RECLAMATION

Managing Water in the West

2005 Southwestern Willow Flycatcher Study Results

Selected Sites Along the Rio Grande From Velarde to Elephant Butte Reservoir, New Mexico

U.S. Department of the Interior
Bureau of Reclamation
Ecological Planning and Assessment
Denver, Colorado

March 2006

Mission Statements

The mission of the Department of the Interior is to protect and provide access to our Nation's natural and cultural heritage and honor our trust responsibilities to Indian Tribes and our commitments to 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.

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Selected Sites Along the Rio Grande From Velarde to Elephant Butte Reservoir, New Mexico

prepared for

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Contents

Contents (continued)

Attachment and Appendices

Tables

Figures

Contents (continued)

Executive Summary

Overview

During the summer of 2005, the Bureau of Reclamation (Reclamation) conducted surveys and nest monitoring of the federally endangered Southwestern Willow Flycatcher (*Empidonax traillii extimus*) (SWFL) in eight distinct reaches along approximately 165 kilometers of the Middle Rio Grande adjacent to Velarde, New Mexico, and between the Pueblo of Isleta and Elephant Butte Reservoir. Surveys were performed to contribute to current baseline population data of the SWFL along the Middle Rio Grande and also to meet Reclamation's Endangered Species Act (ESA) compliance commitments. There were 221 resident SWFLs documented in 131 territories forming 90 breeding pairs. As in previous years, the San Marcial and Sevilleta reaches were most productive containing 107 and 17 territories, respectively.

Nest monitoring was conducted at all sites where nesting pairs were detected. Nests were monitored for success rates, productivity, and Brown-headed Cowbird (*Molothrus ater*) (BHCO) parasitism. The San Marcial reach proved most productive, producing 127 nests and fledging at least 197 SWFL young. The Sevilleta reach produced 10 nests and fledged at least 3 SWFL young (fates of 6 nests were unknown). Overall, nest variables (success, predation, BHCO parasitism, and productivity) remained similar to 2004.

Other studies were initiated or continued in 2005. These include: (1) BHCO point counts, (2) livestock grazing study, (3) SWFL habitat suitability assessment, (4) vegetation mapping, and (5) SWFL nest site vegetation quantification study. These studies are designed to provide further insight into potential threats to and habitat requirements of SWFL populations.

Survey Results

Reclamation funded:
Velarde – 0 territories
San Acacia – 0 territories
San Marcial – 107 territories

ESA Collaborative Program funded:
Belen – 4 territories
Sevilleta National Wildlife Refuge (NWR)/La Joya – 17 territories
Escondida – 0 territories
Bosque del Apache NWR – 0 territories
Tiffany – 3 territories

Recommendations

1. Continue annual surveying and nest monitoring within the San Marcial and Sevilleta/La Joya reaches to determine reproduction, nest success, recruitment, and population trends of SWFLs within the Middle Rio Grande Basin.
2. Give special attention to "core concentration area" between sites LF-17/17a and the Elephant Butte delta to document expansion of SWFLs into the Elephant Butte conservation pool.
3. Survey suitable/potential habitat in various reaches (e.g., Velarde, Belen, San Acacia, Bosque del Apache NWR) every 3 to 5 years to document new occupation by resident SWFLs.
4. Continue nest monitoring and addling/removal of BHCO eggs/chicks from parasitized SWFL nests in lieu of cowbird trapping.
5. Conduct habitat monitoring at any restoration sites to document the effectiveness of various restoration practices.

Introduction

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

Recent studies indicate that SWFL populations have declined across their range (USFWS 2002). The primary causes of declining populations are likely habitat loss or modification and brood parasitism by the Brown-headed Cowbird (*Molothrus ater*) (BHCO) (USFWS 2002). The U.S. Fish and Wildlife Service (USFWS) officially listed the SWFL as endangered in February 1995 (USFWS 1995). The SWFL is also listed as endangered or a species of concern by the States of Arizona, California, Colorado, New Mexico, Texas, and Utah (Sogge et. al. 1997, TPWD 2005). A recovery plan for the SWFL was finalized in August 2002. To accompany the recovery plan, a series of issue papers associated with the recovery of the endangered SWFL has also been prepared by the Recovery Team. These papers address current issues and recommend management alternatives in regard to BHCO parasitism, livestock grazing, water management, exotic vegetation, habitat restoration, fire management, and recreational impacts (USFWS 2002).

In October 2005, USFWS designated Critical Habitat for the SWFL along the Middle Rio Grande in three separate segments, separated by the Sevilleta and Bosque del Apache National Wildlife Refuges (NWR) which were excluded from the designation. The designated reaches include "from the southern boundary of the Isleta Pueblo for 44.2 miles to the northern boundary of the Sevilleta NWR. The middle Rio Grande segment extends for 27.3 miles from the southern boundary of the Sevilleta NWR to the northern boundary of the Bosque del Apache NWR. The most southern Rio Grande segment extends for 12.5 miles from the southern boundary of the Bosque del Apache NWR to the overhead powerline near Milligan Gulch…"(USFWS 2005). This designation does not include the active pool of Elephant Butte Reservoir.

Presence/absence surveys are 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 the San Marcial reach under a contract with the U.S. Army Corps of Engineers.

The 2005 presence/absence surveys for SWFLs were conducted at selected sites along the Rio Grande from Velarde downstream to the delta of Elephant Butte Reservoir (Figure 2). Surveys were conducted

between May 17 and July 25, 2005. Nest searches and nest monitoring of SWFL nests were conducted in conjunction with survey efforts by permitted biologists. In addition to conducting

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

presence/absence surveys for the SWFL, surveyors were instructed to document occurrences of five additional avian species of special concern: Yellow-billed Cuckoo *(Coccyzus americanus)*, Bell's Vireo *(Vireo bellii)*, Yellow Warbler *(Dendroica petechia)*, Summer Tanager (*Piranga rubra*), and Common Ground-Dove (*Columbina passerina*).

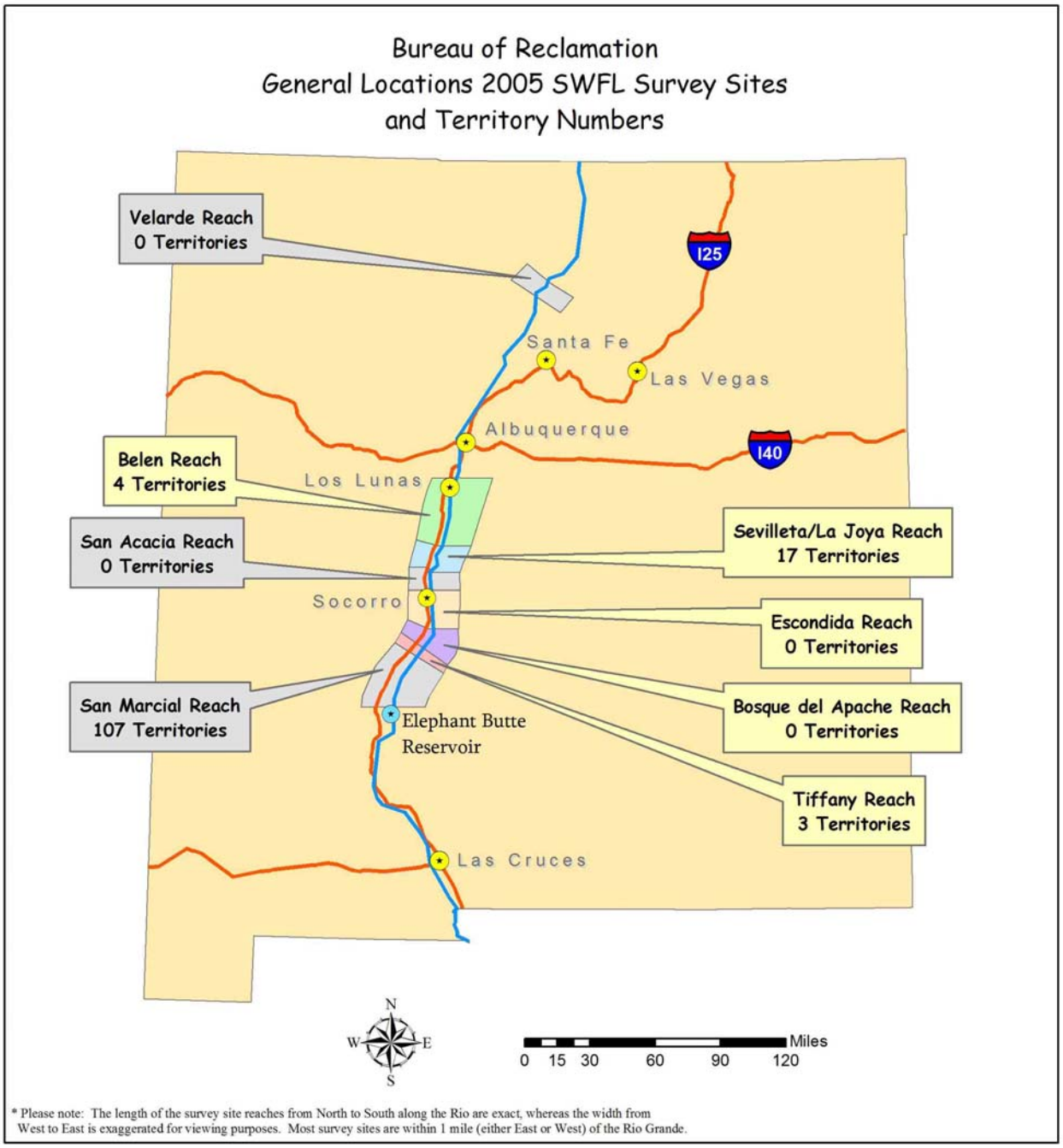

Figure 2. General locations of 2005 survey sites.

Goals and Objectives

Primary goals of the field studies performed in 2005 were:

1. Contribute to current baseline data regarding the population status, distribution, and habitat requirements of the SWFL in the Middle Rio Grande Basin, and
2. Meet Reclamation's Endangered Species Act (ESA) compliance commitments for ongoing and proposed projects and monitoring of completed projects.

Specific objectives included:

- Maintain project compliance in specific areas with five survey requirements.
- Monitor SWFL nests to determine reproductive status, population recruitment, and limiting factors.
- Assess nest site habitat characteristics.
- Provide assessment of general features of occupied habitat patches.
- Document occurrences of other special status avian species within project lands surveyed.

Related Studies

In addition to the presence/absence surveys and nest monitoring conducted in 2005, the following related studies were either previously conducted or continued in 2005:

- Using a modified Breeding Biology Research and Monitoring Database (BBIRD) protocol (Martin et al. 1997), a nest monitoring study was conducted from 1999 to 2004. Potential BHCO host nests were monitored to determine the effectiveness of the discontinued cowbird trapping effort and to gain a better understanding of the effects and intensity of factors such as brood parasitism and predation on productivity of riparian obligate species.

  Parasitism levels, predation, nest success, and nest productivity of SWFLs and comparable riparian obligate species in various sites within the former trapping area were compared to those within two adjacent areas at least 12 kilometers (km) from the trapping area. Neither of the adjacent areas had been subject to cowbird trapping. One of the areas supported year-round grazing, and the other did not support any livestock grazing. Results suggest that trapping may reduce brood parasitism; however compensatory factors such as habitat, predation, and nest abandonment appear to make up for the increased success due to decreased BHCO parasitism. Further information on this study can be found in *Riparian Obligate Nesting Success as Related to Cowbird Abundance and Vegetation Characteristics Along the Middle Rio Grande, New Mexico* (Moore 2006).

- BHCO point counts were continued to determine the distribution and abundance of BHCOs within the Middle Rio Grande Basin. Transects were established within four study areas to determine the distribution and density of BHCOs and to determine the effectiveness of the cowbird trapping program. Based on 1998 – 2005 data, the areas supporting the greatest mean number of BHCOs were within the Bosque del Apache and Sevilleta NWRs—areas not subject to livestock grazing. Livestock grazing was present adjacent to each of these areas, however, based on telemetry data, cowbirds in this reach of the Rio Grande Basin traveled less than 2 km on a daily basis between feeding and breeding areas (Ahlers and Sechrist 2000). The higher numbers of BHCOs could be a result of greater host densities and/or the availability of alternative food sources. Also, BHCO densities within the trapping area were less than that of

another adjacent study area that has not been subject to cowbird trapping and supports year-round livestock grazing. The methods and results of this study can also be found as a component of the *Cowbird Control Program: Middle Rio Grande, New Mexico, 2001* (Ahlers and Sechrist 2002) and *Brown-headed Cowbird Movement and Home Range Analysis in the Middle Rio Grande, New Mexico 1999* (Ahlers and Sechrist 2000).

- A study to monitor and evaluate the impacts of livestock grazing on the establishment and development of riparian vegetation was also continued. This study was initiated in 1997 to determine the effects of seasonal livestock grazing on (1) the potential future habitat of the endangered SWFL and (2) physical disturbance to existing occupied habitats. Data from a series of established livestock exclosures and photo stations are currently being collected and processed. Study data are presented in the draft report *A Long Term Assessment of Livestock Impacts on Riparian Vegetation: Elephant Butte Project Lands* (Ahlers et al. 2005, *in press*).

- Development of a SWFL habitat suitability model was initiated in 1998 for the Middle Rio Grande Basin and continues to be refined based on changes in hydrology and updated vegetation maps. Riparian vegetation in the Middle Rio Grande Basin between San Acacia Diversion Dam and Elephant Butte Reservoir had been classified using the Hink and Ohmart (1984) classification system through a cooperative effort with the U.S. Forest Service. This system identifies vegetation polygons based on dominant species and structure. Plant community types are classified according to the dominant and/or codominant species in the canopy and shrub layers. During the summer and fall of 2002, as part of the ESA Collaborative Program, Reclamation personnel updated vegetation maps from Belen to San Marcial using a combination of ground truthing and aerial photo analysis. During the summer of 2004, the conservation pool of Elephant Butte Reservoir was again aerially photographed (true color) and vegetation heights were remotely-sensed using Light Detection and Ranging (LIDAR) methods. The area was ground truthed again during the summer of 2005. These data are currently being processed and will be used to update the current SWFL habitat model.

- A study to quantify the vegetation at known SWFL breeding sites began in 2003. Data gathered included nesting height and substrate, vegetation density, height diversity, canopy cover, and hydrology. Between 2003 and 2005, data were gathered at 114 nests and will be used to increase overall knowledge of the nesting and general habitat requirements of the species. Data will also provide guidelines for riparian restoration projects targeted for SWFL habitat. Data were analyzed following the 2005 field season and a summary report will be forthcoming.

- In conjunction with SWFL nest monitoring, a hydrology monitoring project was implemented in 2004. Staff gauges were placed at various locations within heavily populated SWFL nesting sites. Data, including water depth and depth to substrate, were recorded on a weekly basis during the SWFL nesting season at all SWFL nest locations. Photos were taken at each station during all data collection events. Data from this study will be used to determine how closely nesting SWFLs associate with surface water, the timing and duration of flood events during the study period, and the associations of nest success and surface hydrology. Data were gathered in 2005 and are presented in *Status and Management of Southwestern Willow Flycatchers in Elephant Butte Reservoir, New Mexico* (Moore 2005).

Methods

Study Area

Survey sites were selected based on environmental compliance mandates related to Reclamation projects and an overall desire to obtain baseline data of SWFLs in the Middle Rio Grande Basin. The 2005 survey area encompassed selected sites along the Rio Grande between Velarde and Elephant Butte Reservoir. This stretch contained eight distinct survey reaches: Velarde, Belen, Sevilleta/La Joya, San Acacia, Escondida, Bosque del Apache, Tiffany, and San Marcial (Figures 3 to 11). Table 1 shows a summary of the survey effort within each reach.

Presence/Absence Surveys

All sites were surveyed in accordance with Sogge et al. (1997) and the USFWS revised protocol (USFWS 2000), using the repeated tape-playback method. Surveys in individual sites were conducted a minimum of 5 days apart, generally between 0530 and 1030 or 1100 (depending on weather conditions) by trained and permitted personnel. Survey forms were completed daily for each respective site. Survey dates are summarized in Table 2.

The first survey conducted in late May increases the likelihood of detection, since territorial males are more vocal when establishing territories than after nesting has begun. It was anticipated that migrant WIFLs would also be detected. The second and third surveys were conducted between early June and early 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. The fourth and fifth surveys, conducted during mid-July, were initiated in 2002 to derive a greater degree of confidence regarding the breeding status, habitat association, or presence/ absence of SWFLs at the selected sites. WIFLs documented on or after June 10 were considered resident birds (i.e., SWFLs). Each site was surveyed as thoroughly as conditions would allow. Many sites surveyed during 2005 were flooded by high flows in the Rio Grande or the Low Flow Conveyance Channel (LFCC), making access difficult.

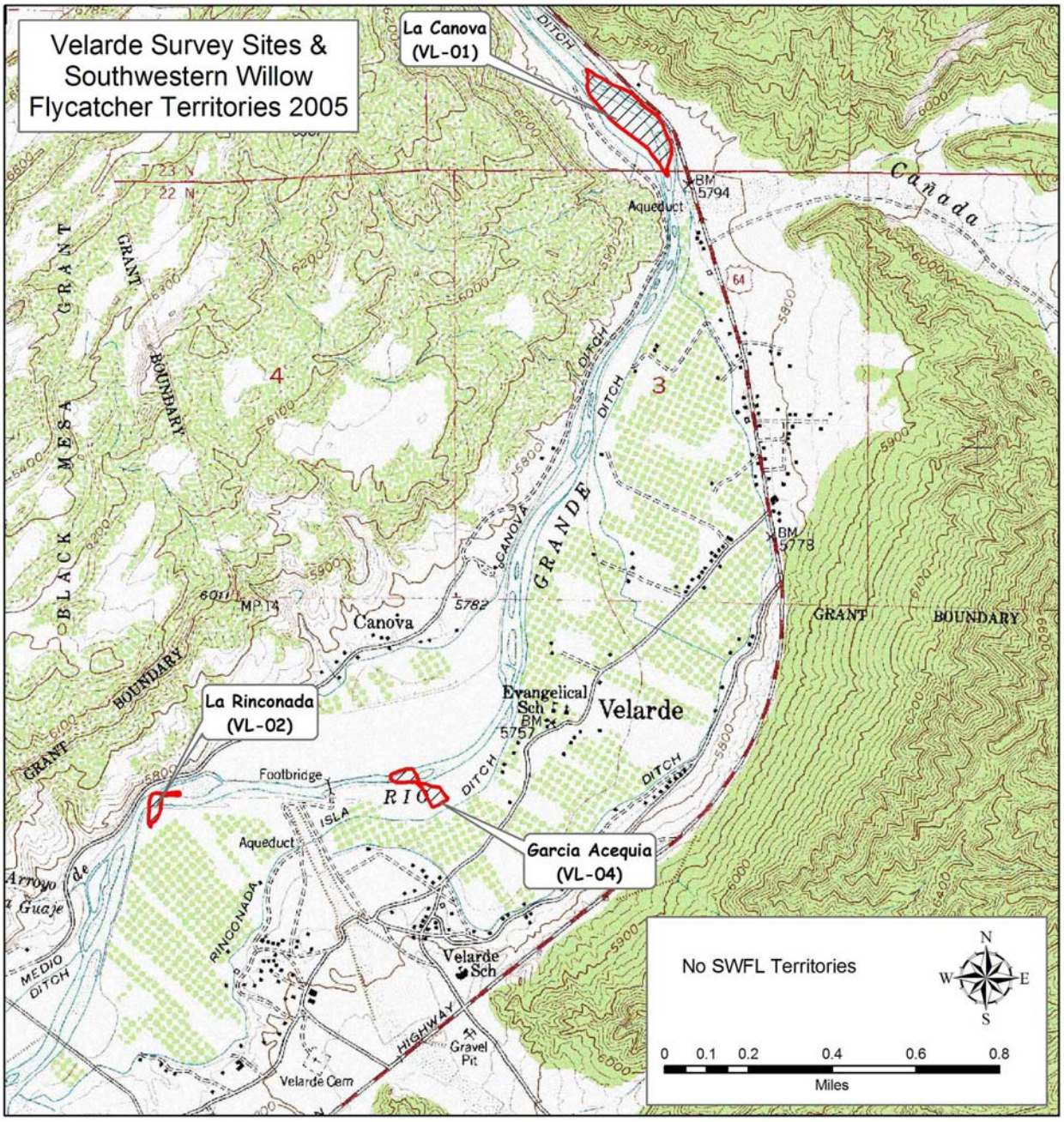

Figure 3. Overview of and SWFL detections within the Velarde survey sites.

