacia Diversion Dam which backs-up water, allowing the portion immediately upstream of the dam to aggrade. Based on 2021 habitat mapping/modeling, 449 acres of suitable or moderately suitable habitat is located within this reach (figure 3; Siegle and Moore 2022a). During 2024, a total of 84 WIFLs were detected in this reach; 49 were determined to be migrants and the remaining 35 consisted of 1 unpaired male and 17 pairs. Resident SWFLs were located in sites SV-06, SV-07, SV-09 and SV-10.

San Acacia Reach

This reach extends downstream from San Acacia Diversion Dam to the Escondida Bridge and encompasses approximately 16 km of riparian corridor. All sites within this reach (figure 6) were each surveyed five times. The active floodplain within the San Acacia Reach is relatively narrow and constrained by uplands to the east and levees along the LFCC to the west. Habitat within this

reach is varied and consists of a mixture of gallery cottonwood, saltcedar of various ages and structures, and coyote willow and Russian olive along the river. The recent drought has stressed many of the native willows and some have died. The highly degraded river channel in this reach has reduced overbank flooding and limited significant understory growth in many areas. Based on habitat mapping conducted in 2021 (Siegle and Moore 2022a), the San Acacia Reach holds the smallest amount of suitable habitat (297 acres) of any study reach (figure 3). Twenty-six migrant WIFLs were documented during 2024 surveys.

Escondida Reach

The reach stretches from the Escondida Bridge down to the northern boundary of the Bosque Del Apache NWR. The active floodplain is confined by levees to the west but more expansive to the east. Habitat in this reach consists of gallery cottonwood, Russian olive, various ages of saltcedar and coyote willow along the river. Small numbers of resident SWFLs have been documented in this reach since 2002 (table 4). Between 2011 and 2013, a small breeding population of SWFLs emerged in the lower portion of this reach, adjacent to the Bosque del Apache NWR. This population was likely supported by the relatively large source population established in the Bosque del Apache NWR during those years. However, during 2014 and 2015, only a single breeding pair and several scattered territories were recorded in this reach. This occurred coincidentally with the reduction in territories in the Bosque del Apache Reach. Between 2016 and 2023, small numbers of territories and breeding pairs were documented annually within the downstream sites in the Escondida Reach, although the survey effort has been sporadic since 2020. Each site in this entire reach was surveyed five times in 2024. Ninety-nine WIFLs were documented in the summer of 2024. Of those 99 WIFLs, 28 of them were resident SWFLs. The resident SWFLs included 4 unpaired males and 12 pairs (table 2).

Bosque del Apache Reach

Less than seven SWFL territories were detected annually within the active floodplain of the Bosque del Apache NWR between 2002 and 2008 (table 4). However, from 2009 through 2012, the number of SWFL territories dramatically increased due to overbank flooding and the formation of a sediment plug in 2008 plus high nest success in 2009 and 2010. Moore and Ahlers (2009) predicted that multi-year flooding would likely promote the development of higher quality SWFL habitat resulting in larger populations developing in this reach, and likely so, the attractiveness of habitat in following years improved due to overbank flooding, and the SWFLs responded accordingly. The 51 territories documented in 2012 were second only to the San Marcial Reach in terms of abundance (table 2). Conversely, drought conditions experienced between 2012 and 2016 severely impacted habitat quality, and consequently nest success, within this reach and the population declined through 2015. Wetter than normal conditions in 2017, 2019, and 2023 (figure 17) again inundated the floodplain in this reach and promoted habitat development, which promoted expansion of the SWFL population into new areas. In 2024, the entire reach was surveyed five times. Forty territories were documented in 2024, the most since 2012 (table 4). The territories consisted of four unpaired males and 36 pairs.

The Rio Grande within the northern portion of this reach was highly aggraded and prone to inundation during high river flows. Recently, due to the risk posed to refuge infrastructure and water delivery, the river was realigned to the east to bypass the sediment plug. Work was completed during the fall and winter of 2020/2021. Habitat adjacent to the former alignment and sediment plug, once suitable for breeding SWFLs, has become dry and decadent. Ideally, this habitat will be replaced by developing habitat adjacent to the new river. The relocated river channel has also altered the overall hydrology of the northern half of the refuge and its impacts have yet to be fully realized. A more thorough survey effort and continued habitat monitoring in association with the channel relocation (Siegle and Moore 2022b) will determine the trajectory of this SWFL population and its associated habitat.

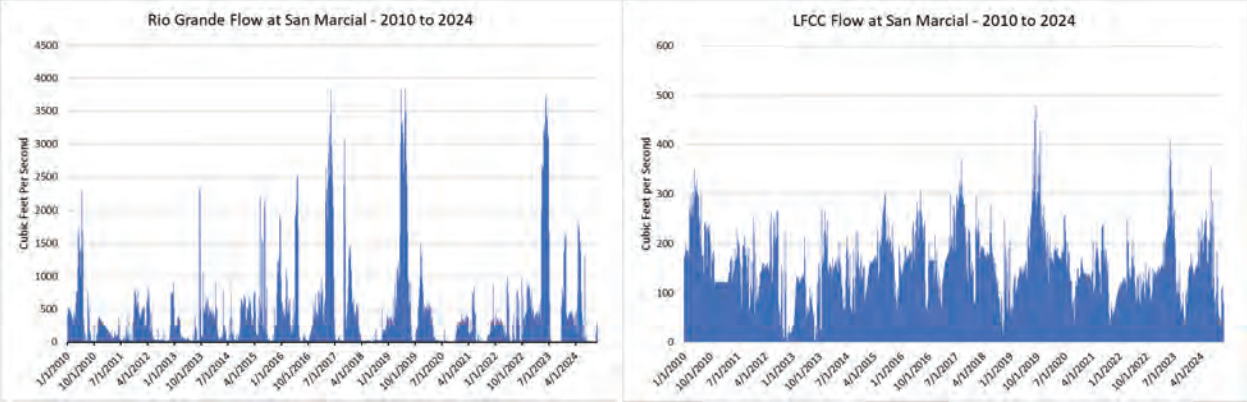


Figure 17.—Flows within the Rio Grande and LFCC at San Marcial between 2010 and 2024. Note the lower flows between 2011 and 2015 and the higher flows experienced in 2017, 2019, and 2023.

Tiffany Reach

Most of the habitat in this reach was burned by the Tiffany Fire in 2017. Prior to the fire, vegetation in this reach consisted primarily of various age classes of saltcedar with occasional patches of Russian olive and native willows and cottonwoods, particularly near the river. A large, dry marsh also exists at the foot of Black Mesa, upstream of the railroad trestle. SWFL territory numbers ranged between 1 and 16 between the years 2002 and 2016. Following the fire, no SWFL territories were recorded between 2017 and 2022. Currently, much of the vegetation in the reach has not recovered from the fire and is too sparse and immature to provide suitable breeding SWFL habitat. However, certain patches were less impacted by the fire and/or have regrown. A total of 336 acres of suitable SWFL habitat was mapped in 2021 (figure 3; Siegle and Moore 2022a). Portions of this reach receive overbank flooding during high river flows and a sediment plug in the southern end of this reach in both 2005 and 2008 forced river water through habitat in the southern end. Twenty-eight WIFLs were recorded during surveys in this reach in 2024, all were migrants.

San Marcial Reach

SWFL surveys in this reach began in 1995 (table 4). For the following 14 years, the SWFL population increased dramatically (figure 18). Since 2000, a majority of these SWFL territories occurred in the exposed conservation pool of EBR. As reservoir levels decreased during the late-1990s and early-2000s (figure 19), vast expanses of primarily native habitat developed on the western side of the floodplain. This habitat consisted almost exclusively of dense Goodding's willow of various age classes and was provided with water by the LFCC West. SWFLs first occupied suitable habitat in the uppermost reaches of the reservoir (sites LF-17 and LF-17a) and expanded downstream as habitat became suitable. During this same period, channel degradation and lower flows within the Rio Grande caused habitat upstream of the reservoir pool in the San Marcial Reach to decline in quality. Due to these factors, the majority of SWFL territories in this reach, and the study area as a whole, are found within the exposed reservoir pool.

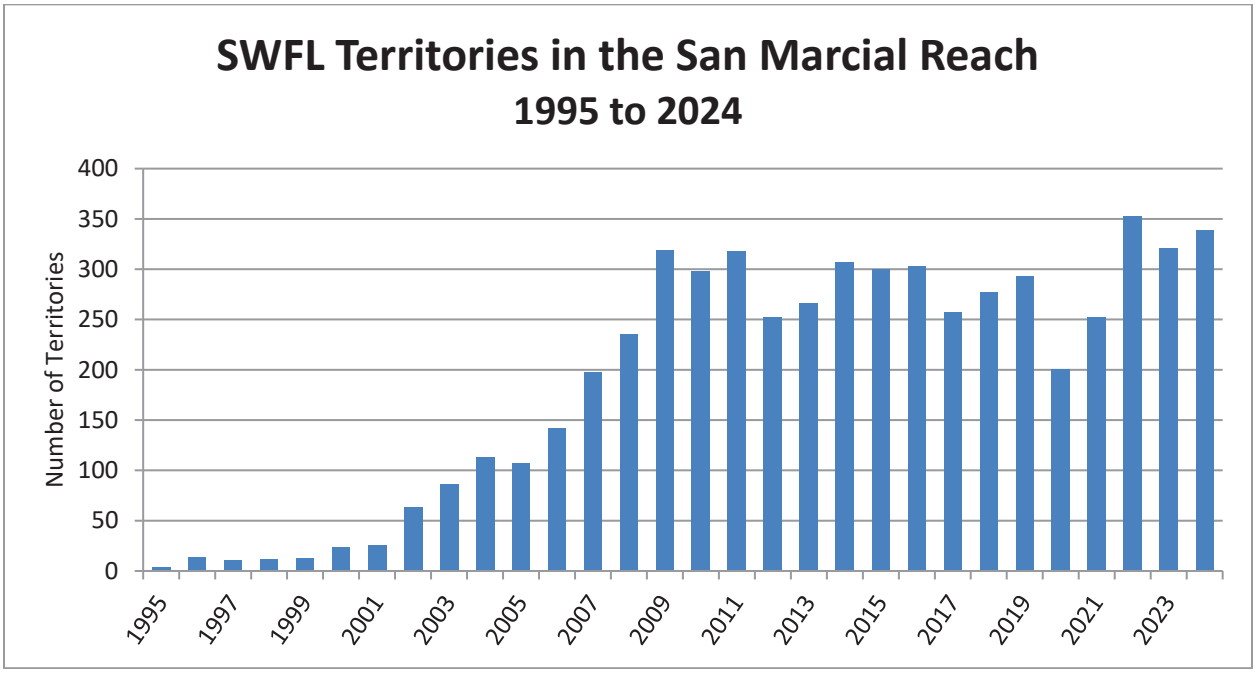


Figure 18.—SWFL territories within the San Marcial Reach – 1995 to 2024.