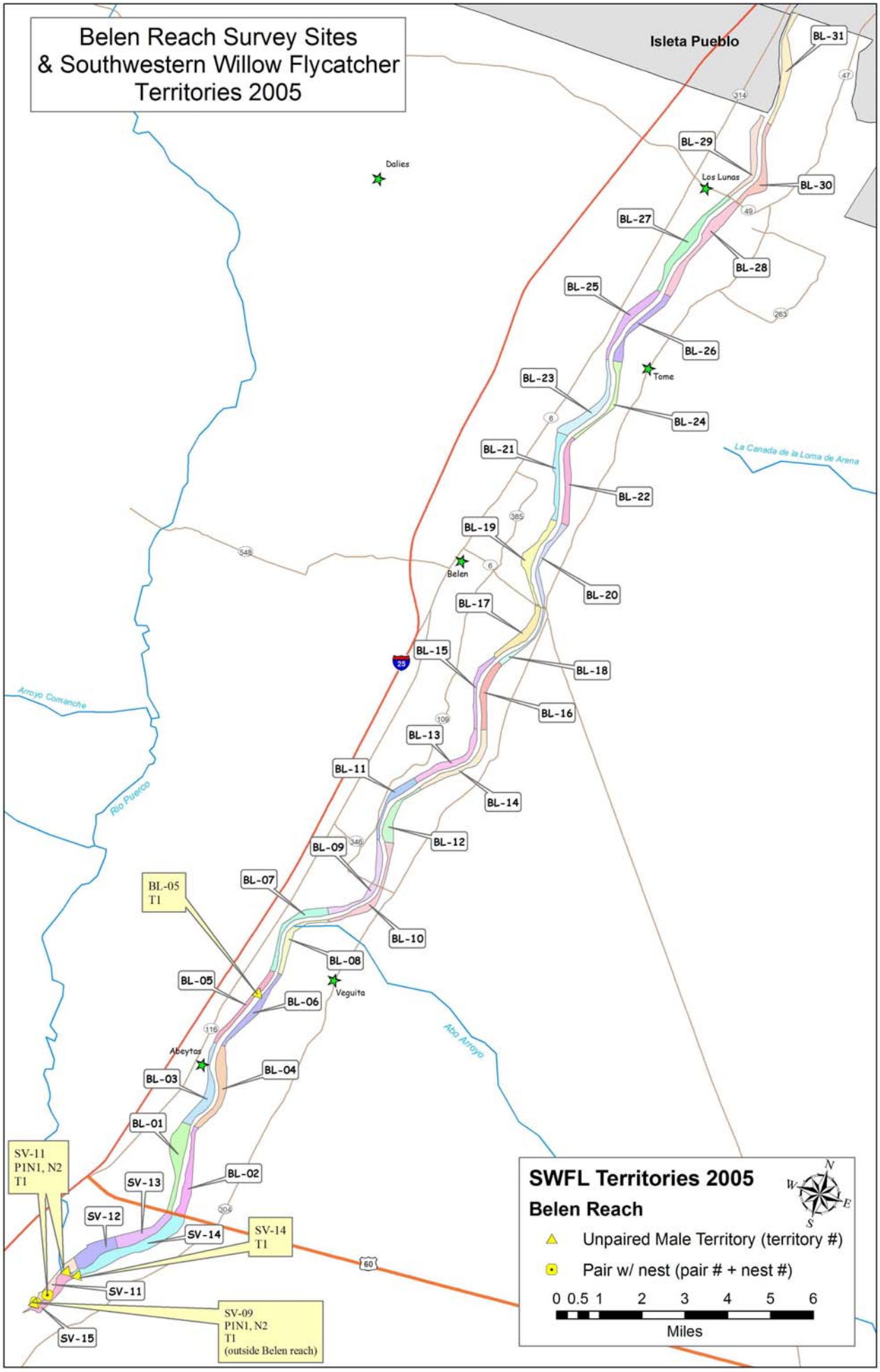

Figure 4. Overview of and SWFL detections within the Belen survey sites.

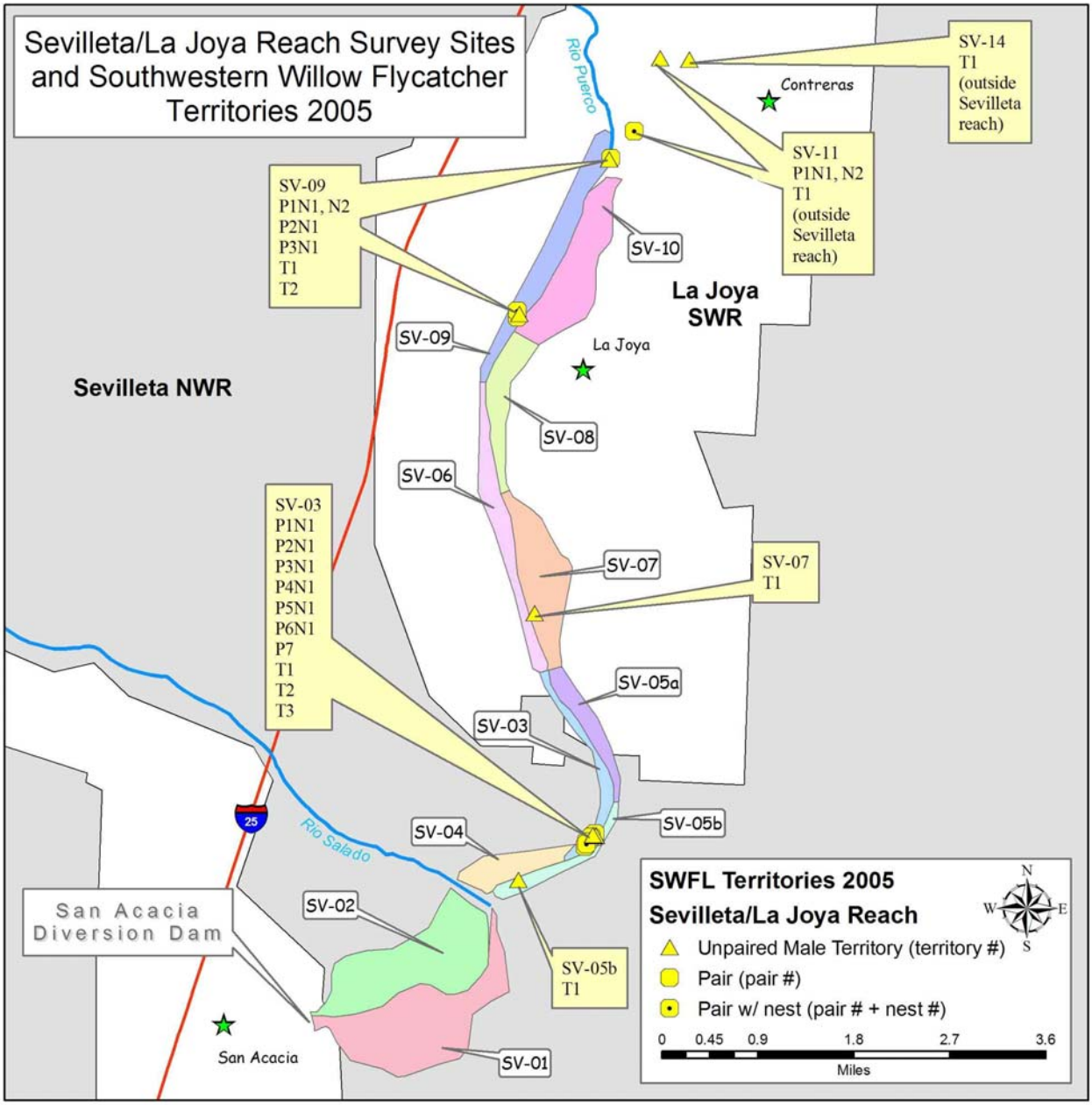

Figure 5. Overview of and SWFL detections within the Sevilleta/La Joya survey sites.

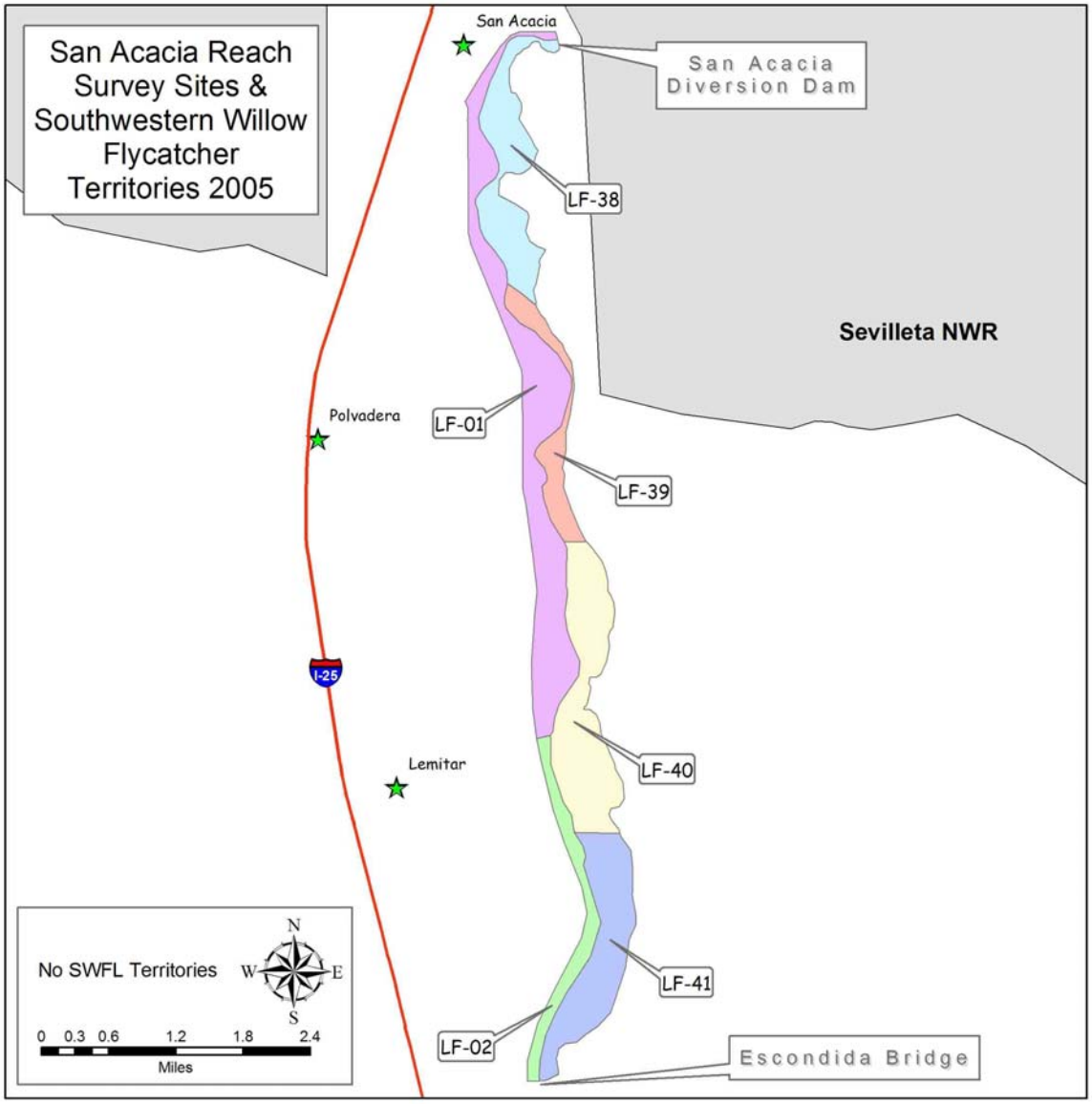

Figure 6. Overview of and SWFL detections within the San Acacia survey sites.

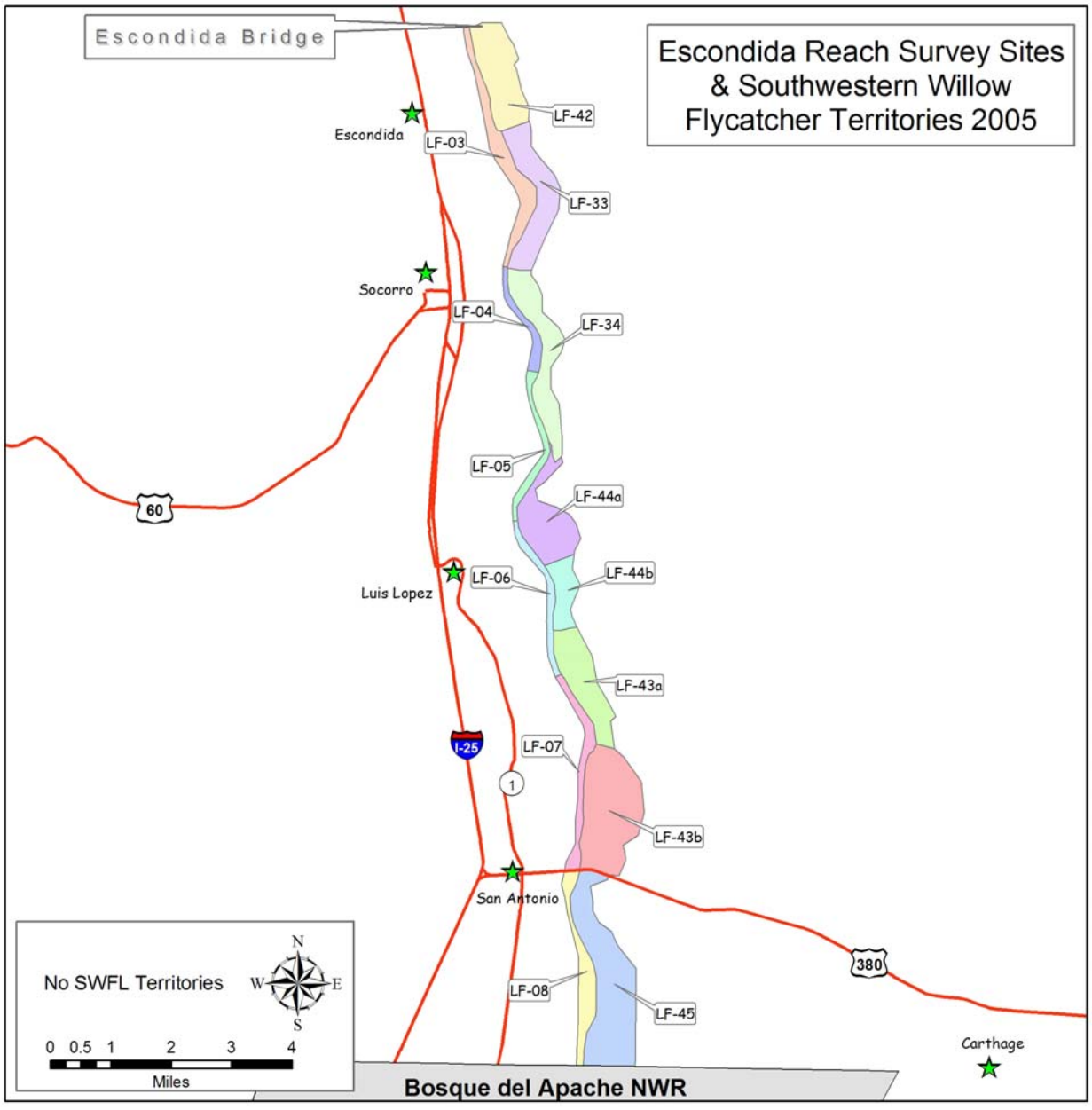

Figure 7. Overview of and SWFL detections within the Escondida survey sites.

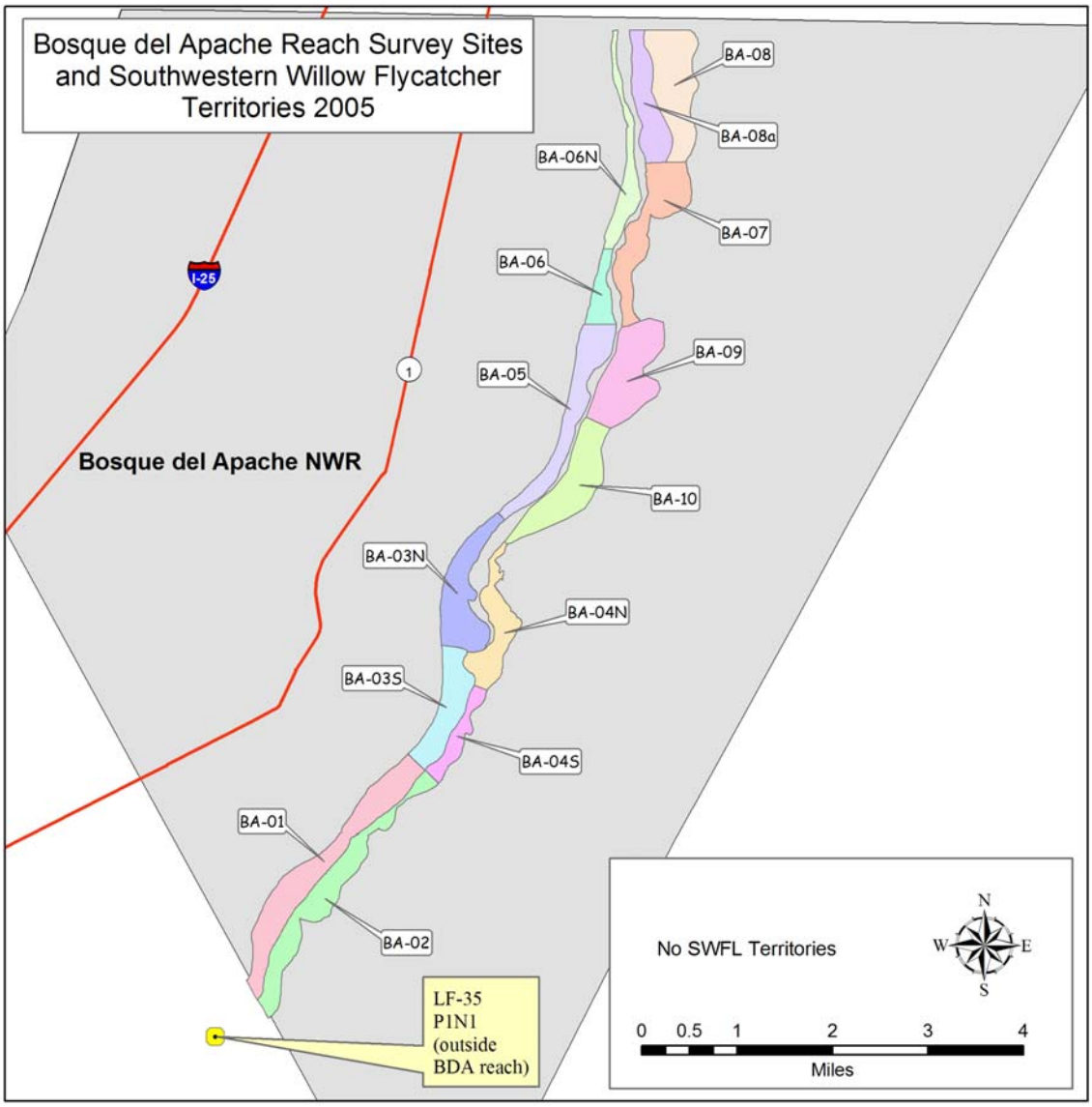

Figure 8. Overview of and SWFL detections within the Bosque del Apache survey sites.