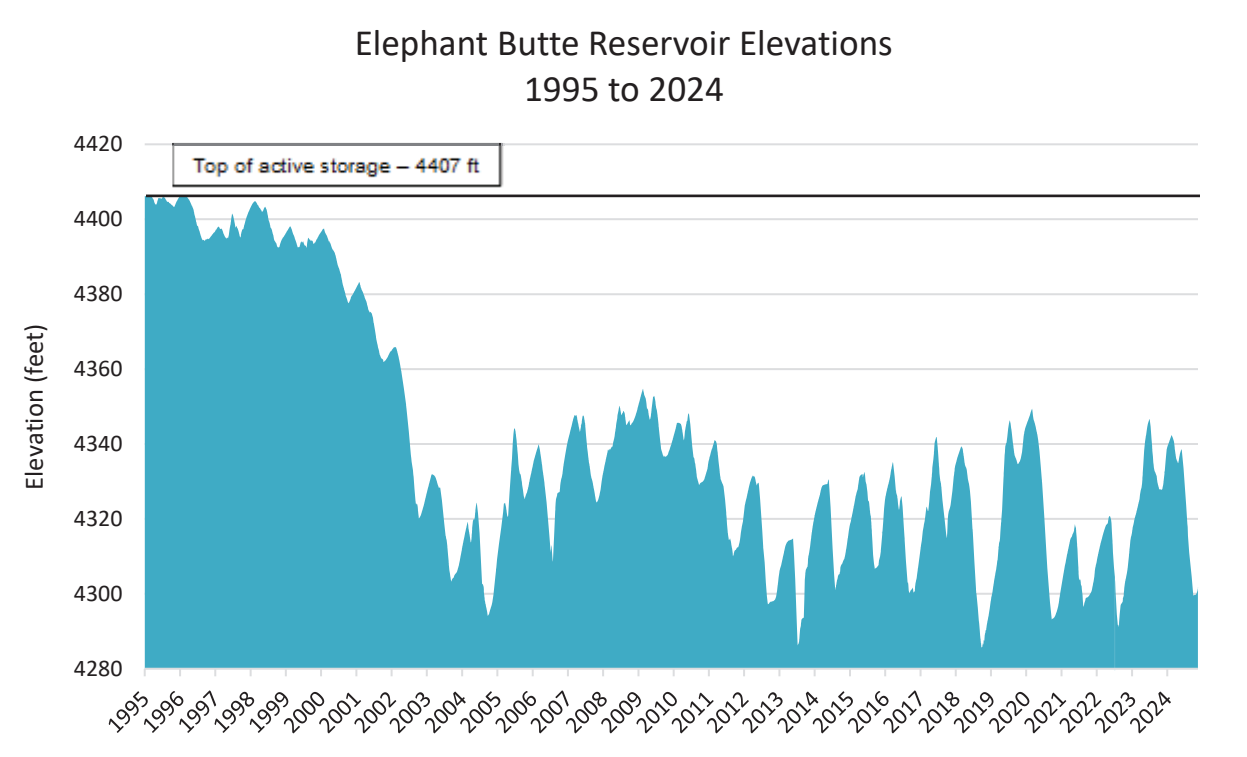


Figure 19.—Elephant Butte Reservoir elevations – 1995 to 2024.

Most of the suitable habitat which supported the initial growth of the SWFL population within the upstream portion of the reservoir pool has become unsuitable due to decadence, natural succession, prolonged flooding, and drought. However, younger habitat that has developed during the past six years on the west side of the reservoir delta has compensated for these losses and currently supports the bulk of the SWFL territories in the reservoir. This habitat is supported by a shallow water table and/or fluctuating reservoir levels and is comprised of native willow that is healthy and vigorous. Indeed, populations within sites DL-08 and 12, EB-01, 04, 07, 09, 15, and 16 have grown during the past six years as other subpopulations have contracted. Thus, while territory numbers have fluctuated since the 2009 peak, numbers recorded in 2022 through 2024 marked the highest recorded in the entire period of study (table 4; figure 16).

Habitat mapping/modeling conducted in 2021 (Siegle and Moore 2022a) documented a slight increase in suitable habitat within the San Marcial Reach compared to 2016 (figure 3). However, as noted above, drought, the increased presence of exotic saltcedar, and the age of many of these native stands have decreased the suitability of habitat, although not enough to be reclassified as unsuitable. Most of the SWFLs documented in the San Marcial Reach in 2024 were found in younger age classes of primarily willow that is of higher suitability for breeding SWFLs. These areas promote successful breeding and are responsible for the recent population expansion.

Lastly, much consideration has been given to the potential detrimental effects of a rising reservoir pool on this population of SWFLs. During the past 16 years, SWFLs have moved

farther into the exposed pool of EBR and the sub-population in sites EB-15 through 17 would be most highly impacted and likely displaced if reservoir levels were to rise significantly. However, it is also likely that not only within the reservoir pool, but within the MRG as a whole, stagnant reservoir levels could be far more detrimental to the SWFL population. During the past 16 years, prolonged drought conditions and reduced flows in both the river and LFCC have prevented irrigation of habitat via flooding. This has reduced habitat vigor and density and promoted encroachment of exotics like saltcedar. Within the reservoir itself, the dynamics of a rising and falling pool would cause habitat to be created and destroyed. It is this type of dynamic system that SWFLs depend on for breeding habitat. From year to year there may be net gains and losses of habitat, but as a whole this habitat could persist and provide highly suitable SWFL habitat for a large source population. To investigate this situation, Reclamation recently modeled impacts of a rising reservoir on SWFL habitat and territories within the EBR pool (Siegle et al. 2020). This assessment will be updated in 2025.

Nest Searches/Monitoring

Overview of Middle Rio Grande Nest Monitoring

A total of 5,446 SWFL nests with known outcomes has been monitored in the MRG since 1999 (table 5). As shown in figure 20, nest success declined drastically to 25 percent in 2017 – the lowest rate in the history of this study – but has rebounded the past 7 years to a more normal rate for a passerine species. Nest success declined due to the increase in depredation rates which is presumably a factor of decreasing habitat quality. Nest success rates above 50 percent usually have led to growth of the MRG SWFL population. Rates below 50 percent have caused population growth to level off, and in certain years, territory numbers have decreased.

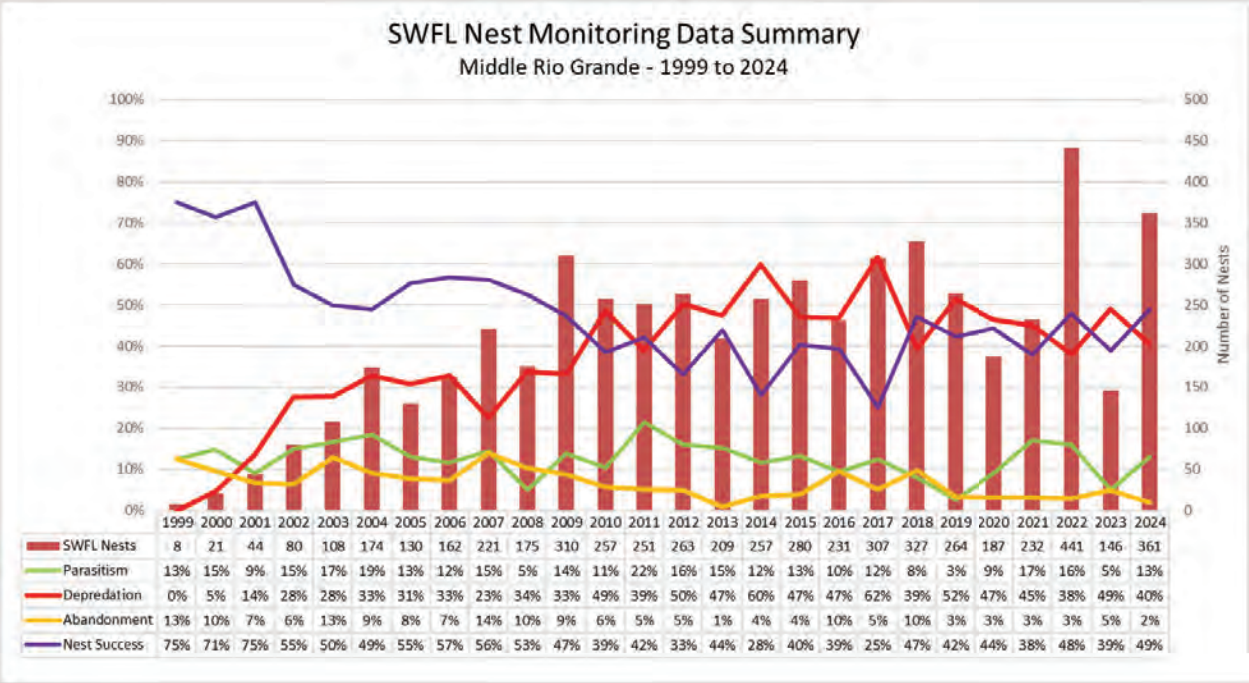
Table 5.—Summary of SWFL nesting parameters within the Middle Rio Grande – 1999 to 2024

Nesting Parameters		
General Nest Data 1999 to 2024		
Parasitism Rate 13% (687 out of 5446 nests)		
Depredation Rate 42% (2300 out of 5446 nests)		
Abandonment Rate 6% (318 out of 5446 nests)		
Nest Success 44% (2386 out of 5446 nests)		
Territory Vegetation Type		
Number of nests in *Salix*-dominated territories	2797	51% of total
Number of nests in exotic-dominated territories	797	15% of total
Number of nests in mixed dominance territories	1852	34% of total
Nest Substrate Species		
Number of nests in *Salix* substrate	2365	43% of total
Number of nests in saltcedar substrate	2968	55% of total
Number of nests in Russian olive substrate	69	1% of total
Number of nests in other (*Baccharis*/cottonwood) substrate	44	1% of total

Nesting Parameters		
Nest Substrate/Territory Vegetation Combination		
Number of nests in saltcedar substrate within *Salix*-dominated territories	617	22% of 2797 nests
Number of nests in *Salix* substrate within exotic or mixed dominance territories	231	9% of 2649 nests
Nest Success Per Nest Substrate Species		
Percentage of successful nests in *Salix* substrate	45%	1060 out of 2365 nests
Percentage of successful nests in saltcedar substrate	43%	1278 out of 2968 nests
Percentage of successful nests in Russian olive substrate.	46%	32 out of 69 nests
Percentage of successful nests in other (*Baccharis*/cottonwood) substrate	36%	16 out of 44 nests
Nest Success Per Territory Vegetation Type		
Percentage of successful nests in *Salix*-dominated territories	45%	1260 out of 2797 nests
Percentage of successful nests in exotic-dominated territories	44%	354 out of 797 nests
Percentage of successful nests in mixed dominance territories	42%	772 out of 1852 nests
Cowbird Parasitism Per Nest Substrate Species		
Percentage of nests parasitized in *Salix* substrate	12%	273 out of 2365 nests parasitized
Percentage of nests parasitized in saltcedar substrate	13%	394 out of 2968 nests parasitized
Percentage of nests parasitized in Russian olive substrate	20%	14 out of 69 nests parasitized
Percentage of nests parasitized in other (*Baccharis*/cottonwood) substrate	14%	6 out of 44 nests parasitized
Cowbird Parasitism Per Territory Vegetation Type		
Percentage of nests parasitized in *Salix*-dominated territories	12%	333 out of 2797 nests
Percentage of nests parasitized in exotic-dominated territories	12%	97 out of 797 nests
Percentage of nests parasitized in mixed dominance territories	14%	257 out of 1852 nests
Productivity[(1)] Per Territory Vegetation Type		
Productivity of nests found in *Salix*-dominated territories	2.54/nest	3204 young from 1260 nests
Productivity of nests found in exotic-dominated territories	2.46/nest	870 young from 354 nests
Productivity of nests found in mixed dominance territories	2.53/nest	1957 young from 772 nests
Productivity[(1)] Per Nest Substrate Species		
Productivity of nests found in *Salix* substrate	2.56/nest	2715 young from 1060 nests
Productivity of nests found in saltcedar substrate	2.51/nest	3208 young from 1278 nests
Productivity of nests found in Russian olive substrate	2.19/nest	70 young from 32 nests
Productivity of nests found in other (*Baccharis*/cottonwood) substrate	2.38/nest	38 young from 16 nests
Productivity[(1)] Compared to Nest Substrate Species and Territory Vegetation Type		
Productivity of nests in *Salix* substrate within *Salix* dominated territories	2.56/nest	2482 young from 971 nests
Productivity of nests in saltcedar substrate within *Salix* dominated territories	2.51/nest	684 young from 272 nests
Productivity of nests in saltcedar substrate within exotic dominated territories	2.46/nest	852 young from 347 nests
Total SWFL nests of known outcomes monitored from 1999-2024	**5446**	

Notes: Summary data only from nests with known outcomes 1999-2024. Nests may have been depredated, parasitized, and/or abandoned. Thus, totals sum to more than 100%.

[(1)] Productivity is defined as the number of SWFL young fledged per successful nest.



	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
SWFL Nests	8	21	44	80	108	174	130	162	221	175	310	257	251	263	209	257	280	231	307	327	264	187	232	441	146	361
Parasitism	13%	15%	9%	15%	17%	19%	13%	12%	15%	5%	14%	11%	22%	16%	15%	12%	13%	10%	12%	8%	3%	9%	17%	16%	5%	13%
Depredation	0%	5%	14%	28%	28%	33%	31%	33%	23%	34%	33%	49%	39%	50%	47%	60%	47%	47%	62%	39%	52%	47%	45%	38%	49%	40%
Abandonment	13%	10%	7%	6%	13%	9%	8%	7%	14%	10%	9%	6%	5%	5%	1%	4%	4%	10%	5%	10%	3%	3%	3%	3%	5%	2%
Nest Success	75%	71%	75%	55%	50%	49%	55%	57%	56%	53%	47%	39%	42%	33%	44%	28%	40%	39%	25%	47%	42%	44%	38%	48%	39%	49%

Figure 20.—Summary of SWFL nesting within Bureau of Reclamation surveyed sites between 1999 and 2024.

Habitat Availability and Selection

Since 2005, SWFLs gradually converted from using almost entirely *Salix*-dominated habitats to a more even mixture of the three different habitat types: *Salix*-dominated, exotic-dominated (usually saltcedar), and mixed (figure 21). Dominance is defined as habitat composed of at least 75 percent *Salix* or exotic species. Although SWFL use of native-dominated habitat has recently increased, 2024 was the 13th consecutive year that fewer than 50 percent of territories were in *Salix*-dominated habitat.

Drought conditions and senescence of native vegetation have allowed exotic saltcedar to become more of a habitat component and prompted SWFLs to occupy lesser quality habitats – primarily within the EBR delta. This ability to occupy saltcedar-dominated habitat may benefit the SWFL population in times of drought as saltcedar is more drought tolerant and may provide a refuge until conditions are suitable for native habitat. Conversely, the recent spread of the tamarisk beetle, which was first documented in the MRG in 2015, could negatively impact occupied saltcedar habitat via defoliation and cause detrimental changes to microclimate at nest sites during the SWFL breeding season. Dillon and Moore (2022) documented sporadic defoliation and microclimate impacts during an ongoing *Diorhabda* monitoring study that was initiated in 2015. These impacts may intensify if the extent and abundance of *Diorhabda* increases within the MRG.

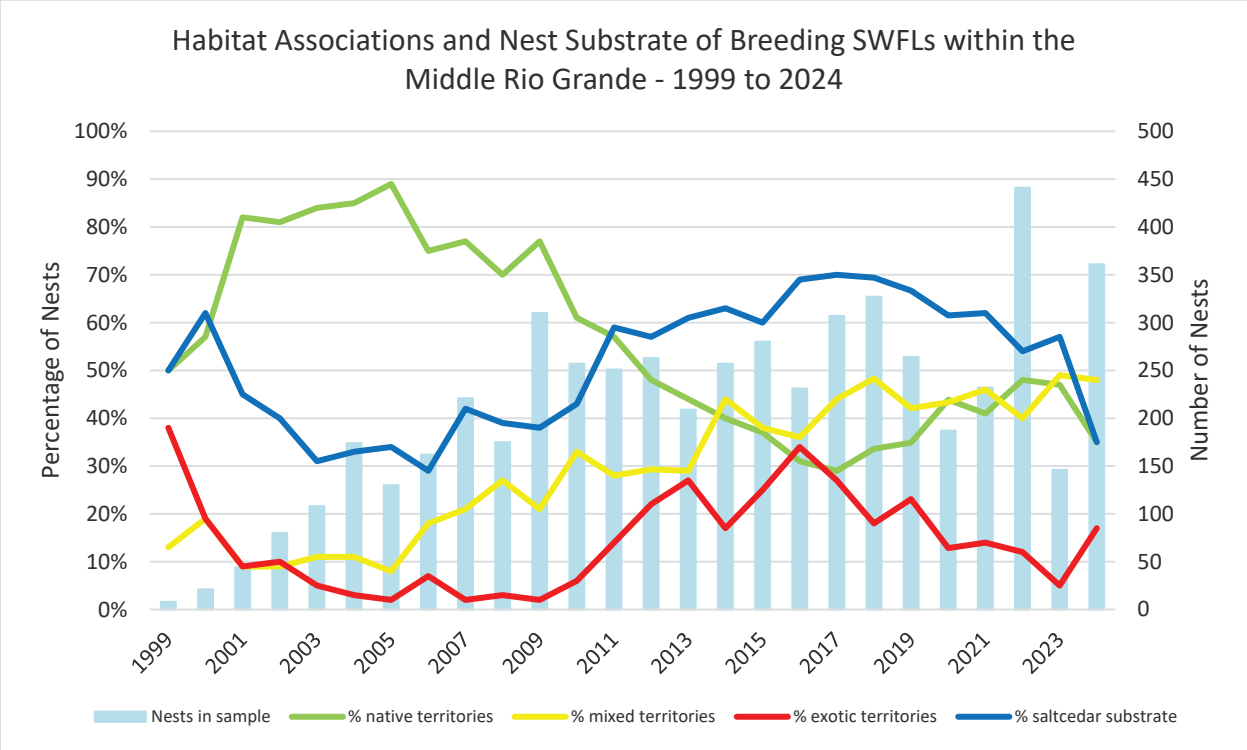


Figure 21.—Percentage of SWFL breeding territories located in three habitat types (native, exotic, and mixed) and saltcedar substrate within the Middle Rio Grande between 1999 and 2024.

General nest data from the 5,446 nests monitored since 1999 indicate an overall brood parasitism rate of 13 percent, a nest depredation rate of 42 percent, a nest abandonment rate of 6 percent, and an overall nest success rate of 44 percent over the past 25 years (table 5). Although annual results were often similar to average study period rates, the large sample size associated with the combined data set provides greater insight into the relationships of habitat, hydrology and nesting variables. Sound management decisions should be based on the best available data, and for SWFL in the MRG, nest success across years is typically more informative than a single year's dataset given the variability across years relative to the multiple years it takes for suitable SWFL habitat to develop.

It is likely that vegetation density and structure, with hydrology, play a greater role in territory selection than species composition. However, as shown in table 5, 51 percent of SWFL nesting territories since 1999 were dominated by *Salix* and only 15 percent were dominated by exotic species (primarily saltcedar). The remaining nests were found in mixed stands (34 percent). When establishing territories in the MRG, SWFLs predominantly select native dominated stands or stands with a native species component.

However, a disproportionate use of saltcedar as the nest substrate is also apparent. SWFLs selected saltcedar as the nest substrate 55 percent of the time since 1999 (n=5,446). These data suggest a preference for establishing territories within native dominated stands, while selecting saltcedar as the substrate when constructing a nest. It is likely that the preference for saltcedar as the nest substrate is due to the more supportive twig structure that saltcedar provides.

To explore the relationship between SWFL nesting variables and habitat, data collected at nests between 1999 and 2024 were combined and statistically analyzed using Chi-square tests. Table 6 summarizes the following statistical comparisons used to assess relationships between vegetation species composition and nesting variables. Graphical representations of these comparisons are in appendix C.

Table 6.—Habitat and SWFL nest variable comparisons from the Middle Rio Grande – 1999 to 2024

Nest Variable Comparisons			
Chi-square Test (α = 0.05)			
Comparison	**χ^2 value**	**Df**	***P*-value**
Success and dominant territory vegetation	5.26	2	0.07
Success and substrate species	1.66	1	0.20
Depredation and dominant territory vegetation	4.83	2	0.09
Depredation and substrate species	0.13	1	0.72
Parasitism and dominant territory vegetation	4.10	2	0.13
Parasitism and substrate species	3.61	1	0.06
Kruskal-Wallis Test (α = 0.05)			
Comparison	**H**	**Df**	***P*-value**
Productivity and dominant territory vegetation	5.08	2	0.08
Mann-Whitney W Test (α = 0.05)			
Comparison	**W**	**Df**	***P*-value**
Productivity and substrate species (*Salix,* saltcedar)	-23,810.0	1	0.11

Data from known nest outcomes only.

Of the eight statistical comparisons, two produced significant results. Nest depredation is usually the primary cause of nest failure in passerine birds (King and DeGraaf 2006). Depredation rates between habitat types and substrate species were compared using a Chi-square test. Nests in native-dominated habitat were depredated at a lower rate than those found in mixed dominance habitat. Presumably, native habitats provide the highest nest concealment which reduces depredation. Similarly, and likely due to the difference in depredation rates, when comparing nest success within the three types of habitat – native, exotic and mixed – it was determined that nests in native habitat were more successful than nests in mixed habitat. Nest success is an important indicator of habitat quality and native habitat likely provides better nest concealment, higher prey abundance and other factors important to successful nesting.

Hydrology and Nesting Variables

Beginning in 2004, hydrological data at each nest was collected on each nest visit. One of three possible hydrologic conditions, including dry, saturated soil, or flooded, was recorded and daily data were compiled for each nest at season's end to determine the hydrologic regime throughout the nesting cycle. As a result, four separate scenarios were evaluated, including: (1) dry all cycle, (2) saturated/flooded then dry, (3) saturated/flooded all cycle, and (4) flooded all cycle (a subset of saturated/flooded all cycle). Most nests during the 20-year period were dry all cycle. These four scenarios were then statistically compared to nesting variables to determine potential relationships. Distance to water was also recorded and averaged at the end of the season. Table 7 and the following sections present these comparisons. Graphical representations are presented in appendix C.

Table 7.—Hydrology and SWFL nest variable comparisons from the Middle Rio Grande – 2004 to 2024

Nest Variable Comparisons			
Chi-square Test (α = 0.05)			
Comparison	**χ^2 value**	**Df**	***P*-value**
Nest success and hydrology under the nest	3.70	3	0.30
Depredation rates and hydrology under the nest	1.73	3	0.63
Parasitism rates and hydrology under the nest	25.28	3	<0.01
Nest success and distance to water (> or < 100m)	10.04	1	0.01
Nest success and distance to water (> or < 50m)	1.61	1	0.20
Mann-Whitney W-test (α = 0.05)			
Comparison	**w**	**Df**	***P*-value**
Productivity and distance to water (> or < 100m)	-13,4840	1	0.12
Productivity and distance to water (> or < 50m)	-22,742.5	1	0.05
Kruskall-Wallis Test (α = 0.05)			
Comparison	**H**	**Df**	***P*-value**
Productivity of successful nests based on hydrology under the nest	35.61	3	<0.01

Data from known nest outcomes only. Gray shading = statistically significant difference.

Nests over dry soil were parasitized by BHCOs at a higher rate than nests over saturated/flooded conditions and flooded conditions. BHCO parasitism was 14 percent in nests that were dry all cycle, 10 percent for nests that were saturated or flooded all cycle, and 9 percent for nests that were flooded all cycle. It is likely that the increased habitat quality and higher vegetative cover associated with wetter conditions are responsible for the difference in brood parasitism rates. Nest success and depredation rates were unaffected by hydrology under the nest or distance to water.