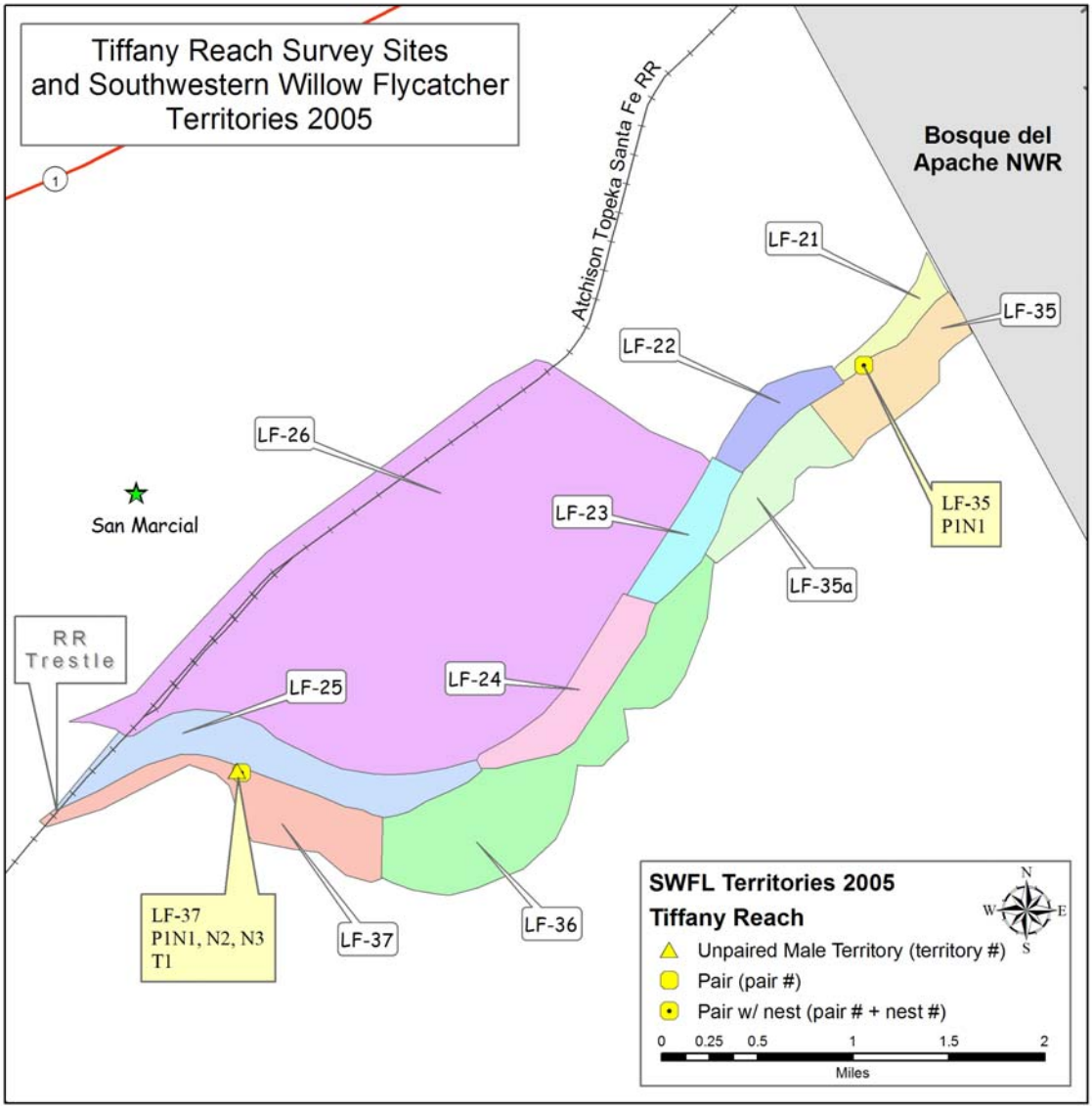

Figure 9. Overview of and SWFL detections within the Tiffany survey sites.

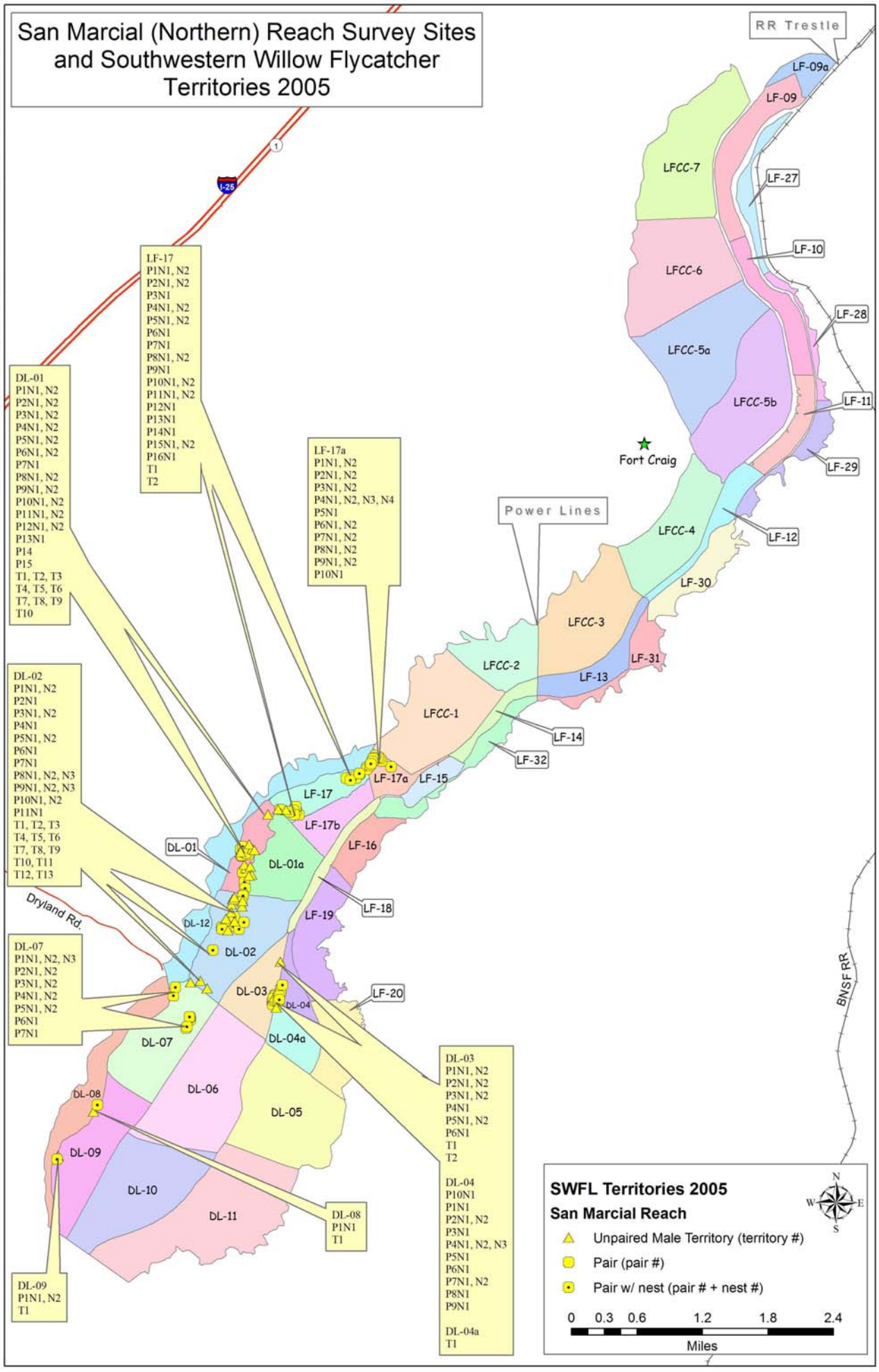

Figure 10. Overview of and SWFL detections within the San Marcial (Northern) survey sites.

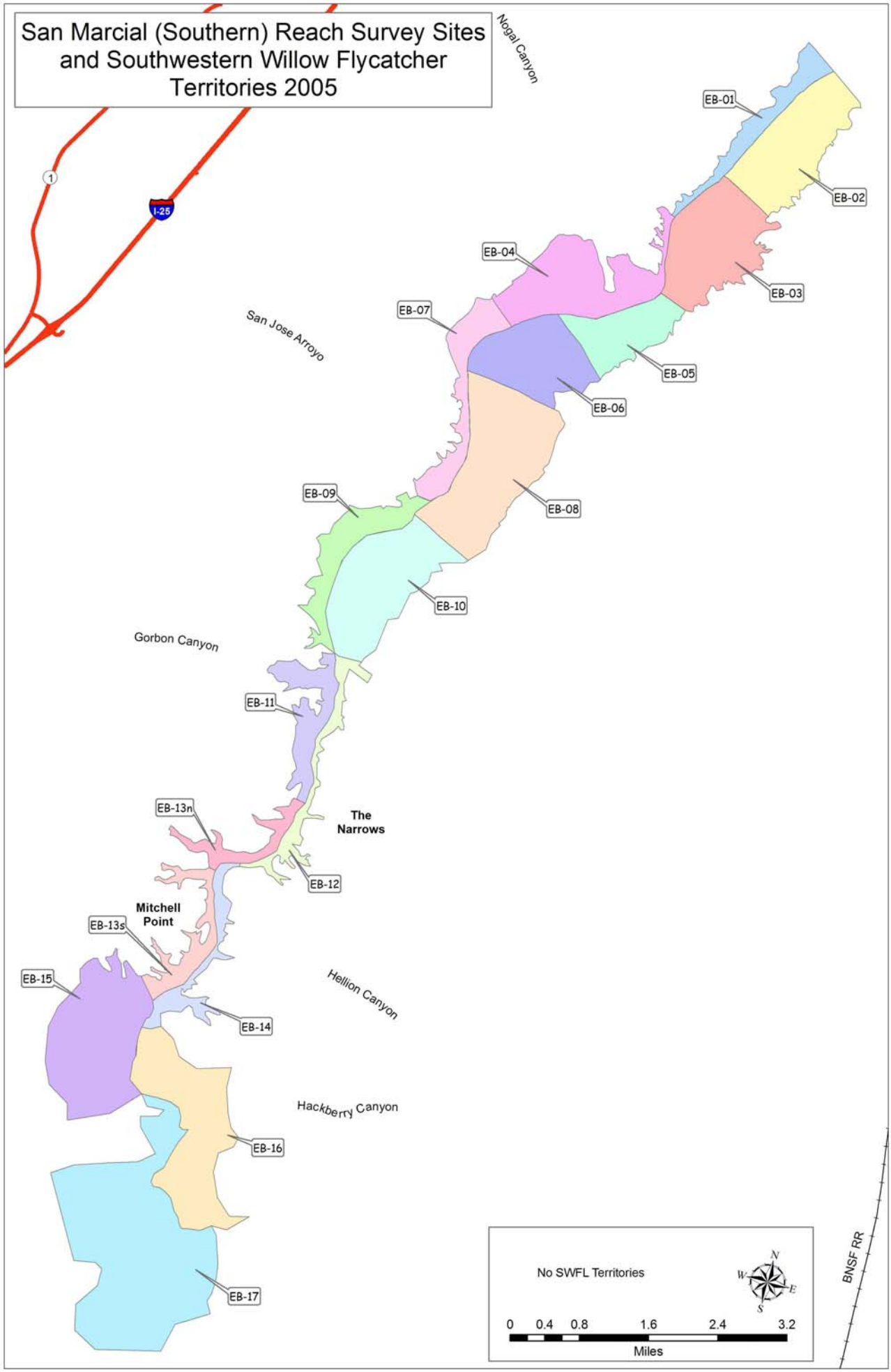

Figure 11. Overview of and SWFL detections within the San Marcial (Southern) survey sites.

Table 1. Number of sites and surveys per reach – Middle Rio Grande 2005.

Survey reach	Total sites surveyed	Number of surveys
Velarde	3	3
Belen	36	3
Sevilleta/La Joya[1]	10	3
San Acacia	6	5
Escondida[1]	14	3
Bosque del Apache	14	3: BA-01, 02, and BA-03S to BA-07 5: BA-03N and BA-08 to BA-10
Tiffany[2]	10	3: LF-21 to LF-26 and LF-37 2: LF-35 and LF-35a 1: LF-36
San Marcial[3]	57	5: All sites but EB-15, 16, and 17

[1] One site in both the Sevilleta/La Joya reach and Escondida reach was not surveyed due to landowner issues.
[2] Sites in the Tiffany reach that were not surveyed three times were inaccessible due to high flows in the Rio Grande.
[3] Pre-season reconnaissance in sites EB-15, 16,and 17 determined that habitat in these sites was unsuitable for breeding SWFLs, so no surveys were conducted.

Table 2. SWFL survey schedule for the 2005 field season

Survey number	Survey period*
1	May 16 – May 31
2	June 1 - June 21
3	June 22 – July 24
4	July 3 - July 13
5	July 14 - July 24

* For general surveys, a minimum of three surveys per site are required; one each during the first three survey periods. In project-related sites, a minimum of five surveys are required. The final three surveys are performed during the third survey period and must be at least 5 days apart.

Species of Special Concern

Surveyors were also instructed to document incidental detections of other avian species of special concern within survey sites. These species included the Yellow-billed Cuckoo, Bell's Vireo, Yellow Warbler, Summer Tanager, and Common Ground-Dove. Every effort was made to avoid duplicate recording of these individuals, and individuals that were recorded multiple times were sorted out during data processing. When an individual was detected by either sight or sound, UTM coordinates were obtained and a Species of Special Concern form was completed.

Nest Searches/Monitoring

Nest searches were conducted upon discovery of a breeding or suspected breeding SWFL pair by a permitted biologist and/or technicians under the direct supervision of a permitted biologist. To minimize disturbance and maximize accuracy of monitoring efforts, nest searches and monitoring were conducted using methods outlined in Martin and Geupel (1993) and the Southwestern Willow Flycatcher Nest Monitoring Protocol (Rourke et al. 1999). The nest area was located by observing diagnostic SWFL breeding behavior and listening for calls within the habitat patch. Once located, the nest site was approached cautiously with minimum disturbance to vegetation. Typically, adult SWFLs did not immediately reveal nest locations. All suitable midstory trees and shrubs in the suspected area were carefully inspected until the characteristic small, cup-shaped nest, as described in Tibbitts et al. (1994), was found. Nests were usually located within a few minutes of nest search initiation.

At all nest sites, physical data required by the Willow Flycatcher Nest Site Data Form were collected. 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. Nests with eggs/young were examined quickly using a mirror mounted on a telescopic pole. Nesting chronology was subsequently estimated following the initial search and examination. Subsequent visits were minimized and timed so at least one inspection would be made of eggs and nestlings, and pertinent data were recorded on the Willow Flycatcher Nest Record Form.

At the conclusion of the first or early-season nesting attempts, the nesting pair was not monitored for approximately 1 week to minimize disturbance and allow for possible initiation of another nesting attempt. Then a re-nest/second brood search was performed to detect any subsequent nesting attempts. A re-nest is a nesting attempt that occurs after a failed nesting attempt, and a second brood occurs after a nest successfully fledgesyoung. For our purposes, nests that contained nestlings at least 8 days old were considered successful.

In 2002, the practice of addling BHCO eggs from parasitized nests, when necessary and possible, was initiated. This activity was continued in 2005. SWFL eggs were never disturbed and time spent at the nest was minimized. Frequently it was determined that the BHCO egg would not have a chance to hatch, based on nesting chronology. In these cases nests were monitored normally to minimize disturbance.

Results

Presence/Absence Surveys

During presence/absence surveys conducted from May 17 through July 25, 285 SWFLs were documented (195 males and 90 females). Based on detections prior to June 10 and the birds' lack of territorial behavior, 65 were believed to have been migrants (all of which were considered males due to singing). The remaining 221 (131 males and 90 females) were assumed to be resident SWFLs.

These 221 SWFLs established 131 territories and 90 pairs. Documented nesting attempts confirmed 87 pairs; they produced 143 nests. Three additional pairs were observed and, although nesting was suspected, it could not be confirmed in any of these occupied territories. Of the 143 confirmed nesting attempts, 72 were believed successful, 58 failed, and the outcome of 13 was unknown. Successful nests include those which supported chicks at least 8 days old on the last nest visit; however, one nest that was not monitored into the late nestling stage was considered likely to have fledged young and was thus included in the successful nest count. This nest contained nestlings 5 to 6 days old on the last visit of the nesting cycle.

Detection results for 2005 are summarized in Table 3.

During the 2005 season, five surveys were completed in project-related sites, which comprised approximately 45 percent of the sites surveyed. Within these 65 sites, new SWFL territories were found during the fourth or fifth surveys in only one site (DL-04/04a). These territories were discovered during meticulous territory/nest searching by experienced and permitted biologists and were in very close proximity to other territories. Therefore, it is likely that these birds were originally undetected or mistaken for the other territorial SWFLs nearby. No new occupied SWFL "sites" were documented during fourth or fifth surveys. However, the additional surveys did provide greater confidence to the absence of the species in unoccupied sites. Presence/absence survey forms are presented in Appendix A.

Site descriptions

The following section contains an overview of the 18 sites where resident SWFLs were detected during the 2005 season. SWFL detections within the Velarde, Belen, Sevilleta/La Joya, San Acacia, Escondida, Bosque del Apache, Tiffany, and San Marcial reaches are presented in Figures 3 through 11, respectively.

Site BL-05 is 8 km north of Highway 60 on the west side of the river (UTM NAD 83 Zone 13 south – 3819734 N 335266 E to 3816516 N 334081 E). This site is relatively narrow and much of it burned a few years ago. Habitat along the river is composed of Russian olive (*Eleagnus angustifolia*) and saltcedar (*Tamarix* sp.), however, the majority of the site is totally unsuitable for

SWFL habitation. Two WIFLs were documented here; one on May 27 and the other on June 13. Due to the date of detection, the latter bird was considered a resident. Subsequent surveys and territory searches never located the bird again so it was assumed to be a migrant.

Site DL-01 is immediately south of LF-17 in the conservation pool of Elephant Butte Reservoir (UTM NAD 83 Zone 13 south – 3718303 N 307471 E to 3716976 N 306739 E). This site has been the most heavily utilized SWFL site in the Middle Rio Grande for the past two seasons. Because of this, prior to the 2004 survey season, it was split into two sites, DL-01 and DL-01a, to allow increased attention to the high quality habitat on the western side of this site. Formal surveys were not conducted within this site. Instead, experienced/permitted (nest monitoring) biologists conducted extensive nest searches/surveys. Thorough "survey" results were achieved without the additional disturbance/stress of "formal" surveys. However, for purposes of documentation survey forms were completed to reflect abundance during the five survey periods. Habitat within this site is highly suitable for SWFL habitation. Due to its location, vegetation has developed extensively as reservoir levels receded. Vegetation is composed of extensive Goodding's willow (*Salix gooddingii*) stands interspersed with occasional saltcedar shrubs. This site also receives regular flooding caused by the breach in the LFCC.