Nests in drier regimes were less productive during the 2004 to 2024 sample period (n=1,324). Nests that were dry all cycle or saturated/flooded then dry both produced an average of 2.46 and 2.43 young per successful nest. Nests that were saturated/flooded all cycle or flooded all cycle produced an average of 2.63 and 2.72 young, respectively. Wetter sites provide higher thermal

stability, relative humidity, prey abundance and foliage density – all factors that contribute to higher overall habitat quality for this species. No significant differences were found between nest success and productivity rates and distance to water.

Brown-headed Cowbird Brood Parasitism

The practice of addling or removing BHCO eggs from parasitized SWFL nests was initiated in 2002 and continued through 2024. During the 2024 season, 47 SWFL nests with known fates were parasitized; 9 successfully fledged SWFL young. From 2002 to 2024, 687 SWFL nests with known outcomes were parasitized. BHCO eggs were addled or removed from 168 nests, 42 of which successfully fledged SWFL young (25 percent success). Parasitized nests during the same period in the MRG that were unaltered were not as successful. Of 509 parasitized nests monitored, 456 failed and 47 successfully fledged SWFL young—a 9 percent success rate. This difference is statistically significant based on a Chi-square test (χ^2=21.67, Df=1, P<0.01).

Elephant Butte Reservoir Pool SWFL Population

The breeding SWFL population within EBR is the largest, and potentially most important, breeding population within the range of the Southwestern Willow Flycatcher. This population acts as a source for colonization of nearby developing habitat, both natural and man-made. This population experienced near-exponential growth between 2002 and 2009, and now appears to have leveled off (figure 20). Limiting factors, such as declining habitat quality and increasing nest depredation, are adversely affecting the growth of this population. Conversely, developing habitat within downstream sites (e.g., EB-01, 04, 07, 15, 16 and 17) in the reservoir pool is being colonized by expanding SWFL populations. These sites could compensate for habitat declines upstream and continue to be a valuable source population for the surrounding area. However, habitat restoration activities within the MRG should continue in an effort to compensate for the predicted decline in habitat quality and availability during the coming years.

Tamarisk Beetle

As outlined in previous sections, SWFLs within the MRG nested within native (n=2,797), saltcedar (n=797), and mixed native/exotic habitats (n=1,852) between 1999 and 2024. They also nested in saltcedar substrate at a disproportionate rate (55 percent of nests between 1999 and 2024). Given these facts, it is necessary to discuss the potential impacts of tamarisk beetles on occupied SWFL habitat within the MRG. As noted previously, the use of both saltcedar substrate and saltcedar-dominated habitat has dramatically increased during the past 16 years (figure 21). While the use of saltcedar-dominated habitat has recently dropped to the lowest rate since 2010, nearly 50 percent of SWFL territories within the study area were located in either exotic-dominated or mixed dominance habitat during the past 13 years. However, most of the large, monotypic stands of saltcedar in the MRG are not suitable flycatcher breeding habitat and are not occupied by resident flycatchers. Saltcedar-dominated territories occur scattered throughout the study area, interspersed within mixed and native-dominated habitat. These exotic-dominated territories would be adversely impacted by beetle defoliation, as well as mixed territories that contain a significant saltcedar component. Indeed, *Diorhabda* monitoring documented negative impacts to occupied SWFL habitat beginning in 2017 (Dillon and Moore 2022). Documented defoliation was more widespread and severe in 2017 and 2018 than in 2019 and 2020. Extensive

flooding in 2019 may have limited the severity of *Diorhabda* impacts as beetles overwinter in the leaf litter. In the coming years, the location, timing, and intensity of defoliation will determine the impacts to SWFLs and their habitat.

In contrast, a significant percentage of SWFLs continue to nest in native-dominated habitat within the MRG. In 2024, 127 SWFL nests (35 percent, n=361) were located in habitat consisting of at least 75 percent *Salix*. This habitat will not be adversely impacted by the tamarisk beetle but has been greatly impacted by drought conditions during the past decade. If climatic and hydrologic conditions beneficial to native habitat persist, native willows may expand into saltcedar-dominated areas impacted by tamarisk beetles. Conversely, the combination of persistent drought and tamarisk beetle expansion could devastate the various SWFL-occupied habitat types within the MRG. Continued monitoring of habitat, beetle impacts, and SWFL occupancy will provide information on the future status of this valuable SWFL population.

Hydrology Monitoring

Southwestern Willow Flycatcher habitat can be succinctly described as dense and wet. Hydrology is often the most important factor in the creation and maintenance of high quality SWFL habitat. The hydrology studies conducted by Reclamation during the past 20 years have documented interesting trends within occupied habitat in the EBR pool. For several years in the early 2000's, much of this habitat was continually flooded and began to decline in quality presumably due to this prolonged flooding (Ahlers 2018). Conversely, between 2010 and 2016, drought conditions reduced flow in the LFCC that sustains the high-quality habitat on the western side of the reservoir pool to the point that this habitat dried significantly. This promoted both encroachment of saltcedar into formerly native-dominated habitat and SWFL movement from declining native habitat to adjacent saltcedar-dominated habitat. And although the wetter years experienced periodically since 2017 provided a respite from the ongoing drought, if beneficial hydrologic conditions do not occur on a regular basis, this native habitat will eventually degrade and potentially be lost.

Rising reservoir levels and inundation of potential/occupied habitat are important hydrologic dynamics within the reservoir pool. Habitat created by reduced reservoir elevations could be stressed and/or killed if flooded for an extended period [greater than 5 years (Reclamation 2009)]. Occupied SWFL habitat within and downstream from The Narrows of EBR (e.g., sites EB-13 through 17) has been flooded within the past five years by a fluctuating reservoir. The depth and duration of flooding caused widespread vegetation mortality in downstream portions of the southernmost sites (e.g., EB-16 and 17). Other areas were benefitted by these wetter conditions and the reservoir annually declined, preventing negative impacts. Siegle et al. (2020) found, based on modeled impacts, that if reservoir levels were to rise significantly between 2020 and 2024, such elevated levels would likely negatively impact SWFL and Yellow-billed Cuckoo habitat within the lower delta of EBR.

Recommendations

Recommendations for future SWFL-related studies within the MRG fall into three categories:

1. Annual surveys of SWFL population concentrations
2. Periodic surveys of potential/unoccupied suitable habitat or restoration sites
3. SWFL-related studies

Annual Surveys

- Presence/absence surveys should continue in occupied reaches of the MRG to monitor the status of the SWFL population and colonization of adjacent sites. Special attention should be given to the sizeable populations in the Belen, Bosque del Apache, and San Marcial Reaches due to their importance to the MRG population.

- Presence/absence surveys should continue in project-related areas and within designated critical habitat to meet Biological Opinion and Endangered Species Act mandates.

- Nest monitoring should continue where pairing activity is documented. At least 100 nests (if available) should be monitored each year to provide a sufficient sample size for nest variable analyses. Focus should be given to areas with potential project/habitat impacts (e.g., San Marcial, Bosque del Apache NWR). These data will provide insight into factors limiting recruitment and population growth such as parasitism and depredation 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.

Periodic Surveys

- In reaches where no annual survey mandate exists, the appropriate land management entity should have periodic surveys conducted every 3 years to document any SWFL colonization of newly suitable habitat.

- In any sites where resident SWFLs are documented, nest searching and monitoring should be conducted by the appropriate management agency.

Related Studies

- Habitat assessment monitoring associated with river channel realignment within the Bosque del Apache NWR, the Lower San Acacia Reach Improvement project and River Mile 60 Diversion project areas should continue in order to meet regulatory requirements and detect any impacts to groundwater, riparian habitat, and the breeding SWFL population within the project areas.

- Nest vegetation quantification data should be utilized at other restoration sites to document the effectiveness of SWFL-targeted restoration practices.

- Investigations into the options for water management in the delta of EBR should continue in order to identify possible ways to optimize water use and maximize SWFL habitat over the longer term, in the face of the inherent flood/drought climate cycle in the Rio Grande.

- Monitoring of tamarisk beetle expansion and impacts should continue in order to determine effects of this biocontrol agent on SWFL habitat.

Conclusions

Southwestern Willow Flycatcher surveys in 2024 documented 424 territories, including 368 breeding pairs, in the MRG. Presence/absence data continue to facilitate Endangered Species Act compliance for specific river maintenance and restoration projects. Additionally, the data collected over the course of the 29-year study period benefits the implementation of the Southwestern Willow Flycatcher Recovery Plan (USFWS 2002), specifically for the MRG Management Unit. The MRG Management Unit, spanning the Rio Grande from just upstream of Cochiti Reservoir to Elephant Butte Dam, has exceeded its recovery goal of 100 SWFL territories for the past 22 consecutive years. However, ongoing patterns of native habitat decline, increased reliance by SWFL on nonnative saltcedar habitat, presence of the tamarisk beetle throughout the MRG, variable nest success rates across years, potential for dynamic reservoir elevations at Elephant Butte, and the flood/drought cycles inherent in the Rio Grande all indicate this management unit requires ongoing attention through continued monitoring and investigations that both inform and support Endangered Species Act compliance for SWFL and its habitat in the MRG.

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Appendix A

2024 Willow Flycatcher Survey Detections within the Middle Rio Grande

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	County
BL-25	1	0	0	0	0	N/A	1 migrant	Socorro
BL-27	24	10	20	10	10	3 successful; 2 failed; 5 unknown	4 migrants; 10 pairs	Socorro
BL-30	5	0	0	0	0	N/A	5 migrants	Socorro
Belen Reach[4] Summary	30	10	20	10	10	3 successful; 2 failed; 5 unknown	23 migrants; 1 unpaired male; 11 pairs	
SV-01	8	0	0	0	0	N/A	8 migrants	Socorro
SV-02	4	0	0	0	0	N/A	4 migrants	Socorro
SV-03	10	0	0	0	0	N/A	10 migrants	Socorro
SV-04	1	0	0	0	0	N/A	1 migrant	Socorro
SV-05a/05b	5	0	0	0	0	N/A	5 migrants	Socorro
SV-06	15	4	z	4	4	2 successful; 1 failed; 1 unknown	7 migrants; 4 pairs	Socorro
SV-07	4	0	1	1	0	N/A	3 migrants; 1 unpaired male	Socorro
SV-09	15	5	10	5	5	4 successful; 1 unknown	5 migrants; 5 pairs	Socorro
SV-10	22	8	16	8	11	4 successful; 7 failed	6 migrants; 8 pairs	Socorro
Sevilleta/La[5] Joya Reach	84	17	35	18	20	10 successful; 8 failed; 2 unknown	49 migrants; 1 unpaired male; 17 pairs	
LF-01	10	0	0	0	N/A	N/A	10 migrants	Socorro
LF-02	3	0	0	0	N/A	N/A	3 migrants	Socorro
LF-38	6	0	0	0	N/A	N/A	6 migrants	Socorro
LF-39	2	0	0	0	N/A	N/A	2 migrants	Socorro
LF-40	1	0	0	0	N/A	N/A	1 migrant	Socorro
LF-41	4	0	0	0	N/A	N/A	4 migrants	Socorro
San Acacia[6] Reach	26	0	0	0	N/A	N/A	26 migrants	
LF-03	3	0	0	0	N/A	N/A	3 migrants	Socorro
LF-04	6	0	0	0	N/A	N/A	6 migrants	Socorro

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	County
LF-05	16	0	0	0	N/A	N/A	16 migrants	Socorro
LF-06	3	0	0	0	N/A	N/A	3 migrants	Socorro
LF-07	6	0	1	1	N/A	N/A	5 migrants; 1 unpaired male	Socorro
LF-08	11	1	3	2	1	1 successful	8 migrants; 1 unpaired male; 1 pair	Socorro
LF-33	4	0	1	1	N/A	N/A	3 migrants; 1 unpaired male	Socorro
LF-34	4	0	0	0	N/A	N/A	4 migrants	Socorro
LF-42	4	0	0	0	N/A	N/A	4 migrants	Socorro
LF-43a	6	0	1	1	N/A	N/A	5 migrants; 1 unpaired male	Socorro
LF-43b	19	6	12	6	7	3 successful; 3 failed; 1 unknown	7 migrants; 6 pairs	Socorro
LF-44a	4	0	0	0	N/A	N/A	4 migrants	Socorro
LF-44b	2	1	2	1	1	1 successful	1 pair	Socorro
LF-45	11	4	8	4	5	4 failed; 1 unknown	3 migrants; 4 pairs	Socorro
Escondida Reach[7] Summary	99	12	28	16	14	5 successful; 7 failed, 2 unknown	71 migrants; 4 unpaired males, 12 pairs	
BA-01	4	0	0	0	N/A	N/A	4 migrants	Socorro
BA-02	4	0	0	0	N/A	N/A	4 migrants	Socorro
BA-03N	1	0	0	0	N/A	N/A	1 migrant	Socorro
BA-03S	1	0	0	0	N/A	N/A	1 migrant	Socorro
BA-04N	1	0	0	0	N/A	N/A	1 migrant	Socorro
BA-05	2	0	1	1	N/A	N/A	1 migrant; 1 unpaired male	Socorro
BA-06N	5	1	4	3	N/A	N/A	1 migrant; 2 unpaired males, 1 pair	Socorro
BA-06S	5	2	4	2	3	0	1 migrant; 2 pairs	Socorro
BA-07	6	2	4	2	3	1	2 migrants; 2 pairs	Socorro
BA-08/08a	50	22	45	23	37	19	5 migrants; 1 unpaired male; 22 pairs	Socorro

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	County
BA-09	36	8	16	8	8	3	20 migrants; 8 pairs	Socorro
BA-10	6	1	2	1	1	0	4 migrants; 1 pair	Socorro
Bosque del Apache Reach[8] Summary	121	36	76	40	52	23 successful; 19 failed; 10 unknown	45 migrants; 4 unpaired males; 34 pairs	
LF-21	2	0	0	0	N/A	N/A	2 migrants	Socorro
LF-22	3	0	0	0	N/A	N/A	3 migrants	Socorro
LF-24	1	0	0	0	N/A	N/A	1 migrant	Socorro
LF-25	4	0	0	0	N/A	N/A	4 migrants	Socorro
LF-26	4	0	0	0	N/A	N/A	4 migrants	Socorro
LF-35	4	0	0	0	N/A	N/A	4 migrants	Socorro
LF-35a	6	0	0	0	N/A	N/A	6 migrants	Socorro
LF-36	1	0	0	0	N/A	N/A	1 migrant	Socorro
LF-37	3	0	0	0	N/A	N/A	3 migrants	Socorro
Tiffany Reach[9] Summary	28	0	0	0	N/A	N/A	28 migrants	Socorro
LF-09/09a	3	0	0	0	N/A	N/A		Socorro
LF-11	1	0	0	0	N/A	N/A		Socorro
LF-12	3	0	0	0	N/A	N/A		Socorro
LF-13	3	0	0	0	N/A	N/A		Socorro
LF-15	4	0	0	0	N/A	N/A		Socorro
LF-17A	10	3	6	3	3	1		Socorro
LF-17/17B	4	1	2	1	1	1 successful		Socorro
LF-18	2	0	0	0	N/A	N/A		Socorro
LF-20	1	0	0	0	N/A	N/A		Socorro
LF-27	2	0	0	0	N/A	N/A		Socorro
LF-28	6	0	0	0	N/A	N/A		Socorro
LF-29	7	0	0	0	N/A	N/A		Socorro
LF-30	1	0	0	0	N/A	N/A		Socorro
LF-32	1	0	0	0	N/A	N/A		Socorro

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	County
LFCC-01	31	14	29	15	20	5		Socorro
LFCC-02	11	5	11	6	6	2		Socorro
LFCC-03	94	45	90	45	64	37		Socorro
LFCC-04	2	0	0	0	N/A	N/A		Socorro
LFCC0-05b	2	0	0	0	N/A	N/A		Socorro
LFCC-07	2	0	1	1	N/A	N/A		Socorro
DL-01/01A	12	6	12	6	5	3		Socorro
DL-02	30	14	29	15	14	5		Socorro
DL-03	7	3	7	4	3	1		Socorro
DL-05	2	0	0	0	N/A	N/A		Socorro
DL-06	7	2	5	3	1	0		Socorro
DL-07	10	1	2	1	1	0		Socorro
DL-08	30	10	20	10	11	4		Socorro
DL-09	3	1	2	1	N/A	N/A		Socorro
DL-10	4	0	0	0	N/A	N/A		Socorro
DL-11	6	0	0	0	N/A	N/A		Socorro
DL-12	97	44	89	45	59	25		Socorro
EB-01	102	44	93	49	65	29		Socorro/Sierra
EB-02	14	2	8	6	1	0		Socorro/Sierra
EB-03	3	0	0	0	N/A	N/A		Sierra
EB-04	33	12	25	13	17	7		Sierra
EB-05	2	0	0	0	N/A	N/A		Sierra
EB-06	5	2	5	3	2	1		Sierra
EB-07	54	20	45	25	21	6		Sierra
EB-08	2	0	0	0	N/A	N/A		Sierra
EB-09	23	8	20	12	9	0		Sierra
EB-10	6	0	3	3	N/A	N/A		Sierra
EB-11	4	0	0	0	N/A	N/A		Sierra
EB-12	4	1	3	2	1	0		Sierra
EB-13N	2	0	0	0	N/A	N/A		Sierra
EB-13S	3	0	0	0	N/A	N/A		Sierra

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	County
EB-14	11	4	8	4	5	0		Sierra
EB-15	60	27	60	33	30	6		Sierra
EB-16	57	22	54	32	24	3		Sierra
EB-17	6	2	4	2	2	0		Sierra
San Marcial Reach[10] Summary	789	293	633	340	365	136 successful; 148 failed; 81 unknown	157 migrants; 47 unpaired males; 293 pairs	
Middle Rio Grande Summary	**1177**	**368**	**792**	**424**	**461**	**177 successful; 184 failed; 100 unknown**	**386 migrants; 57 unpaired males; 368 pairs**	

[1] When a single WIFL responded to the tape playback, and there was no evidence of pairing, it was considered to be an unpaired male.
[2] A resident SWFL is a WIFL documented on or after June 10 that exhibits territorial behavior or for which nesting is confirmed.
[3] A second brood occurs after a SWFL pair has had a successful nesting attempt. A re-nest commonly occurs after an unsuccessful first nesting attempt.
[4] Belen Reach = From south boundary Isleta Pueblo to the confluence of the Rio Puerco and Rio Grande
[5] Sevilleta/La Joya Reach = From confluence of the Rio Puerco and Rio Grande to the San Acacia Diversion Dam.
[6] San Acacia Reach = From the San Acacia Diversion Dam to the Escondida Bridge.
[7] Escondida Reach = From Escondida Bridge, downstream to north boundary of Bosque del Apache NWR
[8] Bosque del Apache Reach = From north boundary of NWR, downstream to southern boundary of NWR.
[9] Tiffany Reach = From south boundary of Bosque del Apache NWR to railroad trestle
[10] San Marcial Reach = From railroad trestle, downstream through The Narrows to Elephant Butte Reservoir Pool (Monticello Bay)
Migrant – any WIFL that does not exhibit territorial behavior and is typically detected only during the period prior to June 10th.
Unpaired Male – a resident SWFL that 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

Appendix B

Reach by Reach Nest Monitoring Tables

Table B-1.—Annual nest monitoring data within the Belen Reach 2002 to 2024

Year	# Territories	# Pairs	# Nests Found*	# Nests Parasitized (%)**	# Nests Depredated (%)**	# Nests Abandoned (%)**	Unknown Success	# Successful Nests (%)	Estimated Total # Chicks Fledged	Estimated Productivity (# Chicks Per Successful Nest)
2002	1	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2003	N/S									
2004	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2005	4	1	2	1 (50%)	0	1 (50%)	0	1 (50%)	2	2.0
2006	1	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2007	10	1	2	1 (50%)	2 (100%)	0	0	0	0	N/A
2008	4	1	1	0	0	0	0	1 (100%)	3	3.0
2009	3	3	3	0	1 (50%)	0	1	1 (50%)	1	1.0
2010	6	4	3	1 (33%)	2 (67%)	0	0	0	0	N/A
2011	9	4	3	0	0	1 (50%)	1	1 (50%)	3	3.0
2012	14	9	10	0	1 (10%)	0	0	9 (90%)	18	2.0
2013	23	17	22	2 (9%)	7 (32%)	1 (5%)	0	14 (64%)	36	2.6
2014	18	16	14	0	4 (29%)	0	0	10 (71%)	26	2.6
2015	17	16	17	1 (7%)	2 (13%)	1 (7%)	2	11 (73%)	31	2.8
2016	20	13	21	1 (7%)	6 (46%)	2 (15%)	8	4 (31%)	14	3.5
2017	17	16	27	3 (11%)	16 (59%)	1 (4%)	0	8 (30%)	21	2.6
2018	20	17	17	0	5 (38%)	0	4	7 (54%)	20	2.9
2019	N/S									
2020	25	20	23	2 (13%)	2 (13%)	1 (7%)	8	10 (67%)	28	2.8
2021	85	71	86	12 (27%)	27 (61%)	0	42	11 (25%)	23	2.1
2022	95	80	108	9 (11%)	29 (35%)	4 (5%)	25	43 (52%)	106	2.5
2023	12	11	12	0	0	0	12	0	0	N/A

Year	# Territories	# Pairs	# Nests Found*	# Nests Parasitized (%)**	# Nests Depredated (%)**	# Nests Abandoned (%)**	Unknown Success	# Successful Nests (%)	Estimated Total # Chicks Fledged	Estimated Productivity (# Chicks Per Successful Nest)
2024	10	10	10	0	2 (40%)	0	5	3 (60%)	9	3.0
Total	394	310	381	33 (13%)	106 (42%)	12 (5%)	128	134 (53%)	341	2.5

Unknowns not included in nest variable calculation.
* Some pairs re-nested after failed attempt or attempted a second, third, or fourth brood.
** Some nests were parasitized, depredated, and/or abandoned.
N/S = not surveyed

Table B-2.—Annual nest monitoring data within the Bosque del Apache Reach 2003 to 2024

Year	# Territories	# Pairs	# Nests Found*	# Nests Parasitized (%)**	# Nests Depredated (%)**	# Nests Abandoned (%)**	Unknown Success	# Successful Nests (%)	Estimated Total # Chicks Fledged	Estimated Productivity (# Chicks Per Successful Nest)
2003	3	1	1	0	0	0	0	1 (100%)	1	1.0
2004	1	1	2	1 (50%)	1 (50%)	0	0	1 (50%)	3	3.0
2005	0	0	0	0	0	0	0	0	0	0
2006	4	1	1	0	1(100%)	0	0	0	0	0
2007	7	6	1	0	0	0	1	0	0	0
2008	5	3	2	0	0	0	2	0	0	0
2009	20	16	19	1 (6%)	5 (28%)	1 (6%)	1	11 (61%)	28	2.3
2010	34	22	25	1 (4%)	8 (35%)	1 (4%)	2	14 (61%)	38	2.7
2011	49	30	34	4 (12%)	15 (44%)	3 (9%)	0	12 (35%)	32	2.7
2012	51	29	38	10 (28%)	19 (53%)	1 (3%)	2	9 (25%)	22	2.4
2013	27	19	20	7 (35%)	11 (55%)	0	0	4 (25%)	11	2.8
2014	23	13	17	2 (13%)	8 (53%)	1 (7%)	2	4 (27%)	9	2.3
2015	11	6	5	1 (50%)	0	0	3	2 (100%)	6	3.0
2016	17	13	1	n/a	n/a	n/a	1	n/a	n/a	n/a
2017	16	11	16	4 (27%)	7 (47%)	1 (7%)	1	5 (33%)	12	2.4
2018	24	21	22	3 (15%)	10 (50%)	2 (10%)	2	6 (30%)	11	1.8
2019	24	16	7	n/a	n/a	n/a	7	n/a	n/a	n/a
2020	35	34	39	5 (23%)	9 (41%)	1 (5%)	17	10 (45%)	26	2.6
2021	39	29	31	7 (33%)	6 (29%)	2 (10%)	10	8 (38%)	20	2.5
2022	35	25	33	9 (39%)	8 (35%)	0	10	8 (35%)	17	2.1
2023	27	21	26	4 (40%)	1 (10%)	1 (10%)	16	8 (80%)	17	2.1

Year	# Territories	# Pairs	# Nests Found*	# Nests Parasitized (%)**	# Nests Depredated (%)**	# Nests Abandoned (%)**	Unknown Success	# Successful Nests (%)	Estimated Total # Chicks Fledged	Estimated Productivity (# Chicks Per Successful Nest)
2024	40	36	52	16 (38%)	14 (33%)	0	10	23 (55%)	58	2.5
Total	492	353	392	75 (25%)	123 (40%)	14 (5%)	87	126 (41%)	311	2.5

Unknowns not included in nest variable calculation.
* Some pairs re-nested after failed attempt or attempted a second, third, or fourth brood.
** Some nests were parasitized, depredated, and/or abandoned.