Site DL-02 is immediately south of DL-01 in the Elephant Butte Reservoir conservation pool (UTM NAD 83 Zone 13 south – 3716809 N 307932 E to 3715299 N 306713 E). Habitat on the western edge is very similar DL-01. This site was nearly as productive as DL-01 in terms of number of SWFL territories. SWFLs in this site are concentrated in the high quality native habitat on the western edge along the LFCC. On the interior of the site dense, dry saltcedar dominates. Flooding occurs due to the LFCC outfall.

Site DL-03 is immediately southeast of DL-02, adjacent to the Rio Grande (UTM NAD 83 Zone 13 south – 3716385 N 307767 E to 3714748 N 307408 E). Habitat is composed of high quality coyote and Goodding's willow on the eastern edge adjacent to the river and dense saltcedar throughout the remainder of the site. The native habitat in this site developed when the river was realigned but, due to the embankment paralleling the new pilot channel, it receives no overbank flows. Due to the drying of this site and the lowering of the water table, the high quality willow habitat adjacent to the river seems to be slowly dying out.

Site DL-04/04a is located immediately southeast and across the Rio Grande from DL-03 (UTM NAD 83 Zone 13 south – 3716400 N 307841 E to 3715271 N 307545 E). Site DL-04 was split into DL-04 and DL-04a prior to the 2003 survey season to allow for increased attention to the high quality SWFL habitat adjacent to the river. All but one territory within these sites were located within DL-04 (Figure 10). Along the western edge, highly suitable SWFL habitat is composed of mature native species such as Goodding's willow and coyote willow. The interior of the site is composed of a mixture of mature saltcedar, Russian olive, and native species including coyote willow, Goodding's willow, and cottonwood (*Populus deltoides*). Habitat within this site, other than that immediately adjacent to the river, is fairly dry and decadent due to the disconnection from the active river channel.

Table 3. Summary of WIFL detections – Middle Rio Grande – 2005

Site name	WIFLs observed[1]	Est. # of pairs	Est. # of *E. t. extimus*[2]	Est. # of territories	Nest(s) Found[3]	Nest success	Comments
VL-01	1 (♂)	0	0	0	N/A	N/A	WIFL assumed to be a migrant
Velarde reach summary	1 (♂)	0	0	0	N/A	N/A	WIFL assumed to be a migrant
BL-03	3 (3♂)	0	0	0	N/A	N/A	All WIFLs assumed to be migrants.
BL-05	2 (2♂)	0	1 (♂)	1	N/A	N/A	One WIFL treated as resident due to date of detection (6/13); not found on subsequent surveys - likely a late migrant. Other WIFL was a migrant.
BL-06	1 (♂)	0	0	0	N/A	N/A	WIFL assumed to be a migrant.
BL-08	2 (2♂)	0	0	0	N/A	N/A	Both WIFLs assumed to be migrants.
BL-09	2 (2♂)	0	0	0	N/A	N/A	Both WIFLs assumed to be migrants.
BL-10	6 (6♂)	0	0	0	N/A	N/A	All WIFLs assumed to be migrants.
BL-13	1 (♂)	0	0	0	N/A	N/A	WIFL assumed to be a migrant.
BL-20	1 (♂)	0	0	0	N/A	N/A	WIFL assumed to be a migrant.
BL-22	3 (3♂)	0	0	0	N/A	N/A	All WIFLs assumed to be migrants.
BL-25	1 (♂)	0	0	0	N/A	N/A	WIFL assumed to be a migrant.
BL-27	4 (4♂)	0	0	0	N/A	N/A	All WIFLs assumed to be migrants.
SV-11	3 (2♂, 1♀)	1	3 (2♂, 1♀)	2	2	1 successful, 1 failed (1 fledged, 1 parasitized and abandoned)	1 pair and 1 single male territory.
SV-14	1 (♂)	0	1 (♂)	1	N/A	N/A	1 single male territory.
Belen reach summary	30 (29♂, 1♀)	1	4 (3♂, 1♀)	4	2	1 successful, 1 failed (1 fledged, 1 parasitized and abandoned)	1 pair, 3 single male territories, 25 migrants and 1 late migrant treated as a resident single male territory.
SV-03	17 (10♂ 7♀)	7	17 (10♂ 7♀)	10	6	1 failed, 5 unknown (1 abandoned)	7 pairs (6 produced nests), 3 single male territories.
SV-05b	1 (♂)	0	1 (♂)	1	N/A	N/A	1 single male territory.
SV-07	3 (3♂)	0	1 (♂)	1	N/A	N/A	1 single male territory and 2 migrants.

Site name	WIFLs observed[1]	Est. # of pairs	Est. # of *E. t. extimus*[2]	Est. # of territories	Nest(s) Found[3]	Nest success	Comments
SV-09	8 (5♂ 3♀)	3	8 (5♂ 3♀)	5	4	1 successful, 2 failed, 1 unknown (1 fledged, 1 predated, 1 abandoned)	3 pairs and 2 single male territories.
SV-10	1 (♂)	0	0	0	N/A	N/A	WIFL assumed to be a migrant.
Sevilleta/La Joya reach summary	30 (20♂ 10♀)	10	27 (17♂ 10♀)	17	10	1 successful, 3 failed, 6 unknown (1 fledged, 2 abandoned, 1 predated, 6 unknown)	10 pairs (9 nested), 7 single male territories, 3 migrants.
LF-01	4 (4♂)	0	0	0	N/A	N/A	All WIFLs assumed to be migrants.
San Acacia reach summary	4 (4♂)	0	0	0	N/A	N/A	All WIFLs assumed to be migrants.
Escondida reach summary	0	0	0	0	N/A	N/A	
BA-03S	1 (1♂)	0	0	0	N/A	N/A	WIFL assumed to be a migrant.
BA-06N	1 (♂)	0	0	0	N/A	N/A	WIFL assumed to be a migrant.
Bosque del Apache reach summary	2 (2♂)	0	0	0	N/A	N/A	Both WIFLs assumed to be migrants.
LF-25	2 (2♂)	0	0	0	N/A	N/A	Both WIFLs assumed to be migrants.
LF-35	2 (1♂ 1♀)	1	2 (1♂ 1♀)	1	1	1 successful (fledged)	1 pair with nest.
LF-37	7 (6♂ 1♀)	1	3 (2♂ 1♀)	2	3	1 successful, 2 failed (1 predated, 1 abandoned, 1 fledged)	4 assumed migrants, 1 pair and 1 single male territory.
Tiffany reach summary	11 (9♂ 2♀)	2	5 (3♂ 2♀)	3	4	2 successful, 2 failed (2 fledged, 1 predated, and 1 abandoned)	2 pairs, 1 single male territory, and 6 migrants.
LF-16	1(♂)	0	0	0	N/A	N/A	WIFL assumed to be a migrant.
LF-17	36 (20♂ 16♀)	16	34 (18♂ 16♀)	18	24	15 successful, 8 failed, 1 unknown (15 fledged, 4 abandoned, 3 predated, 1 abandoned due to parasitism, and 1 unknown)	16 pairs, 2 single male territories and 2 migrants.

Site name	WIFLs observed[1]	Est. # of pairs	Est. # of *E. t. extimus*[2]	Est. # of territories	Nest(s) Found[3]	Nest success	Comments
LF-17a	20 (10♂ 10♀)	10	20 (10♂ 10♀)	10	20	11 successful, 9 failed (11 fledged, 8 predated, and 1 abandoned)	10 pairs with nests.
LF-17b	1 (♂)	0	0	0	N/A	N/A	WIFL assumed to be a migrant.
LF-27	1 (♂)	0	0	0	N/A	N/A	WIFL assumed to be a migrant.
LF-31	1 (♂)	0	0	0	N/A	N/A	WIFL assumed to be a migrant.
LF-32	1 (♂)	0	0	0	N/A	N/A	WIFL assumed to be a migrant.
LFCC-01	1 (♂)	0	0	0	N/A	N/A	WIFL assumed to be a migrant.
LFCC-02	1 (♂)	0	0	0	N/A	N/A	WIFL assumed to be a migrant.
DL-01	40 (25♂ 15♀)	15	40 (25♂ 15♀)	25	24	15 successful, 7 failed, 2 unknown (15 fledged, 6 predated, 1 abandoned, and 2 unknown)	15 pairs (13 nested) and 10 single male territories.
DL-01a	2 (2♂)	0	0	0	N/A	N/A	Both WIFLs considered migrants.
DL-02	35 (24♂ 11♀)	11	35 (24♂ 11♀)	24	19	8 successful, 10 failed, 1 unknown (8 fledged, 7 predated, 3 parasitized and abandoned, and 1 unknown)	11 pairs and 13 single male territories.
DL-03	14 (8♂ 6♀)	6	14 (8♂ 6♀)	8	10	5 successful, 4 failed, 1 unknown (5 fledged, 4 predated, and 1 unknown)	6 pairs and 2 single male territories.
DL-04/ DL-04a	22 (12♂ 10♀)	10	21 (11♂ 10♀)	11	14	7 successful, 6 failed, 1 unknown (7 fledged, 5 predated, 1 abandoned, and 1 unknown)	10 pairs, 1 single male territory, and 1 assumed migrant.
DL-07	16 (9♂ 7♀)	7	14 (7♂ 7♀)	7	13	6 successful, 6 failed, 1 unknown (6 fledged, 4 parasitized and abandoned, 2 predated, and 1 unknown)	7 pairs and 2 assumed migrants.
DL-08	3 (2♂ 1♀)	1	3 (2♂ 1♀)	2	1	1 failed (predated)	1 pair and 1 single male territory.

Site name	WIFLs observed[1]	Est. # of pairs	Est. # of *E. t. extimus*[2]	Est. # of territories	Nest(s) Found[3]	Nest success	Comments
DL-09	6 (5♂ 1♀)	1	3 (2♂ 1♀)	2	2	1 successful, 1 failed (1 fledged and 1 predated)	1 pair, 1 single male territory and 3 migrants.
DL-10	2 (2♂)	0	0	0	N/A	N/A	Both WIFLs assumed to be migrants.
DL-11	1 (♂)	0	0	0	N/A	N/A	WIFL assumed to be a migrant.
DL-12	2 (2♂)	0	0	0	N/A	N/A	Both WIFLs assumed to be migrants.
EB-11	1 (♂)	0	0	0	N/A	N/A	WIFL assumed to be a migrant.
EB-12	1 (♂)	0	0	0	N/A	N/A	WIFL assumed to be a migrant.
San Marcial reach summary	208 (131♂ 77♀)	77	184 (107♂ 77♀)	107	127	68 successful, 52 failed, 7 unknown (68 fledged, 37 predated, 7 abandoned, 8 parasitized and abandoned, and 7 unknown)	77 pairs (75 nested), 30 single male territories, and 24 migrants.
Total for all sites surveyed	285 (195♂ 90♀)	90	221 (131♂ 90♀)	131	143	72 successful, 58 failed, 13 unknown (72 fledged, 39 predated, 10 abandoned, 9 parasitized and abandoned, and 13 unknown)	90 pairs (87 produced nests), 41 single male territories, and 65 migrants.

(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. It is possible that some WIFLs counted as males may have been females, especially during the migration period.

(2) A documented WIFL was considered to be a resident *Empidonax traillii extimus* if it was documented on or after June 10 or nesting activity could be confirmed

(3) A second brood occurs after a SWFL pair has had a successful nesting attempt (i.e., young are fledged). A re-nest commonly occurs after an unsuccessful first nesting attempt.

Site DL-07 is located directly south of DL-02 on the east side of the LFCC outfall (UTM NAD 83 Zone 13 south – 3715299 N 306713 E to 3713826 N 305732 E). This site contains several patches of highly suitable SWFL habitat in the form of mature Goodding's willow and coyote willow, particularly in the northwestern end of the site along the LFCC outfall and former high-flow channels. The rest of the site is a mix of dead or decadent saltcedar and open areas with low-growing herbaceous vegetation such as grasses and emergent aquatics. There is a fair amount of marshy habitat within this site if water from the LFCC is present in sufficient quantity. On the western edge of this site, an outbreak of Cottonwood Leaf Beetles resulted in minor defoliation of Goodding's willow within SWFL breeding habitat.

Site DL-08 is located on the west side of the LFCC outfall south of Dryland Road (UTM NAD 83 Zone 13 south – 3715506 N 306009 E to 3711922 N 304339 E). It is a narrow, linear site that is dominated by marshy areas interspersed with young to mid-age saltcedar and Goodding's willow.

Portions of this site adjacent to the LFCC outfall receive regular overbank flooding. Both territories within this site were immediately adjacent to the LFCC outfall in mid-age stands of native willows.

Site DL-09, located directly south of DL-07 along the LFCC outfall (UTM NAD 83 Zone 13 south – 3713826 N 305732 E to 3711830 N 304474 E), contains habitat that is very similar to DL-07. Several patches of high quality Goodding's willow habitat exist within the site; however, the majority of vegetation within the site is mid-age saltcedar or herbaceous "weedy" vegetation. This site was either flooded or saturated throughout the survey season. Along the northwestern edge of this site, an outbreak of Cottonwood Leaf Beetles resulted in significant defoliation of Goodding's willow within SWFL breeding habitat.

Site LF-17 is located in the northern end of the conservation pool of Elephant Butte Reservoir, and to the south of the breach in the LFCC (UTM NAD 83 Zone 13 south - 3718796 N 308899 E to 3718303 N 307471 E). This area encompassed by LF-17 in 2003 was split in two (LF-17 and LF-17b) prior to the 2004 survey season to allow more attention to the high quality, occupied habitat on the western side of the site. Formal surveys were not conducted within this site. Instead, experienced/permitted (nest monitoring) biologists conducted extensive nest searches/surveys. Thorough "survey" results were achieved without the additional disturbance/stress of "formal" surveys. For purposes of documentation, survey forms were completed to reflect abundance during the five survey periods. Due to water provided by the LFCC outfall, standing water or saturated soil was present in much of this site throughout the 2005 survey season. Habitat is very high quality with mature Goodding's willow dominant and occasional coyote willow, saltcedar, and cottonwoods mixed in. Habitat within this site seems to be becoming more decadent and less attractive to nesting SWFLs as time progresses, as beaver activity takes its toll, and as understory trees are shaded out by large, overstory willows.

Site LF-17a is located immediately north of LF-17 adjacent to the LFCC outfall (UTM NAD 83 Zone 13 south - 3719016 N 309039 E to 3718308 N 309016 E). Habitat is a mixture of native willow habitat interspersed by high-flow channels filled with cattails (*Typha* sp.). Over the past several years, habitat has expanded in this site so that the once fairly large cattail marsh component has been nearly filled in by native willows. This site, due to its proximity to the LFCC, was flooded during most of the 2005 survey season. Formal surveys were not conducted within this site. Instead, experienced/permitted (nest monitoring) biologists conducted extensive nest searches/surveys. Thorough "survey" results were achieved without the additional disturbance/stress of "formal" surveys. For purposes of documentation, survey forms were completed to reflect SWFL abundance during the five survey periods.

Site LF-35's northern boundary is the southern boundary of the Bosque del Apache NWR. It is located on the east side of the river and stretches approximately 1.5 km to its southern boundary (UTM NAD 83 Zone 13 south – 3732924 N 3223831 E to 3731979 N 321672 E). Habitat within this site varies highly from dense saltcedar in the interior and eastern portion of the site to dense Russian olive and canopy cottonwoods on the western edge, adjacent to the river. There is a large earthen berm running through the middle of the site that acts as a barrier to floodwaters and even the western side of the site does not appear to receive much overbank flooding. In 2004 this site was surveyed for the first time since 1996.

Site LF-37, located across the river from LF-25 and immediately upstream of the railroad trestle (UTM NAD 83 Zone 13 south – 3728521 N 318082 E to 3728585 N 315353 E) was also surveyed in 2004 for the first time since 1996. The habitat within this site is dominated by dense, decadent saltcedar. In several locations there is a significant native component in the form of mature, overstory Goodding's willow and cottonwood. It is these areas that SWFLs have chosen to occupy. This site receives overbank flooding during high riverflows and was difficult to access during the 2005 survey season due to flooded conditions.

Site SV-03 is approximately 5 km upstream of the San Acacia Diversion Dam on the west side of the river (UTM NAD 83 Zone 13 south – 3797415 N 329795 E to 3794541 N 330046 E). Habitat is composed almost entirely of very dense saltcedar interspersed with Russian olive and gallery cottonwoods. It is very dry and receives infrequent overbank flooding. Occasionally, soil underneath the saltcedar canopy is moist due to rains or moisture trapped in the thick layer of saltcedar duff. SWFLs were first discovered in this site in 1999, and the population has slowly grown over the past 5 years.

Site SV-05b is located on the east side of the Rio Grande immediately north of the confluence with the Rio Salado in the Sevilleta National Wildlife Refuge (UTM NAD 83 Zone 13 south – 3794009 N 329002 E to 3795422 N 330819 E). This site is a narrow strip of habitat bounded by upland to the east. Habitat consists of saltcedar and Russian olive patches in a variety of densities and age classes. This site rarely receives overbank flooding and was almost entirely dry during the 2005 survey season.

Site SV-07, located on the west side of the river approximately 7 km north of the San Acacia diversion dam (UTM NAD 83 Zone 13 south – 3800075 N 329074 E to 3797415 N 329795 E) consists of a few different habitat types. On the eastern side of the site, away from the river, habitat consists of sparse saltcedar and occasional Russian olive. Several strips of gallery cottonwoods exist within this site. On recently formed riverbars adjacent to the active river channel, there are dense patches of native willows and Russian olive. Similar to 2004, it is in these patches that SWFLs were discovered in 2005. Portions of this site, particularly lower lying areas such as the riverbars, receive regular overbank flooding.

Site SV-09 is approximately 8 km south of Highway 60 on the west side of the river (UTM NAD 83 Zone 13 south – 3805506 N 330744 E to 3801755 N 328855 E). Habitat is a mixture of native and exotic vegetation, including saltcedar, Russian olive, coyote willow, Goodding's willow, and cottonwood. Habitat near the river is of higher quality than that away from the river and receives periodic overbank flow in certain areas. SWFLs were documented in the mixed habitat adjacent to the active river channel.

Site SV-11 is directly north of the Rio Puerco and Rio Grande confluence on the west side of the Rio Grande (UTM NAD 83 Zone 13 south - 3805122 N 330783 E to 3806837 N 331875 E). Habitat within the site is predominantly composed of dense saltcedar and Russian olive. On the eastern edge of the site, coyote willow and seep willow (*Baccharis* sp.) are intermixed with the saltcedar and Russian olive. At the southern end of the site adjacent to the river, a high-flow channel contains saltcedar, Russian olive, coyote willow, seep willow, Goodding's willow, and cottonwood. Both

SWFL territories were located adjacent to the river in habitat composed of a greater amount of native species.

Site SV-14 is located immediately south of Highway 60 opposite site SV-13 on the east side of the river (UTM NAD 83 Zone 13 south – 3809922 N 334677 E to 3806618 N 331677 E). It is a relatively long, narrow site encompassing almost 5 km of floodplain. Habitat is very sparse in most areas, consisting mainly of saltcedar and occasional cottonwoods. There are a few patches of native vegetation along the river.

Species of Special Concern

Occurrences of special status species were recorded in all survey reaches except the Velarde reach. Results for the Belen, Sevilleta/La Joya, San Acacia, Escondida, Bosque del Apache, Tiffany, and San Marcial reaches are presented in Figures 12 through 16, respectively. As has been the case over the past several years, the Summer Tanager was the most abundant of the special-concern species and was distributed evenly throughout the study area. Bell's Vireo and Yellow-billed Cuckoo were relatively abundant, with
29 and 12 detections, respectively. These two species were concentrated in areas of primarily native habitat in the southern half of the study area. The species occurring in the lowest abundance was Yellow Warbler; one detection was recorded in the dense native habitat within site DL-01. No Common Ground-Doves were detected during the 2005 season.