Table B-3.—Annual nest monitoring data within the San Marcial Reach 1996 to 2024

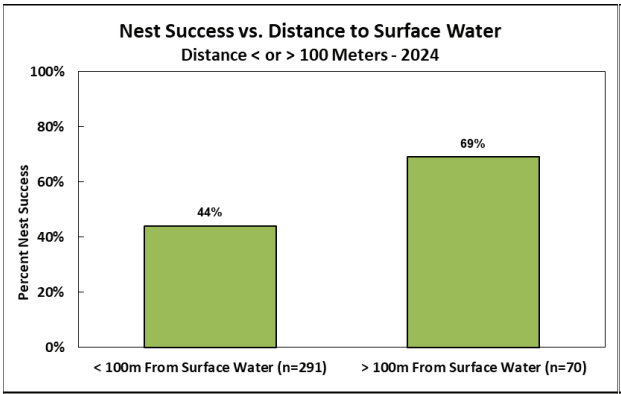
Year	# Territories	# Pairs (% Of Total Territories)	# Nests Found*	# Nests Parasitized (%)**	# Nests Depredated (%)**	# Nests Abandoned (%)**	Unknown Success	# Successful Nests (%)	Estimated Total # Chicks Fledged	Estimated Productivity (# Chicks Per Successful Nest)
1996	13	1 (8%)	1	0	0	1 (100%)	---	0	0	---
1997	10	3 (30%)	2	0	0	0	0	2 (100%)	4	2.0
1998	11	4 (36%)	2	0	0	0	0	2 (100%)	7	3.5
1999	12	5 (42%)	5	1 (20%)	0	1 (20%)	0	4 (80%)	10	2.5
2000	23	20 (87%)	19	2 (12%)	1 (6%)	2 (12%)	2	14 (82%)	29	2.1
2001	25	25 (100%)	36	0	7 (19%)	2 (6%)	0	27 (75%)	79	2.9
2002	60	50 (83%)	66	11 (17%)	19 (29%)	6 (9%)	0	36 (55%)	86	2.4
2003	82	67 (82%)	96	17 (18%)	31 (33%)	13 (14%)	3	48 (52%)	126	2.6
2004	113	92 (81%)	153	25 (17%)	48 (32%)	15 (10%)	4	71 (48%)	187	2.6
2005	107	77 (72%)	127	16 (13%)	37 (31%)	7 (6%)	7	68 (57%)	197	2.9
2006	142	117 (82%)	148	15 (10%)	47 (33%)	11 (8%)	4	83 (58%)	213	2.6
2007	197	153 (78%)	220	29 (14%)	40 (19%)	31 (15%)	10	117 (56%)	320	2.7
2008	235	168 (71%)	186	5 (3%)	56 (34%)	16 (10%)	23	87 (53%)	209	2.4
2009	319	224 (70%)	294	37 (14%)	90 (33%)	26 (10%)	21	129 (47%)	356	2.8
2010	298	235 (79%)	241	23 (10%)	110 (50%)	14 (6%)	20	82 (37%)	202	2.5
2011	318	237 (75%)	240	48 (23%)	80 (38%)	9 (4%)	30	92 (44%)	208	2.3
2012	252	181 (72%)	223	30 (14%)	106 (51%)	12 (6%)	16	65 (31%)	153	2.4
2013	266	182 (68%)	173	20 (13%)	78 (49%)	1 (1%)	13	72 (45%)	164	2.3
2014	307	205 (67%)	255	28 (12%)	142 (62%)	8 (4%)	27	58 (25%)	151	2.6
2015	300	224 (75%)	287	35 (13%)	130 (50%)	10 (4%)	25	100 (38%)	272	2.7
2016	303	209 (69%)	256	21 (10%)	102 (47%)	20 (9%)	38	87 (42%)	238	2.7

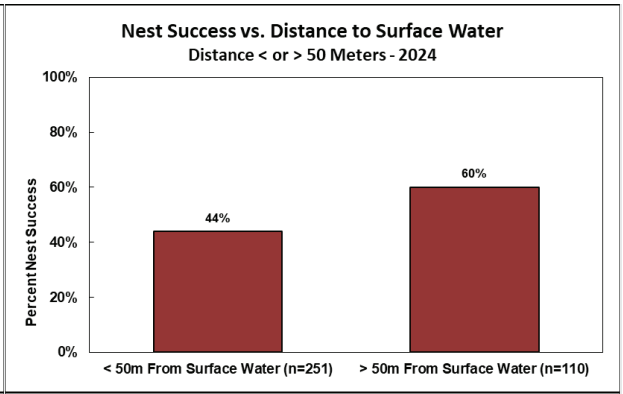
Year	# Territories	# Pairs (% Of Total Territories)	# Nests Found*	# Nests Parasitized (%)**	# Nests Depredated (%)**	# Nests Abandoned (%)**	Unknown Success	# Successful Nests (%)	Estimated Total # Chicks Fledged	Estimated Productivity (# Chicks Per Successful Nest)
2017	257	223 (87%)	298	28 (11%)	161 (63%)	13 (5%)	41	63 (25%)	158	2.5
2018	277	240 (87%)	315	23 (8%)	113 (39%)	23 (8%)	24	139 (48%)	330	2.4
2019	293	243 (83%)	280	6 (2%)	131 (53%)	6 (2%)	33	103 (42%)	272	2.6
2020	200	184 (92%)	219	10 (7%)	76 (51%)	4 (3%)	71	61 (41%)	143	2.3
2021	252	225 (89%)	254	20 (12%)	72 (43%)	5 (3%)	87	70 (42%)	170	2.4
2022	352	302 (86%)	398	50 (16%)	131 (41%)	10 (3%)	76	160 (50%)	360	2.3
2023	321	268 (83%)	317	8 (6%)	71 (52%)	7 (5%)	181	49 (36%)	125	2.6
2024	340	293 (86%)	365	22 (8%)	120 (42%)	7 (2%)	81	136 (48%)	348	2.6
Total	5685	4457 (78%)	5476	508 (12%)	1880 (43%)	273 (6%)	837	2025 (44%)	5117	2.5

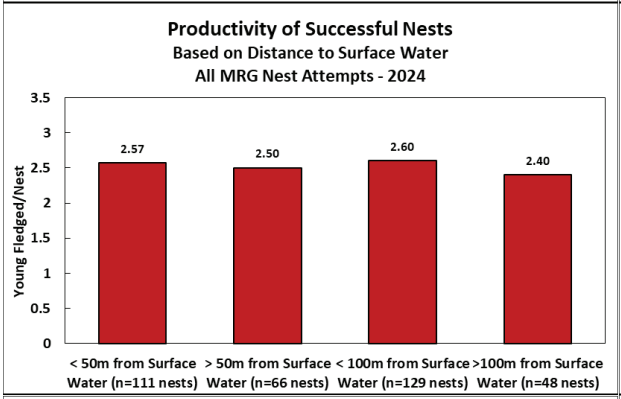
Unknowns not included in nest variable calculation.
* Some pairs re-nested after failed attempt or attempted a second, third, or fourth brood.
** Some nests were parasitized, depredated, and/or abandoned.

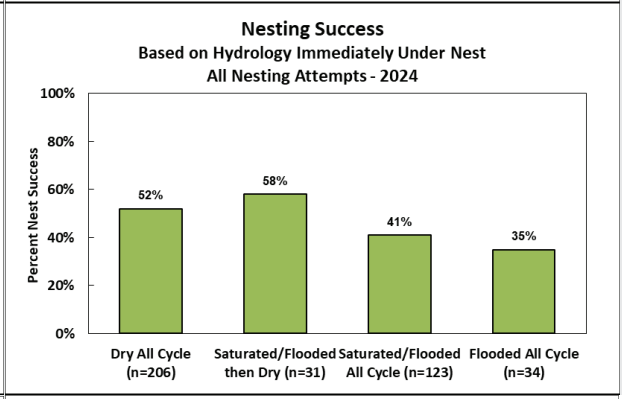
Appendix C

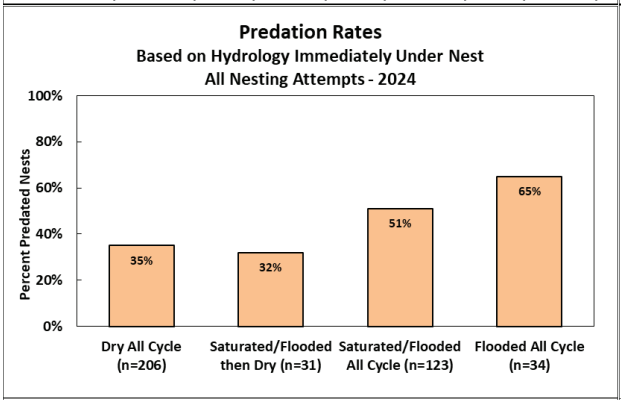
Graphical Representations of Nest Variable and Hydrology Comparisons

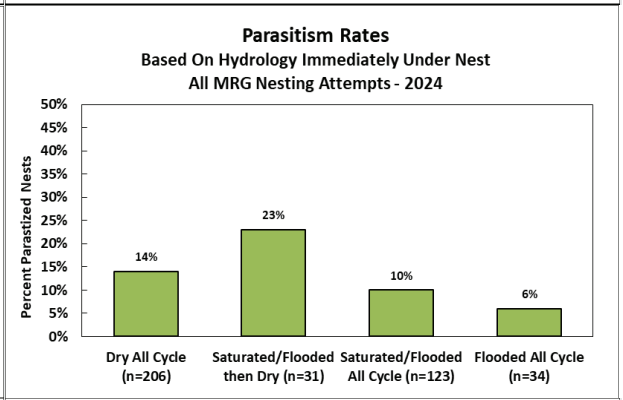

Nest Success vs. Distance to Surface Water
Distance < or > 100 Meters - 2024
Percent Nest Success
100%
80%
60%
40%
20%
0%
44%
69%
< 100m From Surface Water (n=291)
> 100m From Surface Water (n=70)