Nest Searches/Monitoring

In 2005, Reclamation personnel monitored a total of 143 nests in the Middle Rio Grande. Of these, 72 were successful, 58 failed, and 13 were unknown (mostly due to nest height and the inability to monitor). Seventeen nests were parasitized, and BHCO eggs or nestlings were manipulated (eggs addled, eggs or nestlings removed) in 9 of them (Table 4). Of those nine nests, five failed directly due to BHCO parasitism (i.e., abandoned after parasitism), three were predated, and one fledged SWFL young (BHCO egg didn't hatch). Of the other eight parasitized nests in which BHCO egg manipulation was either impossible or not warranted, four were predated, three failed due to parasitism, and two fledged SWFL young.

Table 4. Summary of parasitized SWFL nests in the Middle Rio Grande – 2005

Nest Fate	Number of Nests (n=17)*
Failed directly due to parasitism	8
BHCO egg(s)/nestling manipulation	8
Predated w/o addling	4
Predated after BHCO manipulation	2
Fledged SWFLs w/o addling	2
Fledged SWFLs after addling	1
Abandoned w/o addling	3
Abandoned after addling	5

Nest numbers in table do not equal total (17) because several times multiple events affected the same nest. Addling, depending on when in the incubation stage it occurs, is not always successful at preventing BHCO eggs from hatching.

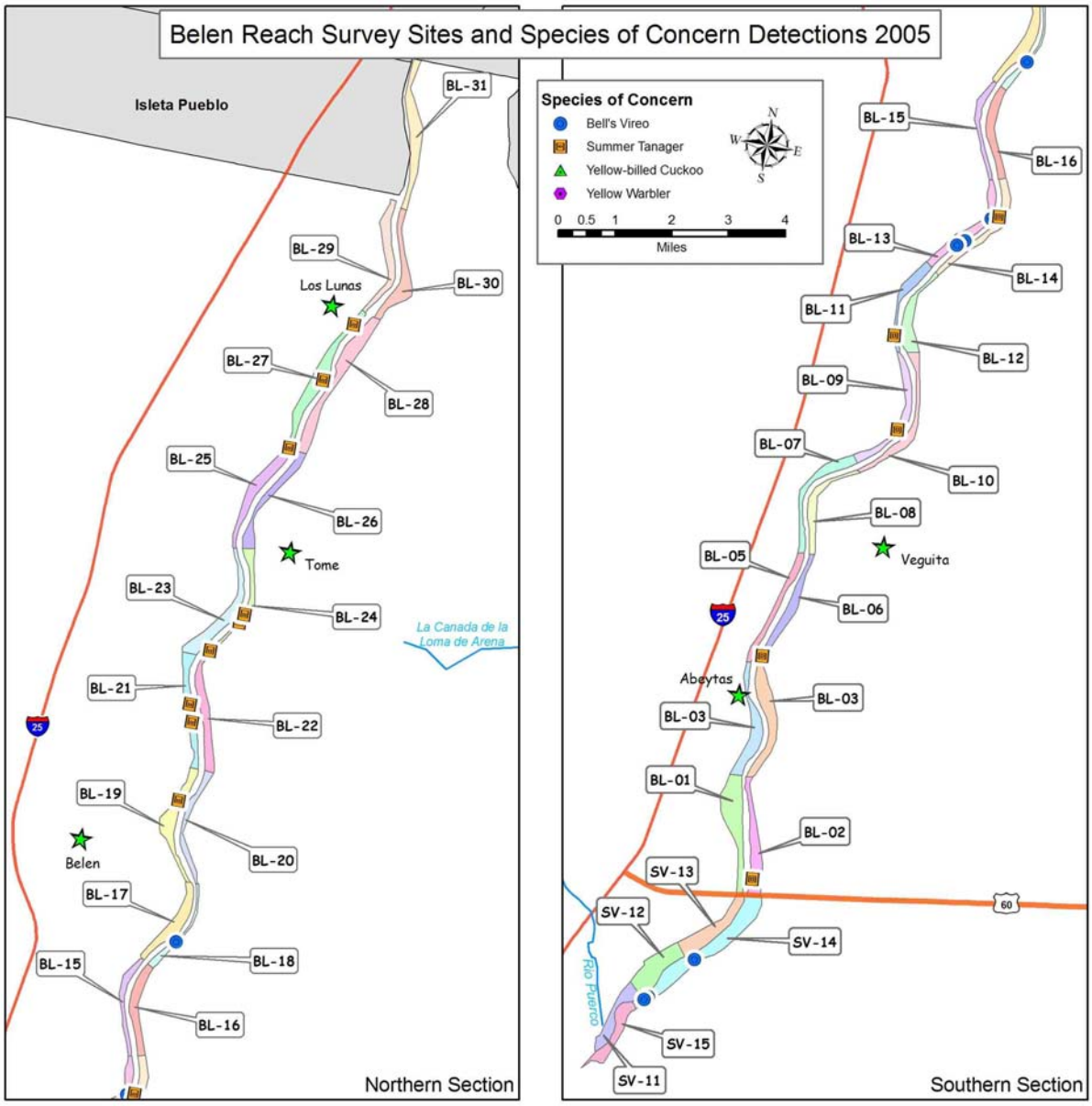

Figure 12. Species of concern occurrences – Belen reach – 2005.

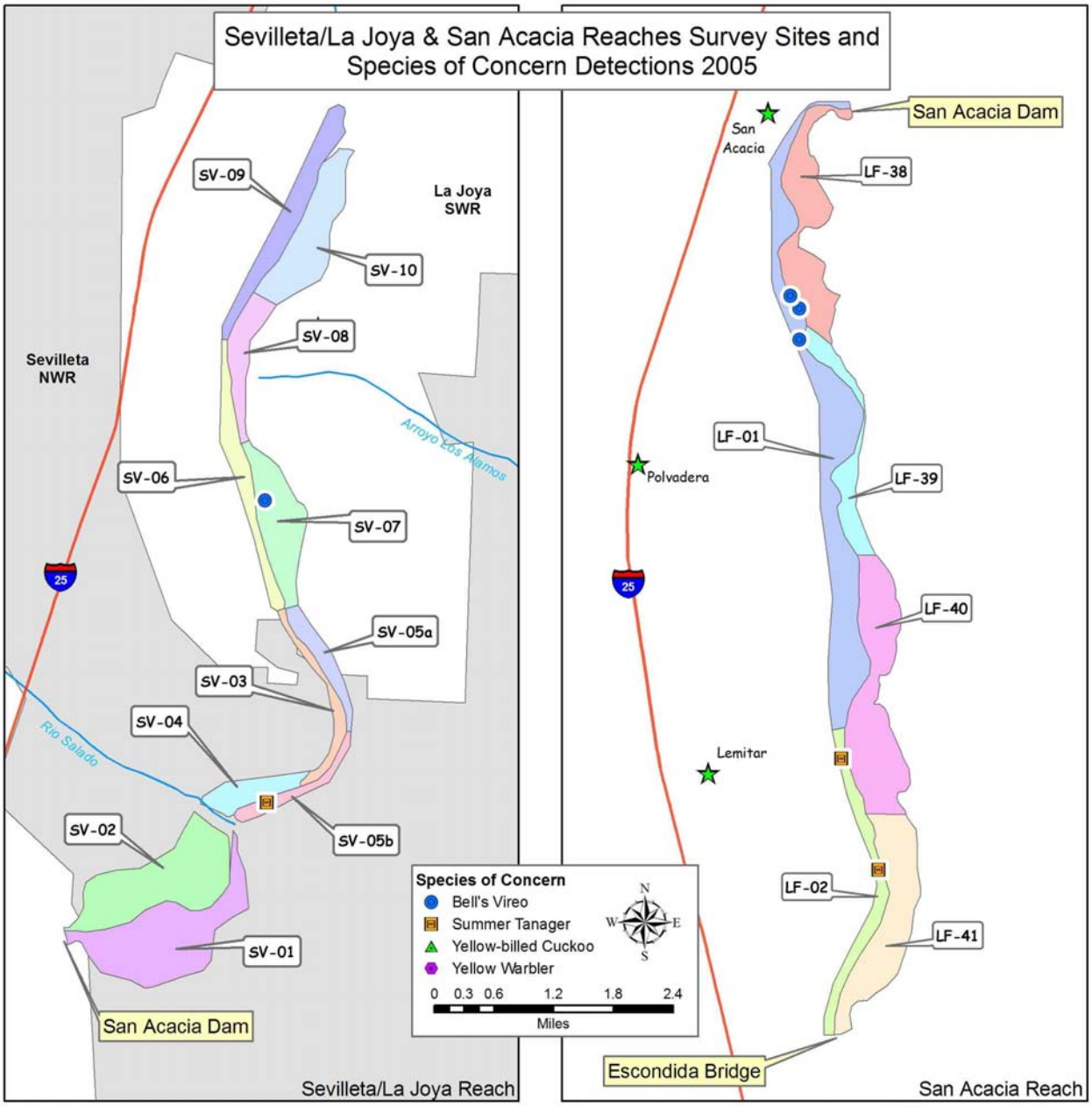

Figure 13. Species of concern occurrences – Sevilleta/La Joya and San Acacia reaches – 2005.

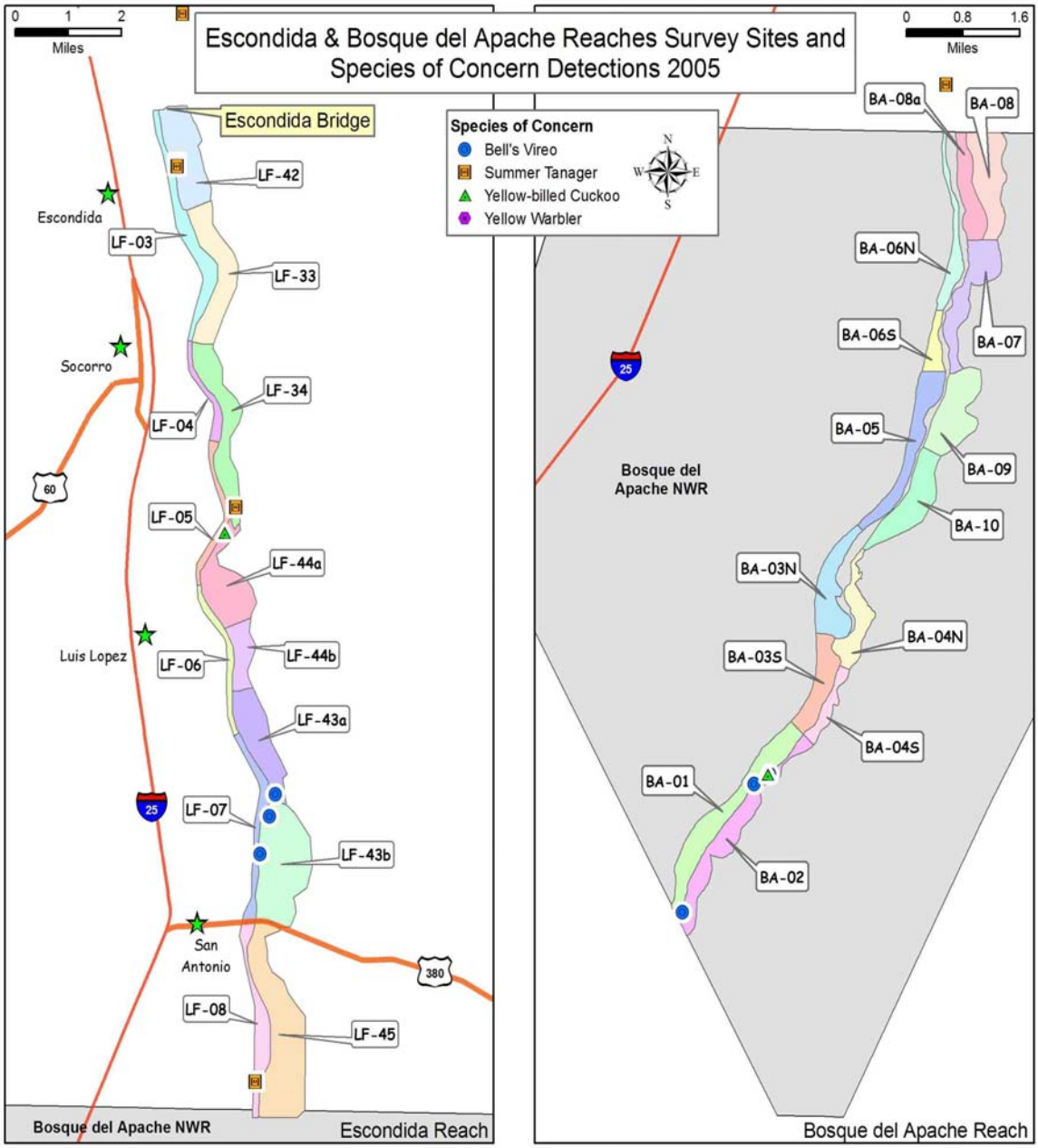

Figure 14. Species of concern occurrences – Escondida and Bosque del Apache reaches – 2005.

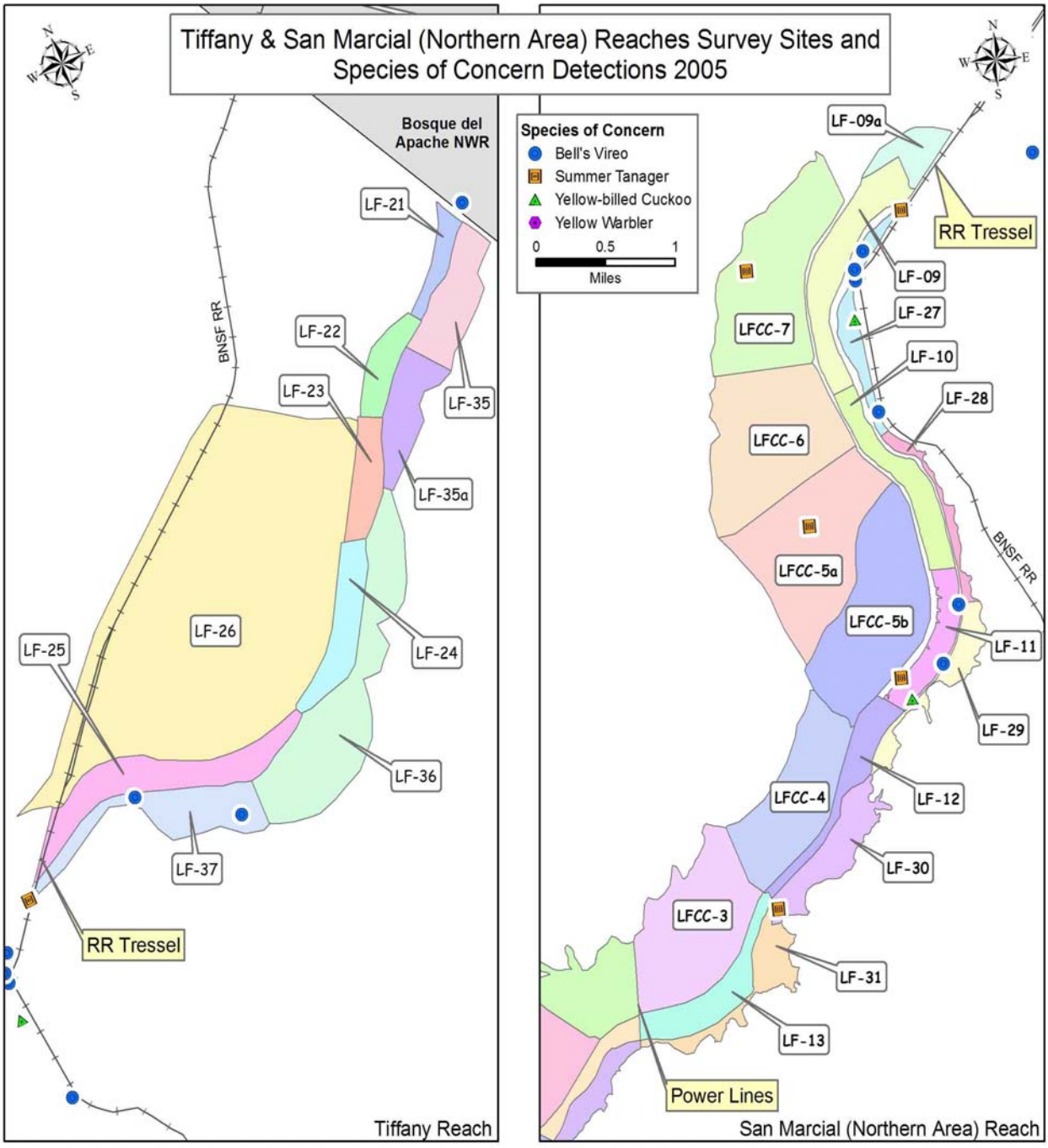

Figure 15. Species of concern occurrences – Tiffany and northern San Marcial reaches – 2005.

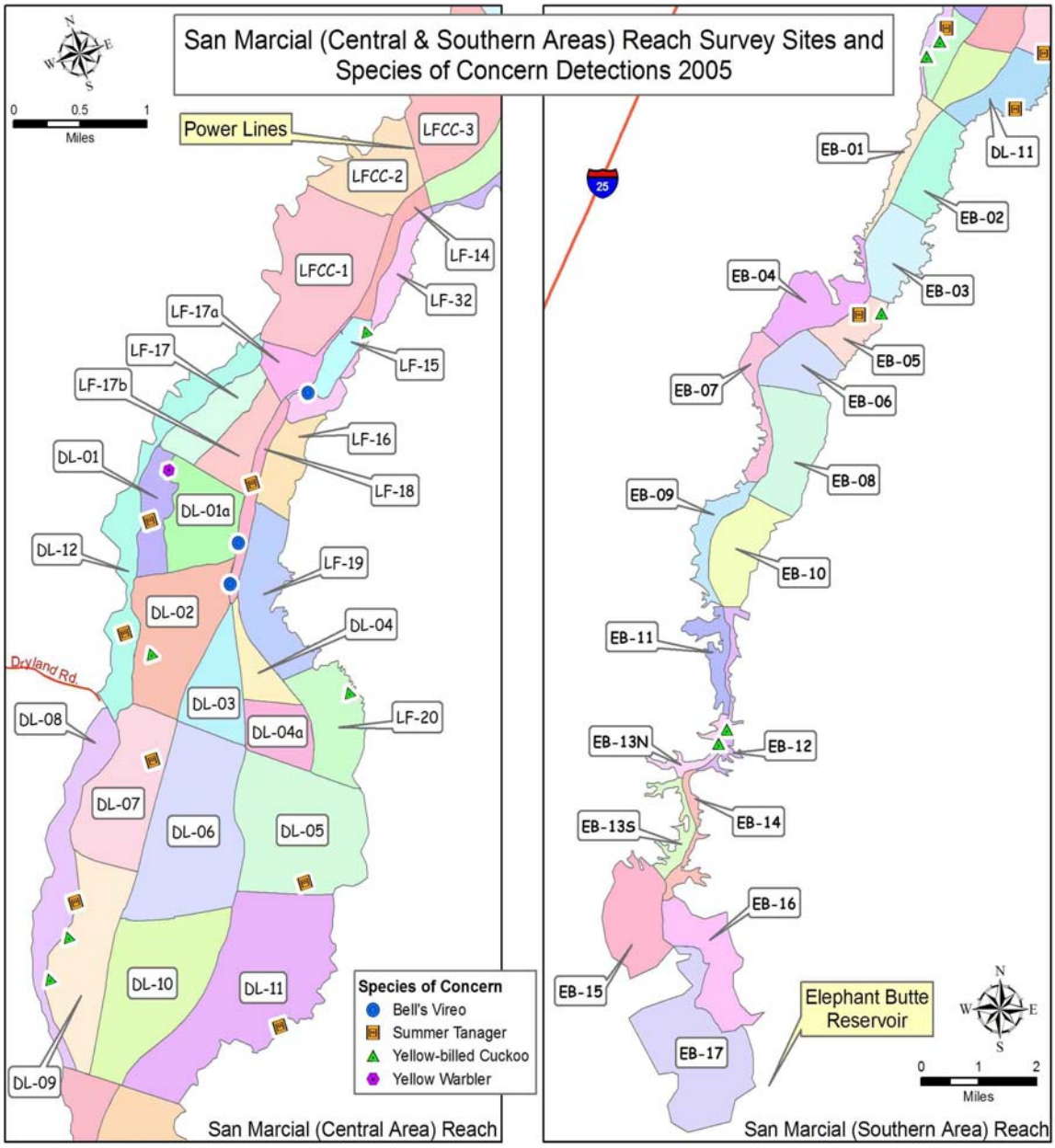

Figure 16. Species of concern occurrences – remainder of San Marcial reach – 2005.