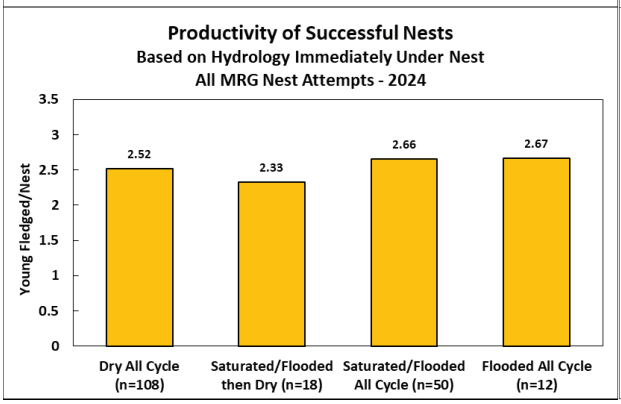

Nest Success vs. Distance to Surface Water
Distance < or > 50 Meters - 2024
Percent Nest Success
100%
80%
60%
40%
20%
0%
44%
60%
< 50m From Surface Water (n=251)
> 50m From Surface Water (n=110)

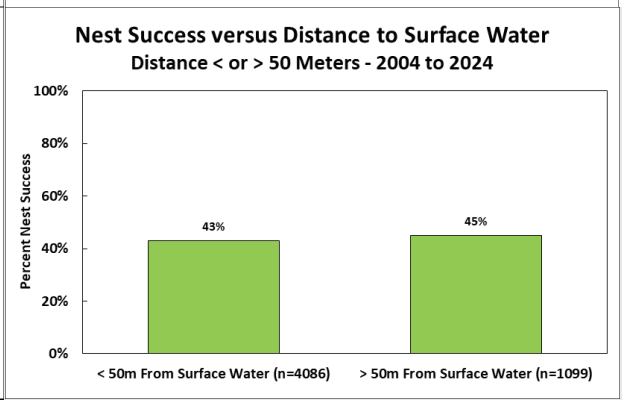

Productivity of Successful Nests
Based on Distance to Surface Water
All MRG Nest Attempts - 2024
Young Fledged/Nest
3.5
3
2.5
2
1.5
1
0.5
0
2.57
2.50
2.60
2.40
< 50m from Surface Water (n=111 nests)
> 50m from Surface Water (n=66 nests)
< 100m from Surface Water (n=129 nests)
>100m from Surface Water (n=48 nests)

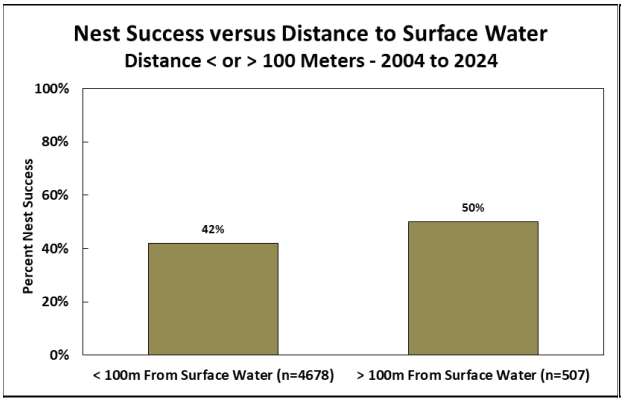

Nesting Success
Based on Hydrology Immediately Under Nest
All Nesting Attempts - 2024
Percent Nest Success
100%
80%
60%
40%
20%
0%
52%
58%
41%
35%
Dry All Cycle (n=206)
Saturated/Flooded then Dry (n=31)
Saturated/Flooded All Cycle (n=123)
Flooded All Cycle (n=34)

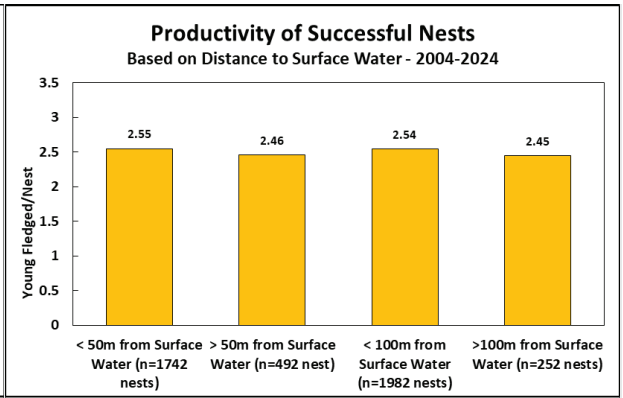

Predation Rates
Based on Hydrology Immediately Under Nest
All Nesting Attempts - 2024
Percent Predated Nests
100%
80%
60%
40%
20%
0%
35%
32%
51%
65%
Dry All Cycle (n=206)
Saturated/Flooded then Dry (n=31)
Saturated/Flooded All Cycle (n=123)
Flooded All Cycle (n=34)

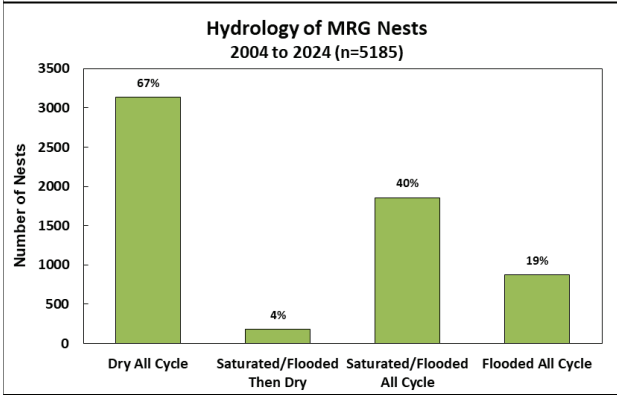

Parasitism Rates
Based On Hydrology Immediately Under Nest
All MRG Nesting Attempts - 2024
Percent Parastized Nests
50%
45%
40%
35%
30%
25%
20%
15%
10%
5%
0%
14%
23%
10%
6%
Dry All Cycle (n=206)
Saturated/Flooded then Dry (n=31)
Saturated/Flooded All Cycle (n=123)
Flooded All Cycle (n=34)

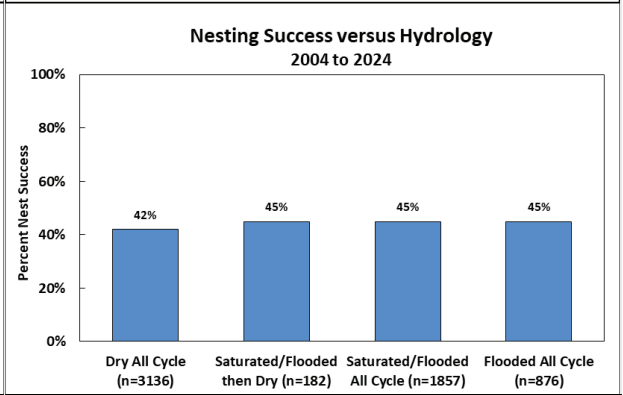

Productivity of Successful Nests
Based on Hydrology Immediately Under Nest
All MRG Nest Attempts - 2024
Young Fledged/Nest
3.5
3
2.5
2
1.5
1
0.5
0
2.52
2.33
2.66
2.67
Dry All Cycle (n=108)
Saturated/Flooded then Dry (n=18)
Saturated/Flooded All Cycle (n=50)
Flooded All Cycle (n=12)

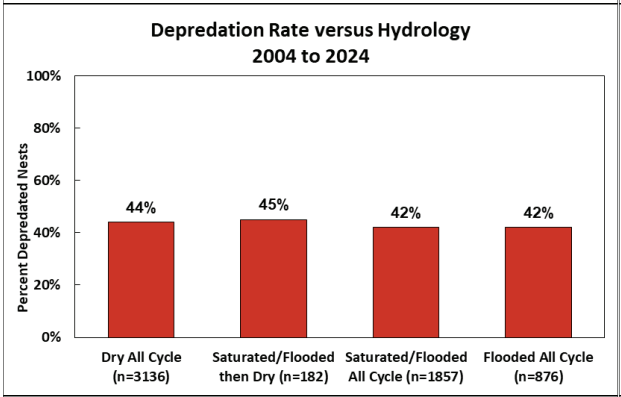

Nest Success versus Distance to Surface Water
Distance < or > 50 Meters - 2004 to 2024
Percent Nest Success
100%
80%
60%
40%
20%
0%
43%
45%
< 50m From Surface Water (n=4086)
> 50m From Surface Water (n=1099)

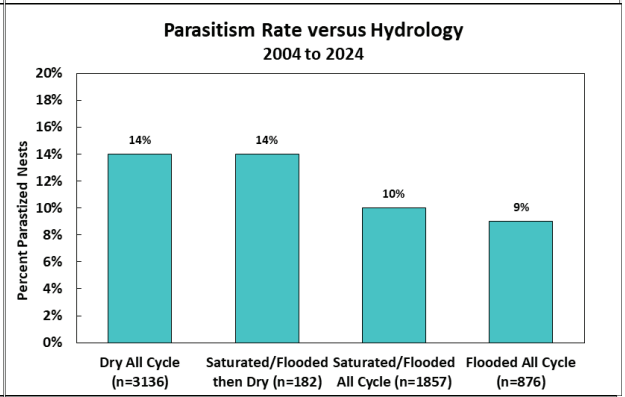

Nest Success versus Distance to Surface Water
Distance < or > 100 Meters - 2004 to 2024
Percent Nest Success
100%
80%
60%
40%
20%
0%
42%
50%
< 100m From Surface Water (n=4678)
> 100m From Surface Water (n=507)

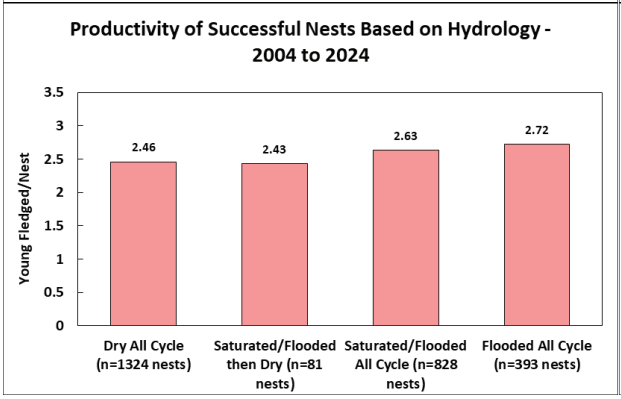

Productivity of Successful Nests
Based on Distance to Surface Water - 2004-2024
Young Fledged/Nest
3.5
3
2.5
2
1.5
1
0.5
0
2.55
2.46
2.54
2.45
< 50m from Surface Water (n=1742 nests)
> 50m from Surface Water (n=492 nest)
< 100m from Surface Water (n=1982 nests)
>100m from Surface Water (n=252 nests)

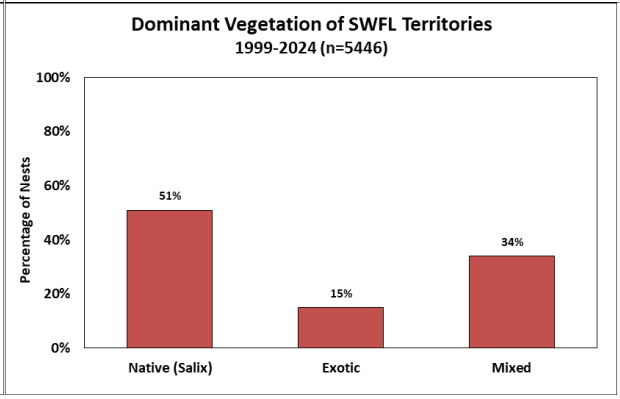

Hydrology of MRG Nests
2004 to 2024 (n=5185)
Number of Nests
3500
3000
2500
2000
1500
1000
500
0
67%
4%
40%
19%
Dry All Cycle
Saturated/Flooded Then Dry
Saturated/Flooded All Cycle
Flooded All Cycle