The following is a reach-by-reach and site-by-site summary of the SWFL nest monitoring efforts of 2005:

Belen reach

2005 is the first year that breeding SWFLs were discovered in the Belen reach. One pair in this reach produced two nests in site **SV-11**. One nest successfully fledged two SWFLs and the other was parasitized and abandoned.

Sevilleta/La Joya reach

SWFLs were first discovered in this reach during the 1999 SWFL breeding season. Unlike the native plant-dominated habitats which supported most other SWFL territories in the Middle Rio Grande, this reach is dominated by exotic species (saltcedar and Russian olive). Territory numbers in this reach have remained steady for the past three years; 17, 19 and 17 in 2003, 2004, and 2005, respectively. However, pairs declined from 18 to10 and nests from 21 to 10 between 2004 and 2005. The cause of the increase in lone male territories is unknown. Of the 10 nests discovered, 1 was a re-nest. One nest was successful, three failed, and the outcome of six was unknown. At least three young are believed to have successfully fledged from these nests. No nests were known to be parasitized. See Appendix B for detailed nest site and nest monitoring data forms.

The following is a site-by-site breakdown of all SWFL nesting in this reach during 2005:

SV-03 - Six pairs produced six nests during the 2005 breeding season. One nest was abandoned and the fates of the other five were unknown. SWFLs in this site often nest at heights greater than five meters making nest monitoring without excessive disturbance difficult. No nests were known to be parasitized and it is unknown if any young fledged from this site.

SV-09 – Three pairs produced four nests in this site during the 2005 breeding season, including one re-nest. One of the nests was successful, two failed, and the fate of one was unknown. One nest failed due to abandonment and the other was predated. None of the nests were parasitized, and three young fledged from the one successful nest.

Tiffany reach

This reach experience the largest decline in territories and nests of any Reclamation-surveyed reach in the Middle Rio Grande. 16 territories, including 13 pairs, produced 11 nests in 2004. In 2005, two SWFL pairs produced four nests in this reach, including one re-nest and one second brood. The cause of this dramatic decline is unknown. Habitat had not changed significantly from 2004. Of the four nests produced in this reach in 2005, two were successful and two failed; one due to abandonment and one due to predation. None of the nests in this reach were parasitized. Three fledglings were assumed to have fledged from this reach. See Appendix B for detailed nest site and nest monitoring data forms.

LF-35 – The one pair in this site produced one nest which successfully fledged two SWFL young. It was not parasitized.

LF-37 – One pair in this site produced three nests, reduced from seven pairs and five nests in 2004. One of the nests was successful and the other two failed; one due to predation and one due to abandonment. Neither nest was parasitized and one SWFL nestling fledged from the successful nest.

San Marcial reach

A total of 77 pairs and 127 nests (including 27 re-nests and 25 second, third, or fourth broods) were documented in this reach in 2005. All occurred within the Elephant Butte Reservoir conservation pool. This represents a decline from 92 pairs and 153 nests documented in 2004. In 2005, 75 pairs were confirmed by the presence of nesting activity, the other 2 did not construct nests or nests were not found. Fledging of SWFL young occurred in 68 of the 127 nests, 37 were predated, 7 were abandoned, 8 failed directly due to parasitism, and the fates of 7 were unknown. The 77 SWFL pairs in this reach produced at least 197 fledglings.

This reach contained 16 parasitized nests; 8 failed directly due to BHCO parasitism, 5 were subsequently predated, and 3 successfully fledged young WIFLs. Eight of the parasitized nests were accessible enough and timed right to mandate addling; five failed directly due to BHCO parasitism, two were subsequently predated, and one fledged. The following is a site-by-site breakdown of nest monitoring efforts for each of the survey sites inhabited by nesting SWFLs in the San Marcial reach during the 2005 SWFL breeding season. See Appendix B for detailed nest site and nest monitoring data forms and Table 5 for a history of the SWFL nest monitoring done in the San Marcial reach since 1994.

DL-01 – This site experienced a decline from 27 pairs and 47 nests in 2004 to 15 nesting pairs that produced 24 nests, including 2 re-nests and 9 second broods, in 2005. Fifteen nests were determined to be successful, 7 failed, and fates of 2 were unknown; 6 were predated and 1 was abandoned. No nests were parasitized. At least 48 SWFLs were assumed to have fledged from this site.

DL-02 – Eleven pairs were documented by confirmed nesting in this site. These pairs produced 19 nests, including 7 re-nests and 1 second brood. Eight nests successfully fledged young, 7 were predated, 3 were parasitized and subsequently abandoned, and the fate of 1 was unknown. Four nests were parasitized. Of these, two were manipulated after parasitism (one predated and one abandoned) and the other two were both predated. Twenty four SWFLs were assumed to have fledged from this site.

DL-03 – Six pairs were documented in this site by confirmed nesting. Ten nesting attempts, including 2 re-nests and 2 second broods, were monitored. Of these, five were successful, four were predated, and the fate of one was unknown. One nest was parasitized, the eggs hatched, and the nest was subsequently predated. Fifteen SWFLs fledged from this site.

DL-04 – This site contained 10 nesting pairs that produced 14 nests, including 3 re- nests and 1 second brood. Seven of the nests were successful, six failed, and the fate of one was unknown. Of those that failed, five were predated and one was abandoned. No nests within this site were parasitized and 19 SWFLs fledged from this site.

Table 5. Summary of SWFL nest monitoring (1994-2005) - downstream of railroad bridge to Elephant Butte Reservoir delta

Year	# Territories	# Pairs	# Nests found	# Nests parasitized (%)	# Nests predated (%)	# Nests abandoned (%)	Unknown success	# Successful nests (%)	Estimated total # chicks fledged	Estimated productivity (# chicks per successful nest)
1994	0	0	0	---	---	---	---	---	0	---
1995	3	0	0	---	---	---	---	---	0	---
1996	13	1	1	0	0	1 (100%)	---	0	0	---
1997	10	3	2	0	0	0	0	2 (100%)	4	2.0
1998	11	4	2	0	0	0	0	2 (100%)	7	3.5
1999	12	5	5	1 (20%)*	1 (20%)*	1 (20%)*	0	4 (80%)	10	2.5
2000	23	20	19	2 (12%)*	1 (6%)	2 (12%)*	2	14 (82%)	29	2.1
2001	25	25	36**	0	7 (19%)	2 (6%)	0	27 (75%)	79	2.9
2002	60	50	66**	11 (17%)*	19 (29%)*	6 (9%)*	0	36 (55%)	≥86	2.4
2003	82	67	96**	17 (18%)*	31 (33%)*	13 (14%)*	3	48 (52%)	≥126	2.6
2004	113	92	153**	25 (17%)*	48 (32%)*	15 (10%)*	4	71 (48%)	187	2.6
2005	107	77	127**	16 (13%)*	37 (31%)*	7 (6%)*	7	68 (57%)	≥197	2.9

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

DL-07 – Seven pairs in this site produced 13 nests (5 re-nests and 1 second brood). Six nests successfully fledged young, four were parasitized and abandoned, two were predated, and the fate of one was unknown. Five nests in total were parasitized. Cowbird eggs were manipulated in three nests; all of which were abandoned. The other two parasitized nests failed (one due to predation and the other abandonment) and a total of four SWFLs fledged from this site.

DL-08 – One pair in this site produced one nest which was predated.

DL-09 – One pair in this site produced an initial nest and a re-nest. It is suspected that defoliation in this site from an outbreak of Cottonwood Leaf Beetles caused the reduction from three nesting pairs in 2004. In 2005, the initial nest was predated and the re-nest successfully fledged three SWFLs. Neither nest was parasitized.

LF-17 – This site contained 24 nests from 16 SWFL pairs, including 2 re-nests and 6 second broods. Fifteen nests were assumed to have successfully fledged SWFL young, 3 were predated, 4 were abandoned, 1 failed directly due to BHCO parasitism, and the fate of 1 was unknown. Five nests were parasitized in this site; two were manipulated and three were not. Of the two that were manipulated, one fledged SWFL young, and the other was abandoned. Of the three non-manipulated

nests, two were assumed to have fledged SWFL young, and the third was abandoned. A total of 39 SWFLs were assumed to have fledged from this site in 2005.

LF-17a – Ten pairs in this site produced 20 nests (5 re-nests and 5 second broods). Of these, 11 were successful, 8 were predated, and 1 was abandoned. No nests were parasitized and 31 SWFLs were assumed to have fledged from this site.

Discussion

Presence/Absence Surveys

Velarde reach

WIFL territories in this survey reach have declined from a high of six in 1995 to one or less between 2002 and 2005 (Table 6). This decline, in combination with the fact that habitat quality in this reach has not declined greatly during this period, suggests that the amount of available breeding habitat in this reach may be insufficient to support a viable SWFL population. It is likely that limiting factors such as predation and brood parasitism are acting in concert with the limited amount of available habitat to produce a local population that is unable to sustain itself. This local population is likely to fluctuate depending on local habitat conditions and reproductive success of nearby populations such as on the San Juan Pueblo. Current trends seem to indicate that this population has become unsustainable.

Belen reach

Suitable SWFL habitat within this reach is limited. The majority of habitat in this site consists of sparse, decadent saltcedar and Russian olive. Cottonwoods and grassy meadows are also interspersed throughout this reach. There are occasional stands of native willows adjacent to the river, which is where the SWFLs that occupy this site were documented in 2005. This reach also receives very little overbank flooding. Monitoring of this reach in the next few years will determine if this localized SWFL population persists.

Sevilleta/La Joya reach

SWFLs in the Sevilleta/La Joya reach were first documented in 1999, and territory numbers have steadily increased since then. As can be seen in Table 6, territory numbers remained steady in 2005 compared to previous years. Seven of these territories were single males and pair numbers declined sharply during the 2005 season from 18 in 2004 to 10 in 2005. This lack of female SWFLs occurred in other reaches surveyed by Reclamation in 2005 and, on a larger scale, throughout much of the Southwestern United States (T. Olson, pers. comm.). It appears that a portion of the female population of SWFLs was removed from the overall population during the previous year and/or there were unpaired females that went undetected. This may have been due to a stochastic weather event or loss of habitat during fall or spring migration or on the wintering grounds. The increased stress of breeding, in

Table 6. Reach-by-reach summary of SWFL territories/pairs in lands within the active flood plain of the Rio Grande surveyed by Reclamation between 1995 and 2005

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Velarde	6 T 1 P	4 T 0 P	5 T 5 P	2 T 2 P	2 T 1 P	2 T 2 P	1 T 1 P	0	n/s	1 T 0 P	0
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
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
San Acacia	n/s	0	0	0	0	0	0	0	0	0	0
Escondida	n/s	n/s	0	0	0	0	0	4 T 0 P	0	0	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
Tiffany[1]	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
San Marcial[2]	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
Total	20 T 8 P	21 T 3 P	15 T 9 P	14 T 6 P	18 T 10 P	33 T 27 P	37 T 36 P	87 T 64 P	113 T 83 P	150 T 124 P	131 T 90 P

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

(1) Survey results from 1995 and 1996 in the Tiffany reach are a combination of Reclamation and NMNHP surveys. The Tiffany reach, with the exception of sites LF-21 and LF-22 (surveyed in 2002 and 2003), was not surveyed during the years 1997-2003.

(2) The San Marcial reach includes all sites below the railroad bridge including the active flood plain and sites LFCC-1 through LFCC-7, outside the active flood plain.

combination with fall migration and extreme weather, may have been more than some female SWFLs could endure. Possibly conditions on the wintering grounds have deteriorated and can only support a certain number of SWFLs. Obviously, it is difficult to determine what caused the decline in females.

Habitat within this reach, particularly within site SV-03 where the bulk of the territories occur, has not changed significantly over the past 5 years. The fact that territory numbers keep growing slowly would seem to indicate that recruitment or immigration, not habitat, limits the productivity of this reach. There is still ample suitable habitat within this reach for additional SWFLs to occupy, and it is expected that SWFLs in this reach will continue to increase in number until the habitat is no longer suitable, available, or some other limiting factor impacts the population.

Population expansion within this reach is also of significant interest due to the type of habitat present. Mature saltcedar and Russian olive dominate the majority of sites in this reach, particularly site SV-03. Overbank flooding is very rare, especially in times of drought. However, the proximity to water, density, and vertical stratification of vegetation, and scattered patches of native vegetation seem to make certain sites—SV-03 and SV-09 in particular—attractive to breeding SWFLs.

San Acacia reach

Habitat in this reach is dominated by dry, decadent exotic vegetation in the form of saltcedar and Russian olive with an occasional cottonwood overstory. Quality SWFL habitat within this reach is very limited and composed of small patches of native vegetation along the river channel. This reach

did get limited overbank flooding during the summer of 2005, which is rare for this reach. This should benefit the habitat in certain areas. However, no nesting SWFLs have been documented in this reach in the 8 years Reclamation has been surveying it.

Escondida reach

Habitat in this reach is very similar to that in the San Acacia reach. Most of it is sparse exotic vegetation in the form of saltcedar and Russian olive with an occasional overstory of cottonwood. Some quality habitat exists or is forming adjacent to the river and on recently formed riverbars. However, this reach of the river seldom receives any overbank flooding and the water table has lowered in recent years so the patches of native vegetation are drying out and dying off. Resident SWFLs were documented in this reach for the first time in 2002. Four territories were located early in the survey season. Because of the date of their discovery, these birds were treated as residents. Birds documented between June 10 and July 21 are typically considered resident SWFLs. However, considering the habitat they were documented in and the fact that they were only documented once early in the season, it is likely that they were late migrants. In 2005, no WIFLs were documented in this reach. Based on habitat and hydrology, it is unlikely that SWFLs will occupy this reach in the near future.

Bosque del Apache reach

The active flood plain within the Bosque del Apache NWR was surveyed in its entirety in 2005. Two WIFLs were documented, both of which were determined to be migrants. This is the first year since 2001 that resident SWFLs were not documented within the active flood plain in this reach (Table 6). However, SWFLs documented in 2002, 2003, and 2004 occurred in different sites each year. This is evidence that the population within the refuge is not becoming established and that suitable breeding habitat is limited.

Tiffany reach

In 2004 a comprehensive survey of this reach was conducted for the first time since 1996. The entire reach was surveyed again in 2005 and territories decreased from 16 to 3 (Table 6). It is unclear why this reach experienced such a large decrease in territories. Habitat within the reach has not changed significantly. The habitat within this site is not of the highest quality and it is possible that returning SWFLs chose to occupy higher quality habitat elsewhere. If SWFL numbers in this reach continue to decrease, SWFLs will soon be absent from the Tiffany reach.

San Marcial reach

SWFL surveys have been conducted in this reach since 1994. Table 6 illustrates a summary of SWFL detections within the San Marcial reach from 1994 through 2005. Since 1995, SWFL territories and available habitat below the railroad bridge have increased greatly. During the 2000 season, a concentration of breeding SWFLs developed within the LF-17 and LF-17a sites. This increase in SWFL population in the "core" areas is likely a result of a consistent water supply provided by the LFCC outfall and the emergence of maturing native vegetation within the receding headwater area of Elephant Butte Reservoir, contributing to high levels of reproductive recruitment in the population. As the reservoir continued to recede during the following years and native vegetation became established, the population of SWFLs expanded in number and extent to inhabit suitable habitat from LF-17a and LF-17 downstream to DL-07 and DL-09. This expansion was facilitated by a number of factors including an increase in available nesting habitat, high survival

rates experience by both adults and fledglings, and consistently high rates of pair nesting success. Based on the amount of habitat present, the population has not expanded to the degree expected, which implies that quality habitat is not limiting the local population's growth.

In the future, as the dynamics of the reservoir cause water levels to rise and fall, it is likely that breeding habitat will continue 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 population should persist and be a valuable source population for the surrounding areas.

Nest Searches/Monitoring

Belen reach

SWFL nesting was first documented in this reach in 2005. One pair (the only pair documented in the reach) produced two nests. It will be interesting to see if site fidelity in this pair and their offspring as well as immigrating individuals from other source populations will be sufficient to maintain or enlarge this local population.

Sevilleta/La Joya reach

In 2005, the Sevilleta/La Joya reach experienced a large decrease in SWFL nesting for the first time since SWFLs were discovered in this reach in 1999 (Table 7). This is due to a decrease in the number of pairs in this reach. As mentioned above, it is unknown why males outnumbered females to such a great degree, but this phenomenon was documented throughout the Middle Rio Grande. Aside from the abundance of single male territories, there are several variables that could be explored within this reach including average nesting height and BHCO parasitism.

Nesting SWFLs in this reach have a propensity for nesting higher in the substrate than the San Marcial population of SWFLs. This makes locating nests and monitoring them much more difficult and is the reason for the high percentage of unknown fates among nests in this reach. It is unknown why SWFLs in this reach nest so high in the substrate.

One possible explanation for the greater nest height in this reach is predator avoidance. With the lack of surface water in this site, it is possible that the birds sense a greater potential for predation from terrestrial animals such as snakes and raccoons, and nesting higher keeps them farther from this threat. Another possible reason SWFLs nest higher in this reach than in San Marcial is that the predominately exotic vegetation in this reach provides different structure, and SWFLs would nest higher in native vegetation if nest sites were available. Determining why SWFLs are nesting higher in this reach would take extensive study, and it is unlikely that knowing why SWFLs are nesting higher in this reach would justify the time and expense needed to explore this issue.

Table 7. Reach-by-reach summary of SWFL nests in lands surveyed by Reclamation between 1995 and 2005

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Belen	n/s	n/s	n/s	n/s	n/s	n/s	n/s	0	n/s	0	2
Sevilleta/ La Joya	n/s	n/s	n/s	n/s	3	6	9	13	12	21	10
Bosque del Apache	n/s	n/s	n/s	0	0	0	0	0	1	2	0
Tiffany[(1)]	6	0	n/s	n/s	n/s	n/s	n/s	1	2	11	4
San Marcial	0	1	2	2	5	19	36	66	96	153	127
Total	6	1	2	2	8	25	45	80	111	187	143

n/s = not surveyed

(1) Nest monitoring results from 1995 and 1996 in the Tiffany reach are from the NMNHP (1995). The Tiffany reach, with the exception of sites LF-21 and LF-22 (surveyed in 2002 and 2003), was not surveyed during the years 1997-2003.

Another variable that could cause concern for the continued productivity of this population is the apparently higher level of BHCO parasitism experienced by SWFLs nesting in this reach. Over the past 2 years, 6 nests (30 percent of known outcomes, n = 20) were parasitized as compared to 42 in the San Marcial reach (15 percent, n = 280). This difference is likely due to habitat differences and the greater density of BHCOs in the Sevilleta/La Joya reach (Moore and Ahlers 2003).

Tiffany reach

In 2004, this reach produced 11 nests. In 2005, SWFL nesting in this reach declined to only four nests from two pairs. What appeared to be a fairly stable local population in 2004, is now two isolated pairs and a single male territory. The reason for this decline is unknown. Nest success in 2004 was relatively high (67 percent) and this reach fledged 14 SWFL young. If only one-third of the fledglings and half of the adults returned to this reach in 2005, there would have been approximately 19 adult SWFLs returning. Obviously, there were other factors limiting the number of SWFLs inhabiting this reach in 2005. Possibly the SWFLs relocated elsewhere or there was an event that removed a significant portion of this local population.

San Marcial reach

During the 2005 survey season, 127 SWFL nests were documented in this reach. This was a slight decline from 2004 (Tables 5 and 7). The reason for this decline is unknown, but similar to other reaches in the Middle Rio Grande and the Southwestern United States, this decline can likely be attributed to natural fluctuations of the population. See Attachment A for graphical representations of SWFL nesting variables and habitat association in Elephant Butte Reservoir.

In 1995, four of six (66 percent) SWFL nests discovered in the riparian area upstream of the railroad bridge had been parasitized by cowbirds (NMNHP 1995). Cowbird control efforts were implemented between 1996 and 2001 and only 3 of 65 nests (5 percent) downstream from the railroad bridge were parasitized. Between 2002 and 2005 no cowbird trapping was done, and the parasitism rate among San Marcial SWFL nests ranged from 14 to 18 percent. These higher numbers seem to indicate that cowbird trapping may be effective at reducing parasitism rates.

However, nest success rates, which are the ultimate indicator of BHCO trapping success, were not affected.

A riparian-obligate nest monitoring study was initiated in 1999 and continued through 2004 to study the effectiveness of BHCO trapping at reducing parasitism rates and increasing nesting success. Statistical analysis indicates that, while during certain years trapping may significantly lower BHCO parasitism rates, there was no statistically significant difference in nesting success rates between trapped and untrapped locations. With many variables involved, including hydrology, vegetation characteristics, predator abundance, and the overall dynamism of the Rio Grande floodplain, it is difficult to determine what is responsible for the variation in BHCO parasitism and success rates between years. However, the SWFL recovery plan (USFWS 2002) states that "cowbird control should be considered if parasitism exceeds 20-30% after collection of two or more years of baseline data," so the decision to end the trapping program is justified based on this recommendation.

Overall, during the 1999 to 2005 breeding seasons, 502 SWFL nests have been discovered in this reach, making it one of the most productive SWFL breeding areas in New Mexico and the largest source population in the Middle Rio Grande Basin. This holds special implications for the population as a whole. Responsible nest monitoring of this population needs to be continued to detect any significant increases in nest failure, cowbird parasitism, or any other variable detrimental to the survival of this population. Continued efforts should also be made to minimize disturbance both at occupied survey sites and individual nest sites.

Middle Rio Grande as a whole

Over the past 7 years, a total of 597 SWFL nests have been monitored along the Middle Rio Grande. Table 8 and the Attachment provide details of habitat comparisons for SWFLs nesting along the Middle Rio Grande between 1999 and 2005. Statistical comparisons between categories were made using Chi-square tests. The following comparisons were considered: nesting success vs. nest substrate and dominant territory vegetation, BHCO parasitism vs. nest substrate and dominant territory vegetation, and BHCO parasitism vs. survey reach. Between 1999 and 2005, 45 nests (7.5 percent) were in saltcedar-dominated territories, 487 (81.6 percent) were in *Salix*-dominated territories, and 65 (10.9 percent) were in mixed-dominance territories. Saltcedar- and *Salix*-dominated territories are defined as >90 percent saltcedar or *Salix*, respectively. Mixed-dominance occurs when a dominant vegetation type is not obvious. In considering nest success for these situations, SWFL nests in *Salix*-dominated (55.1 percent, n = 472) areas were no more successful than those placed in saltcedar-dominated (57.6 percent, n = 33) or mixed-dominance areas (50.0 percent, n = 60) ($\chi^2 = 0.67$, df = 2, $P = 0.71$). Tables 9 and 10 provide details of all statistical tests.

Parasitism rates between different habitat types were compared using a Chi-square test including all three types of dominant vegetation (saltcedar, *Salix*, and mixed). No statistically significant difference ($\alpha = 0.05$) was detected between the three vegetation types ($\chi^2 = 5.27$, df = 2, $P = 0.07$).

Productivity of nests, defined as number of birds fledged per successful nest, in *Salix*-dominated habitats was slightly greater (2.67 fledged birds/nest, n = 260) than nests located in both mixed-dominance territories (2.16 fledged birds/nest, n = 30) and saltcedar-dominated habitats (2.4 fledged

Table 8. Habitat comparison of SWFL nesting within the Middle Rio Grande – 1999 to 2005

Territory Vegetation Type		
Number of nests in exotic dominated territories	45	7.5% of total
Number of nests in *Salix* sp. dominated territories	487	81.6% of total
Number of nests in mixed dominance territories	65	10.9% of total
Nest Substrate Species		
Number of nests in *Salix* sp. substrate	351	58.8% of total
Number of nests in saltcedar substrate	221	37.0% of total
Number of nests in Russian olive substrate	23	3.9% of total
Number of nests in other (*Baccharis* sp.) substrate	2	0.3% of total
Nest Substrate/Territory Vegetation Combination		
Number of nests in saltcedar substrate within *Salix* sp. dominated territories	149	(29.8% of 487 nests)
Number of nests in *Salix* sp. substrate within saltcedar or mixed dominated territories	9	(8.2% of 110 nests)
Nest Success Per Nest Substrate Species		
Percentage of successful nests in *Salix* sp. substrate	55.5%	(188 out of 339 nests)
Percentage of successful nests in saltcedar substrate	53.4%	(109 out of 204 nests)
Percentage of successful nests in Russian olive substrate.	70.0%	(14 out of 20 nests)
Percentage of successful nests in other (*Baccharis* sp.) substrate	50.0%	(1 out of 2 nests)
Nest Success Per Territory Vegetation Type		
Percentage of successful nests in *Salix* sp. dominated territories	55.1%	(260 out of 472 nests)
Percentage of successful nests in saltcedar dominated territories	57.6%	(19 out of 33 nests)
Percentage of successful nests in mixed dominance territories	50.0%	(30 out of 60 nests)
Cowbird Parasitism Per Nest Substrate Species		
Percentage of nests parasitized in *Salix* sp. substrate	14.5%	(49 out of 339 nests parasitized)
Percentage of nests parasitized in saltcedar substrate	17.0%	(34 out of 200 nests parasitized)
Percentage of nests parasitized in Russian olive substrate	15.0%	(3 out of 20 nests parasitized)
Percentage of nests parasitized in other (*Baccharis* sp.) substrate	50.0%	(1 out of 2 nests parasitized)
Cowbird Parasitism Per Territory Vegetation Type		
Percentage of nests parasitized in *Salix* sp. dominated territories	14.0%	(66 out of 472 nests)
Percentage of nests parasitized in saltcedar dominated territories	27.3%	(9 out of 33 nests)
Percentage of nests parasitized in mixed dominance territories	20.0%	(12 out of 60 nests)
Productivity[(1)] Per Territory Vegetation Type		
Productivity of nests (n=260) found in *Salix* sp. dominated territories	2.67/nest	(692 young from 260 nests)
Productivity of nests (n=19) found in saltcedar dominated territories	2.16/nest	(41 young from 19 nests)
Productivity of nests (n=30) found in mixed dominance territories	2.40/nest	(72 young from 30 nests)
Productivity[(1)] Per Nest Substrate Species		
Productivity of nests (n=188) found in *Salix* sp. substrate	2.66/nest	(500 young from 188 nests)
Productivity of nests (n=109) found in saltcedar substrate	2.46/nest	(268 young from 109 nests)
Productivity of nests (n=14) found in Russian olive substrate	2.14/nest	(30 young from 14 nests)
Productivity of nests (n=1) found in *Baccharis* sp. substrate	3.00/nest	(3 young from 1 nest)
Productivity[(1)] Compared to Nest Substrate Species and Territory Vegetation Type		
Productivity of nests in *Salix* substrate within *Salix* sp. dominated territories	2.65/nest	(491 young from 185 nests)
Productivity of nests in saltcedar substrate within *Salix* sp. dominated territories	2.68/nest	(201 young from 75 nests)
Productivity of nests in saltcedar substrate within saltcedar dominated territories	2.40/nest	(41 young from 19 nests)
Total SWFL nests monitored	597	

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

Table 9. Details of habitat comparison statistical tests performed on nest habitat data from 1999 – 2005 – Middle Rio Grande

Chi-square Tests (α = 0.05)			
Comparison	χ^2 value	Degrees of freedom	*P*-value
Success and dominant territory vegetation	0.67	2	0.71
Parasitism and dominant territory vegetation	5.27	2	0.07
Success and substrate species	2.04	2	0.36
Parasitism and substrate species	0.63	2	0.73

Data including only known nesting outcomes.
* denotes statistical significance documented

Table 10. Details of parasitism comparisons performed on SWFL nest data from 1999 – 2005 in the Middle Rio Grande

Chi-square Tests with Yates' Correction (α = 0.05)			
Parasitism comparison	χ^2 value	Degrees of freedom	*P*-value
Salix-dominated vs. saltcedar-dominated territories	3.32	1	0.07
Salix-dominated vs. mixed-dominance territories	1.10	1	0.29
Saltcedar-dominated vs. mixed-dominance territories	0.30	1	0.59
Sevilleta/La Joya vs. San Marcial*	5.23	1	0.02

Data including only known nesting outcomes.
* denotes statistical significance documented

birds/nest, n = 19). Based on these data, SWFLs appear to select native-dominated habitat when available, and appear to have more productive nests in native habitat.

Nest substrate is defined as the species of tree where a SWFL nest is physically located. Though 81.6 percent of SWFL nests over the past 7 years were found in *Salix*-dominated areas, 37.0 percent of all nests and 29.8 percent of nests in *Salix*-dominated habitats were physically located in a saltcedar. Nest success is similar in three substrate categories (*Baccharis* was ignored due to its small sample size of 2): 55.5 percent (*Salix*), 53.4 percent (saltcedar), and 70.0 percent (Russian olive). No statistically significant difference was found to exist between any substrate classes (χ^2 = 2.04, df = 2, *P* = 0.36). Additionally, parasitism rates between nests placed in the three different substrates (*Salix* 14.5 percent, saltcedar 17.0 percent, and Russian olive 15.0 percent) were similar (χ^2 = 0.63, df = 2, *P* = 0.73). Productivity of SWFL nests in *Salix* (2.66 fledged birds/nest, n = 188) and saltcedar (2.46 fledged birds/nest, n = 109) substrates was slightly greater than those located in Russian olive substrate (2.14 fledged birds/nest, n = 14).

When comparing 7 years of nesting data from the two primary nesting reaches within the Middle Rio Grande, another factor becomes apparent. The rate of parasitism within the Sevilleta/La Joya reach (26.2 percent, n = 61) appears to be greater than that experienced by nesting SWFLs within the San Marcial reach (14.1 percent, n = 483). Parasitism data from the three nesting reaches (Sevilleta/La Joya, Tiffany, and San Marcial) were compared and a significant difference was found ($\chi^2 = 5.23$, df = 2, $P = 0.04$). When the Tiffany reach was removed from the comparison due to a small sample size, the significant difference in parasitism rates remained between the Sevilleta/La Joya and San Marcial reaches. The reasons for this difference in parasitism rates can likely be explained by habitat. Territories within the Sevilleta/La Joya reach are either saltcedar-dominated or mixed. There are no native-dominated territories within this reach. Conversely, all territories within the San Marcial reach are dominated by native vegetation. Another explanation could be that BHCOs are more abundant in the Sevilleta/La Joya reach than in the San Marcial reach. Point counts have been conducted for the past 7 years in four different study reaches (Sevilleta/La Joya, San Acacia, Bosque del Apache, and San Marcial). Data from 1999 to 2005 showed that the mean number of cowbird detections per point varied annually but averaged 1.75 times greater within the Sevilleta/La Joya reach than within the San Marcial reach (Moore and Ahlers unpub. data). The Sevilleta/La Joya reach supported the greatest density of cowbirds compared to all other monitored reaches within the Middle Rio Grande and this could be responsible for the increased parasitism rate. For an unknown reason, in 2004 the San Marcial reach exhibited a spike in both frequency and mean number of either-sex BHCO detections per point. This sudden jump in BHCO abundance in this reach with parasitism rates still remaining relatively low further promotes the hypothesis that it is habitat, not BHCO abundance, which dictates parasitism levels. However, the spike was short-lived and in 2005 BHCO mean-per-point in the San Marcial reach dropped to third lowest of the four study reaches.

In the 2004 report, attention was given to an apparent trend of decreasing nest success in the Elephant Butte reservoir delta population of SWFLs. The reduction from a high of 91 percent in 2000 to 48 percent in 2004 could be an explanation for the reduction in SWFL territories, particularly breeding pairs, observed in the delta in 2005 (Table 5). However, in 2005, 57 percent of nests in the delta were successful; the highest success rate since 2001. It is likely that this fluctuation is natural, and that this population is not being limited by habitat or human-caused factors. Additionally, when one factors-in multiple broods and looks at individual pair success and pair success over the entire Elephant Butte population, it is easy to see why this population has continued to expand at such a rapid rate. Even with individual nest success rates declining greatly, the SWFLs tendency for multiple broods per season has allowed this population to continue expanding. See Attachment for a graphical representation of individual and pair nest success.

Lastly, in coordination with the USFWS, addling or removal of BHCO eggs from parasitized SWFL nests is a practice that was begun in 2002 and continued through 2005. Of the 79 SWFL nests parasitized during that period with known outcomes, BHCO eggs were addled or removed from 38 nests, 7 of which successfully fledged SWFL young (18.4 percent success). Parasitized nests over the past six seasons in the Middle Rio Grande that were unaltered were just as successful. Of 41 parasitized nests monitored, 32 failed, 8 successfully fledged young, and 1 BHCO egg was built-over by the adult SWFLs and subsequently fledged young—a 22 percent success rate. This is not a statistically significant difference ($\chi^2 = 0.01$, Df = 1, $P = 0.91$) and addling has not been detrimental to parasitized SWFL nests.

Recommendations

Recommendations for future work in the Middle Rio Grande fall under three categories:

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

Annual Surveys

- Presence/absence surveys should continue in the occupied reaches of the Middle Rio Grande, such as the Sevilleta/La Joya and San Marcial reaches, to monitor the status of the SWFL population. These surveys will provide data regarding population trends and colonization of new sites adjacent to occupied sites.
- Presence/absence surveys should also continue in project-related areas where ESA compliance mandates.
- Nest monitoring should continue in areas where pairing activity is documented. These data will provide insight into factors limiting recruitment and population growth such as parasitism and predation rates.
- Addling/removal of BHCO eggs from parasitized SWFL nests should continue, provided it can be done with minimal disturbance to the nest and the adult SWFLs.

Periodic Surveys

- Periodic surveys (every 3 to 5 years by the appropriate land management entity) should be performed in all unoccupied reaches with suitable habitat in the Middle Rio Grande in order to document any 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.
- The value of documenting the occurrence of Neotropical migrants of special concern should be assessed on an annual basis. If this information continues to be of value to resource managers, the occurrence of these species should be documented concurrent with the presence/absence surveys for the SWFL.
- Assess habitat features at nest sites and occupied patches—both at the territory and patch level—to determine components characteristic of SWFL breeding areas where populations are expanding, remaining stable, or becoming extirpated.

Non Survey-related

- The 2005 SWFL Nest Vegetation Quantification Report should be finalized. Recommendations for further field work should be made.

- Nest monitoring technology that allows nests that are higher than 4 or 5 m to be inspected should be researched.
- The SWFL nesting hydrology study initiated in 2004 should be continued.

Conclusions

Presence/absence data will be beneficial when establishing a long-term monitoring plan and will aid in better understanding of the species' distribution, abundance, and potential threats to it. All available data will prove beneficial in the implementation of the Southwestern Willow Flycatcher Recovery Plan. As defined by the Recovery Plan for the Southwestern Willow Flycatcher (USFWS 2002), the Middle Rio Grande Management Unit, a part of the Rio Grande Recovery Unit, extends from just upstream of Cochiti Reservoir to Elephant Butte Dam. The recovery goal for this reach is 100 SWFL territories. SWFL territories peaked during the 2004 survey season with 149 territories documented in the Middle Rio Grande Management Unit. In 2005, 131 territories were recorded, documenting a slight decline. Even without considering the territories occurring on the Pueblo of Isleta (14 documented in 2000; NMNHP 2000), the recovery goal for the Middle Rio Grande Management Unit has been sustained for 3 consecutive years. Additional population growth is still needed in other Management Units for recovery objectives to be met within the Rio Grande Recovery Unit.

Acknowledgments

The authors of this document would like to thank the Albuquerque Area Office of the Bureau of Reclamation, the Middle Rio Grande Endangered Species Act Collaborative Program and Reclamation's Science and Technology Program for generously funding these studies. We also acknowledge Deb Callahan and Vicky Johanson for superior oversight of field crews during the field season. We thank the many field technicians for performing this work meticulously and dutifully. We appreciate the critical reviews and advice of Rob Doster. Last, but not least, we thank Kathleen Baker for her editing expertise and document preparation.