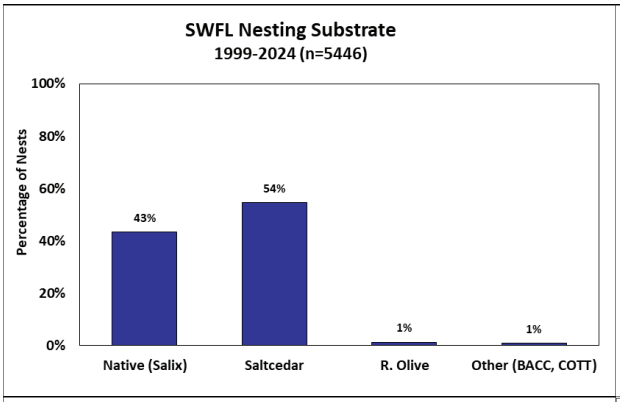

Nesting Success versus Hydrology
2004 to 2024
Percent Nest Success
100%
80%
60%
40%
20%
0%
42%
45%
45%
45%
Dry All Cycle (n=3136)
Saturated/Flooded then Dry (n=182)
Saturated/Flooded All Cycle (n=1857)
Flooded All Cycle (n=876)

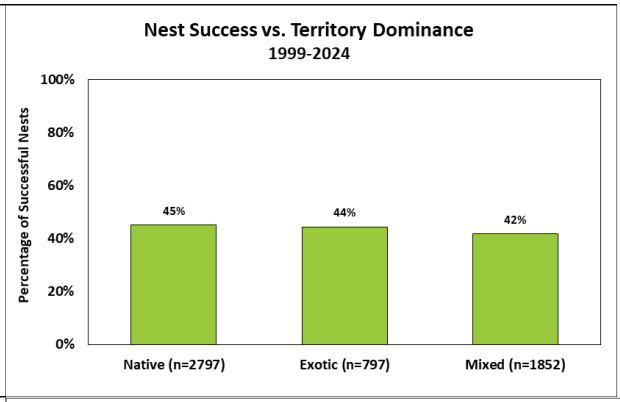

Depredation Rate versus Hydrology
2004 to 2024
Percent Depredated Nests
100%
80%
60%
40%
20%
0%
44%
45%
42%
42%
Dry All Cycle (n=3136)
Saturated/Flooded then Dry (n=182)
Saturated/Flooded All Cycle (n=1857)
Flooded All Cycle (n=876)

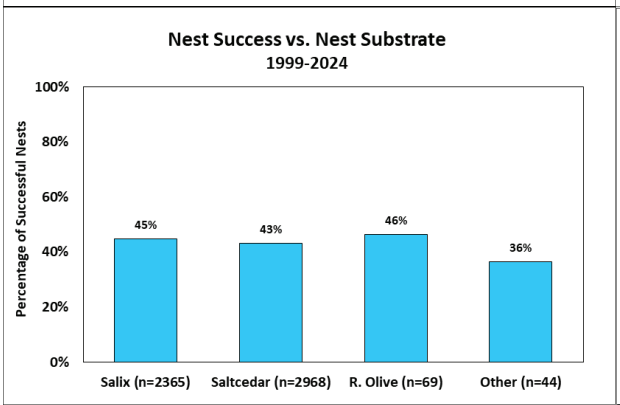

Parasitism Rate versus Hydrology
2004 to 2024
Percent Parastized Nests
20%
18%
16%
14%
12%
10%
8%
6%
4%
2%
0%
14%
14%
10%
9%
Dry All Cycle (n=3136)
Saturated/Flooded then Dry (n=182)
Saturated/Flooded All Cycle (n=1857)
Flooded All Cycle (n=876)

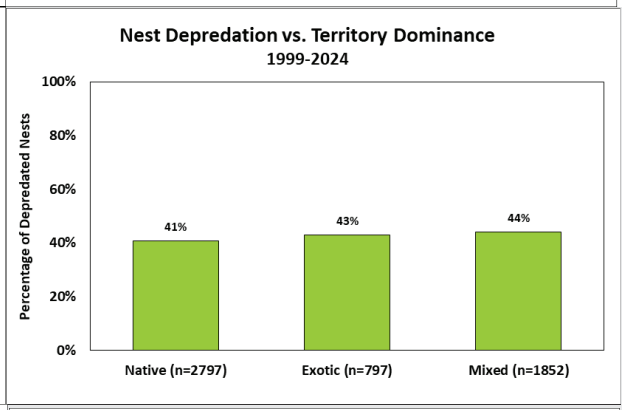

Productivity of Successful Nests Based on Hydrology - 2004 to 2024
Young Fledged/Nest
3.5
3
2.5
2
1.5
1
0.5
0
2.46
2.43
2.63
2.72
Dry All Cycle (n=1324 nests)
Saturated/Flooded then Dry (n=81 nests)
Saturated/Flooded All Cycle (n=828 nests)
Flooded All Cycle (n=393 nests)

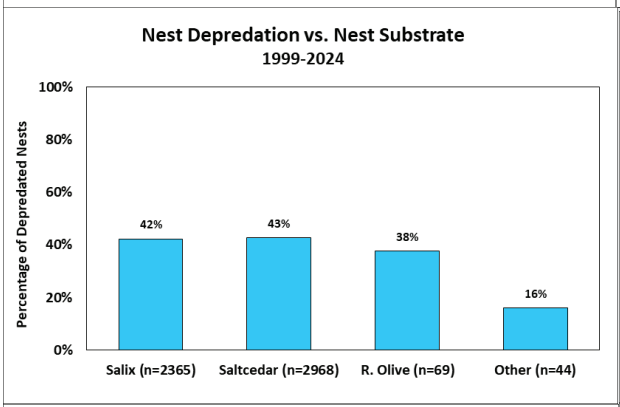

Dominant Vegetation of SWFL Territories
1999-2024 (n=5446)
Percentage of Nests
100%
80%
60%
40%
20%
0%
51%
15%
34%
Native (Salix)
Exotic
Mixed

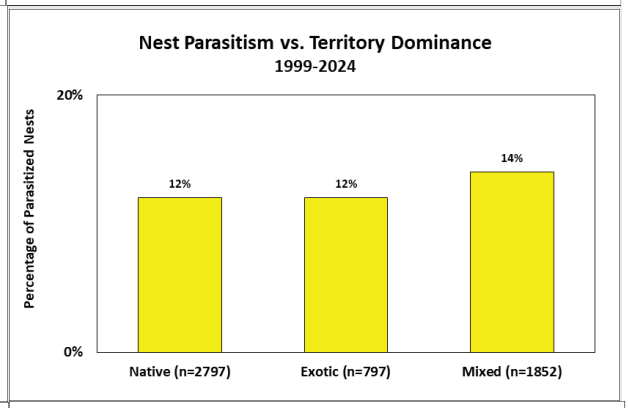

SWFL Nesting Substrate
1999-2024 (n=5446)
Percentage of Nests
100%
80%
60%
40%
20%
0%
43%
54%
1%
1%
Native (Salix)
Saltcedar
R. Olive
Other (BACC, COTT)

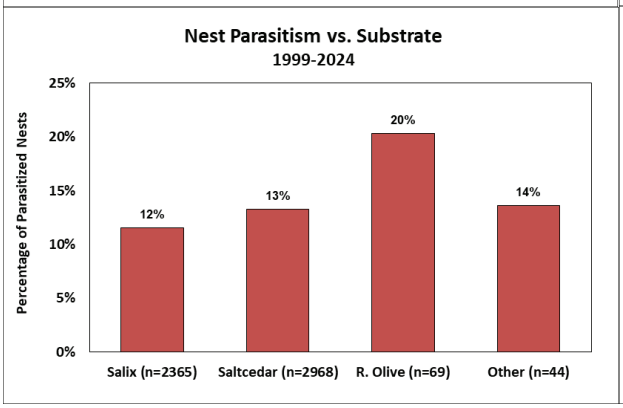

Nest Success vs. Territory Dominance
1999-2024
Percentage of Successful Nests
100%
80%
60%
40%
20%
0%
45%
44%
42%
Native (n=2797)
Exotic (n=797)
Mixed (n=1852)

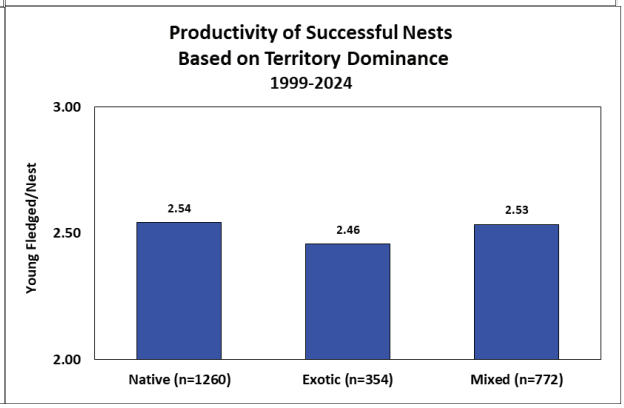

Nest Success vs. Nest Substrate
1999-2024
Percentage of Successful Nests
100%
80%
60%
40%
20%
0%
45%
43%
46%
36%
Salix (n=2365)
Saltcedar (n=2968)
R. Olive (n=69)
Other (n=44)

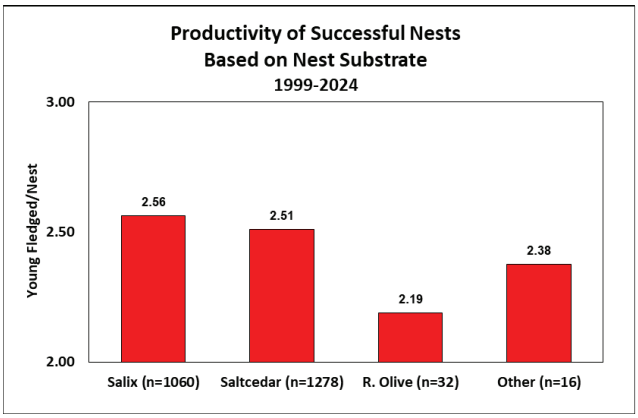

Nest Depredation vs. Territory Dominance
1999-2024
Percentage of Depredated Nests
100%
80%
60%
40%
20%
0%
41%
43%
44%
Native (n=2797)
Exotic (n=797)
Mixed (n=1852)


Nest Depredation vs. Nest Substrate
1999-2024
Percentage of Depredated Nests
100%
80%
60%
40%
20%
0%
42%
43%
38%
16%
Salix (n=2365)
Saltcedar (n=2968)
R. Olive (n=69)
Other (n=44)


Nest Parasitism vs. Territory Dominance
1999-2024
Percentage of Parasitized Nests
20%
0%
12%
12%
14%
Native (n=2797)
Exotic (n=797)
Mixed (n=1852)


Nest Parasitism vs. Substrate
1999-2024
Percentage of Parasitized Nests
25%
20%
15%
10%
5%
0%
12%
13%
20%
14%
Salix (n=2365)
Saltcedar (n=2968)
R. Olive (n=69)
Other (n=44)


Productivity of Successful Nests
Based on Territory Dominance
1999-2024
Young Fledged/Nest
3.00
2.50
2.00
2.54
2.46
2.53
Native (n=1260)
Exotic (n=354)
Mixed (n=772)


Productivity of Successful Nests
Based on Nest Substrate
1999-2024
Young Fledged/Nest
3.00
2.50
2.00
2.56
2.51
2.19
2.38
Salix (n=1060)
Saltcedar (n=1278)
R. Olive (n=32)
Other (n=16)