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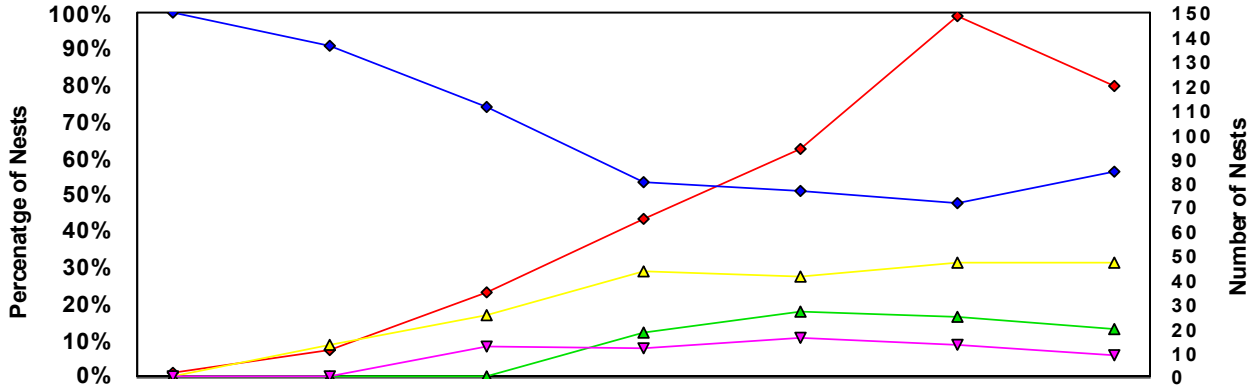
Attachment

Graphical representations of SWFL habitat selection and nesting variables

SWFL Nest Monitoring Data Summary

Elephant Butte Reservoir Pool

Known Nest Outcomes 1999-2005

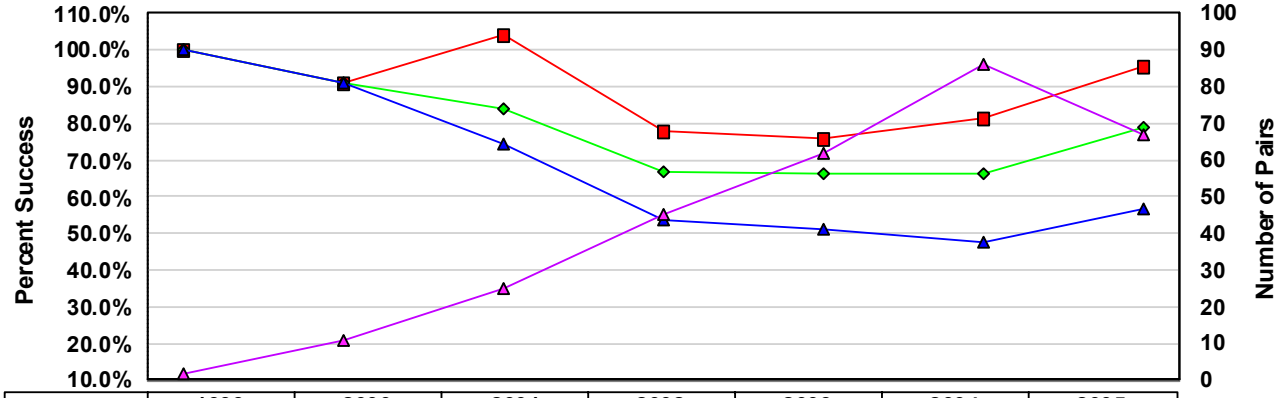


	1999	2000	2001	2002	2003	2004	2005
Year							
Number of Nests	2	11	35	65	94	149	120
Parasitism	0%	0%	0%	12%	18%	17%	13%
Predation	0%	9%	17%	29%	28%	32%	32%
Abandonment	0%	0%	9%	8%	11%	9%	6%
Nest Success	100%	91%	74%	54%	51%	48%	57%

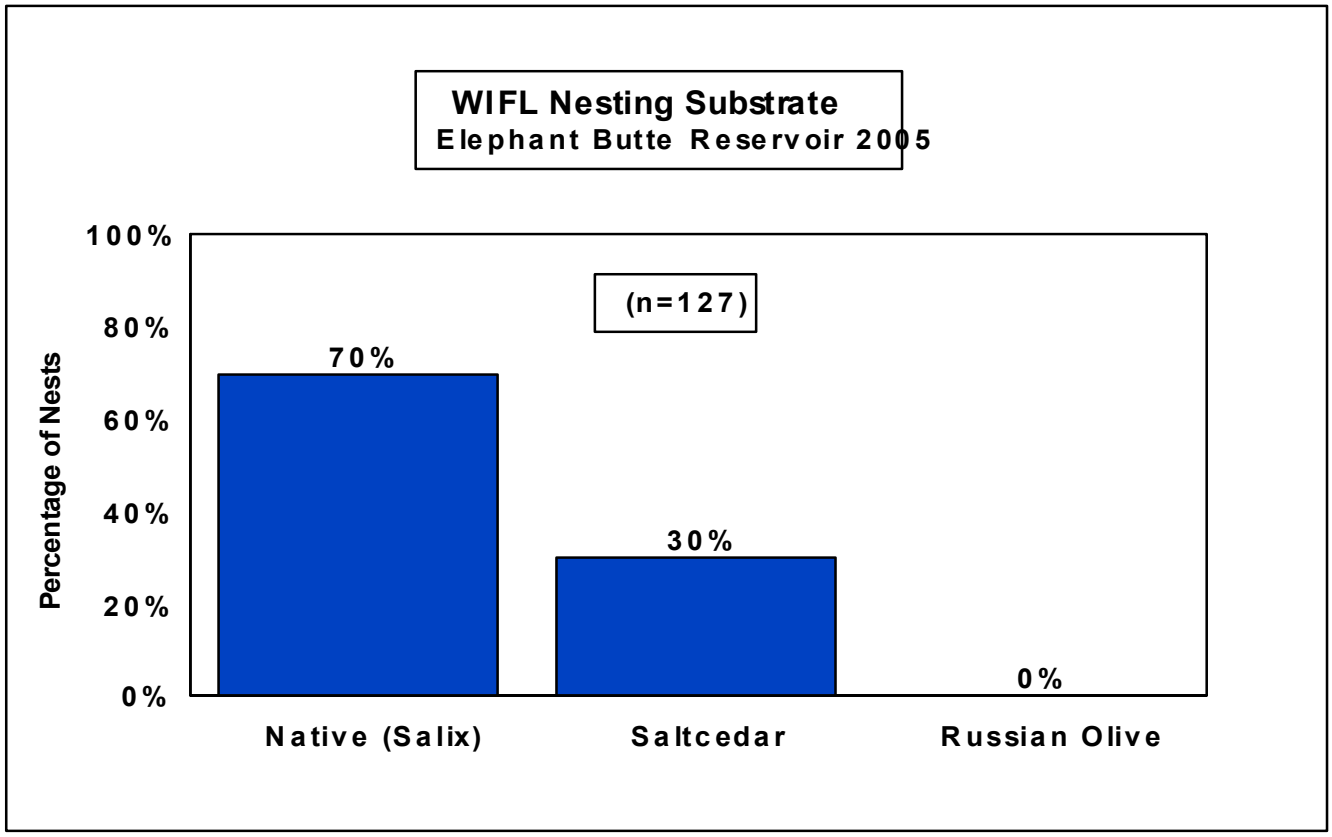
Nest Success vs. Pair Success

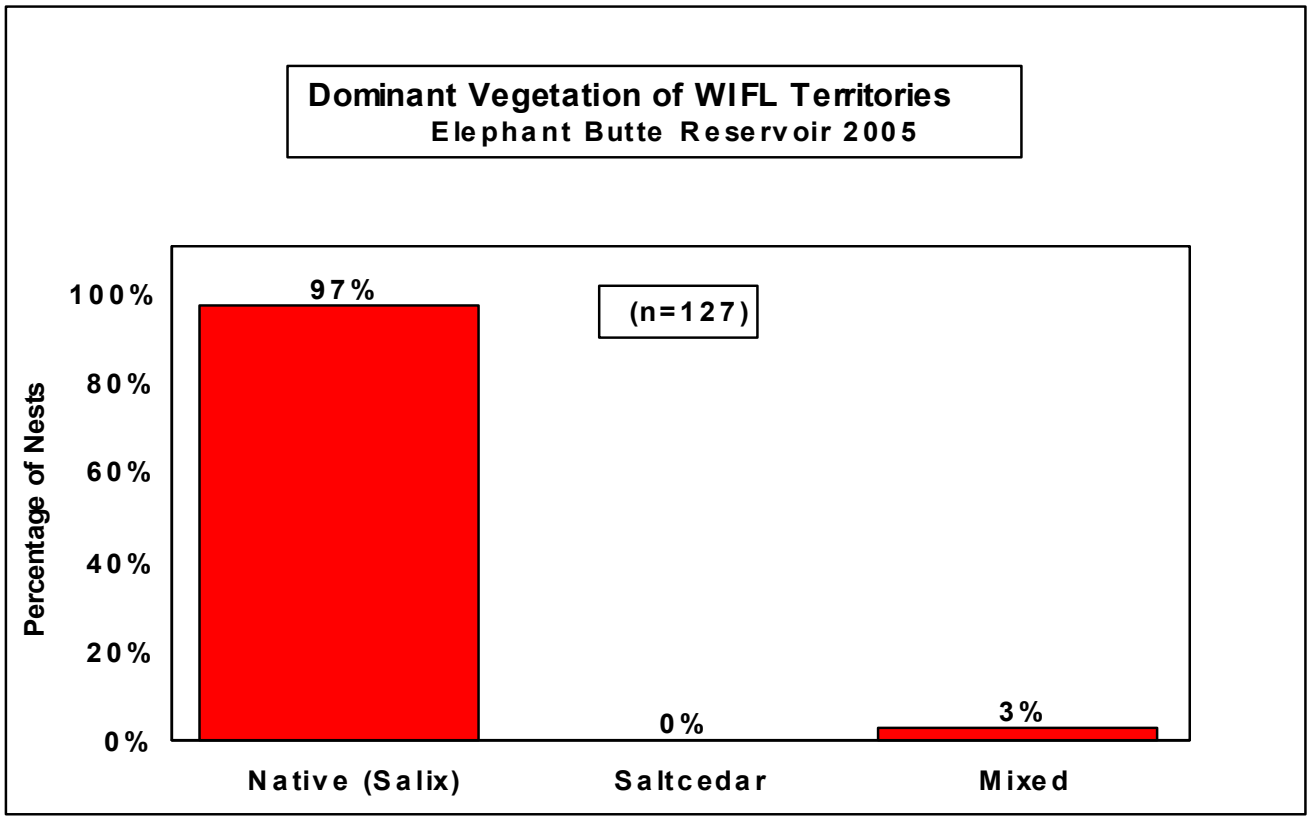
Elephant Butte Reservoir Pool

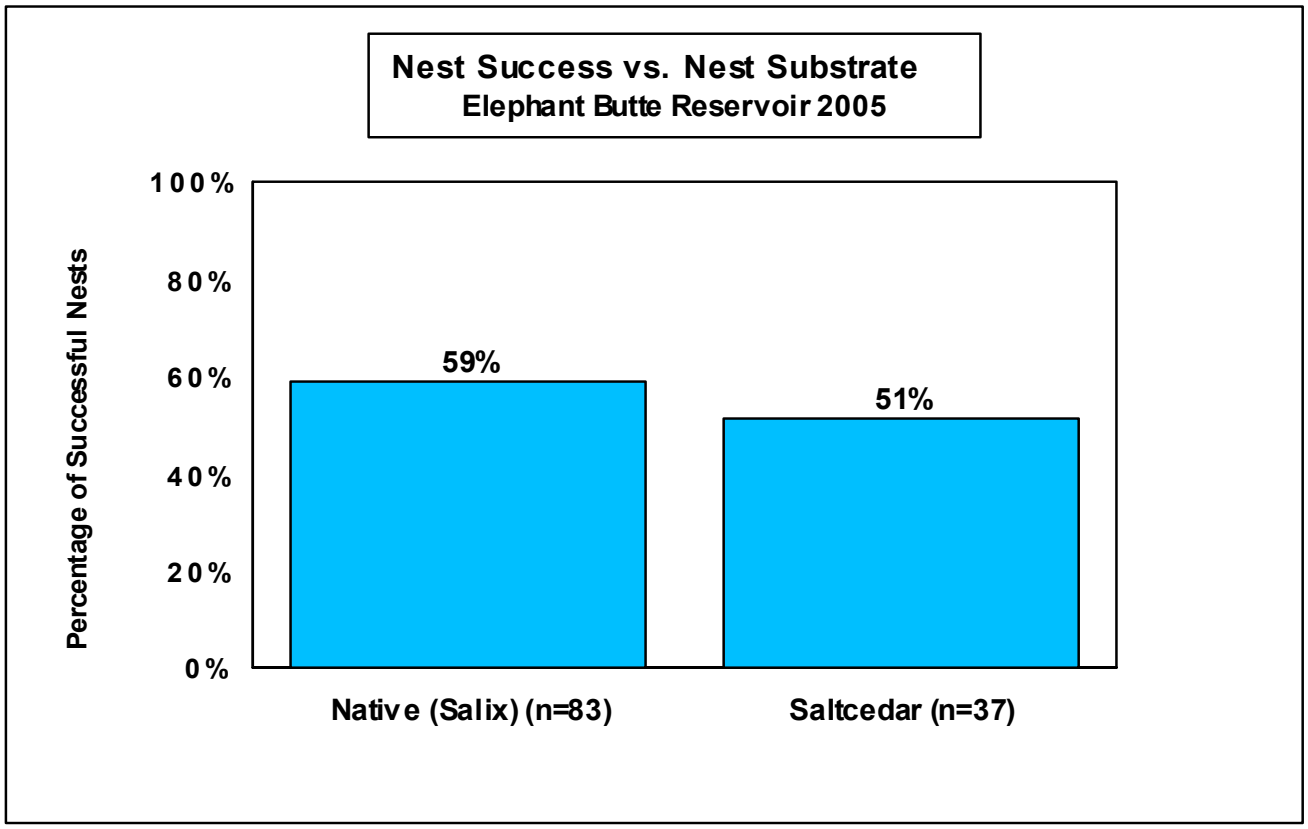
1999-2005

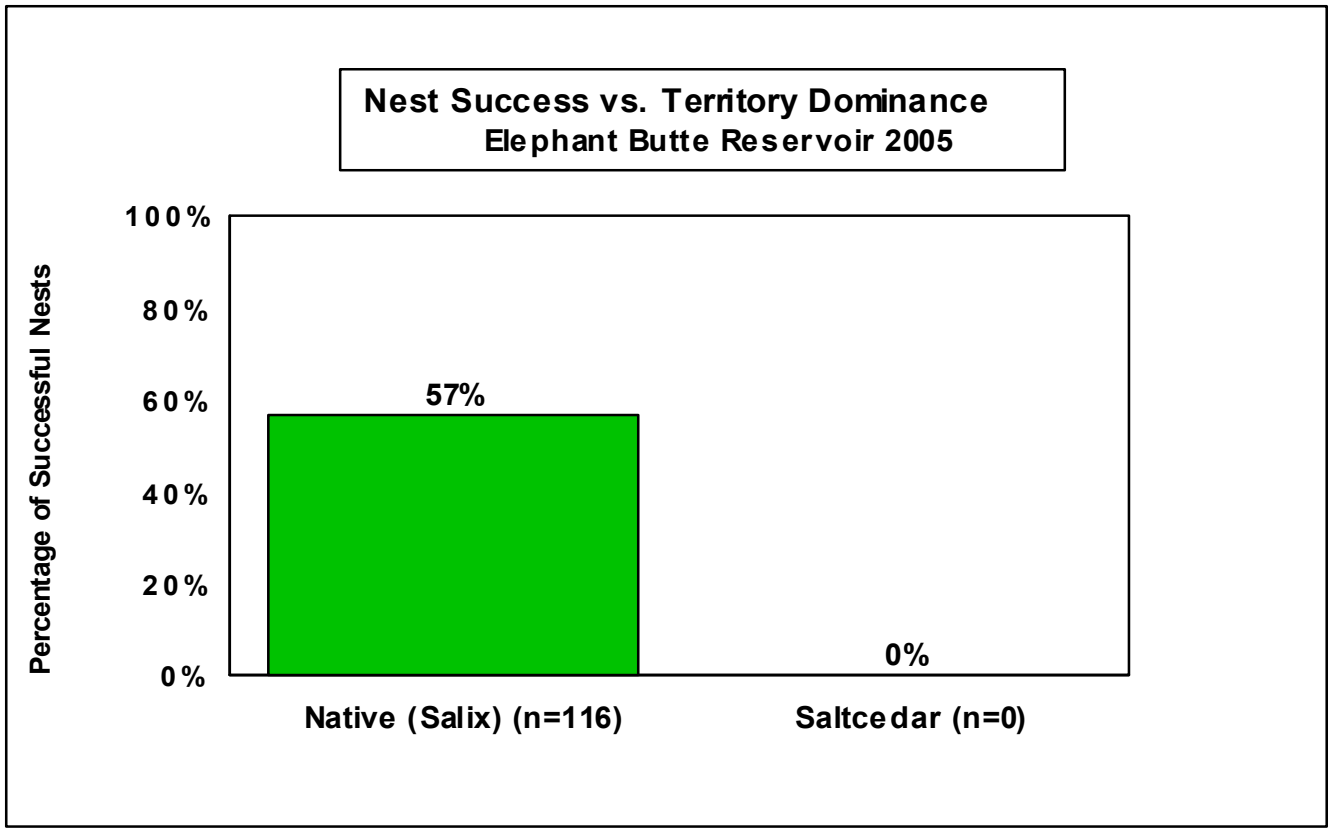


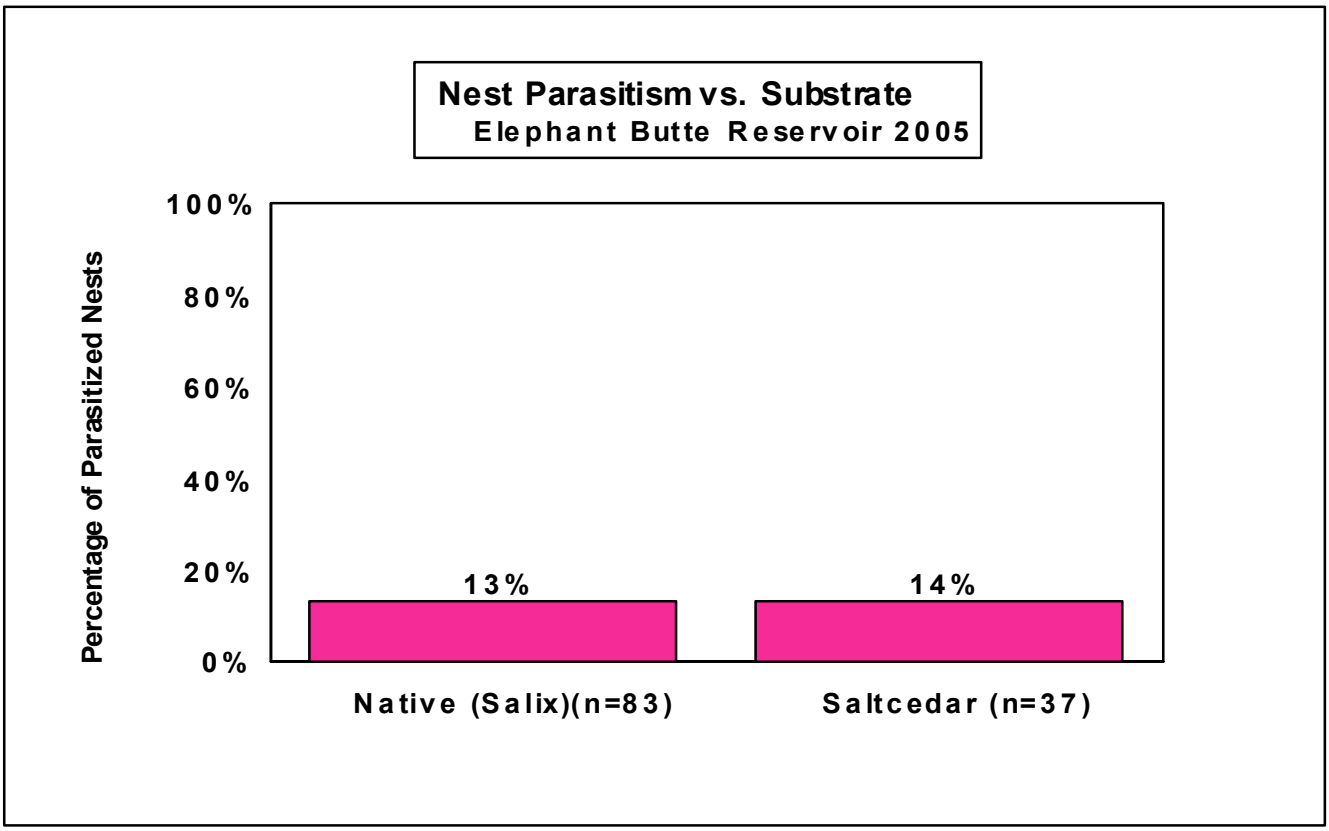
	1999	2000	2001	2002	2003	2004	2005
Pr Success (Pop)	100%	91%	104%	78%	76%	81%	96%
Pr Success (Ind)	100%	91%	84%	67%	66%	66%	79%
Nest Success	100%	91%	74%	54%	51%	48%	57%
Number of Pairs	2	11	25	45	62	86	67

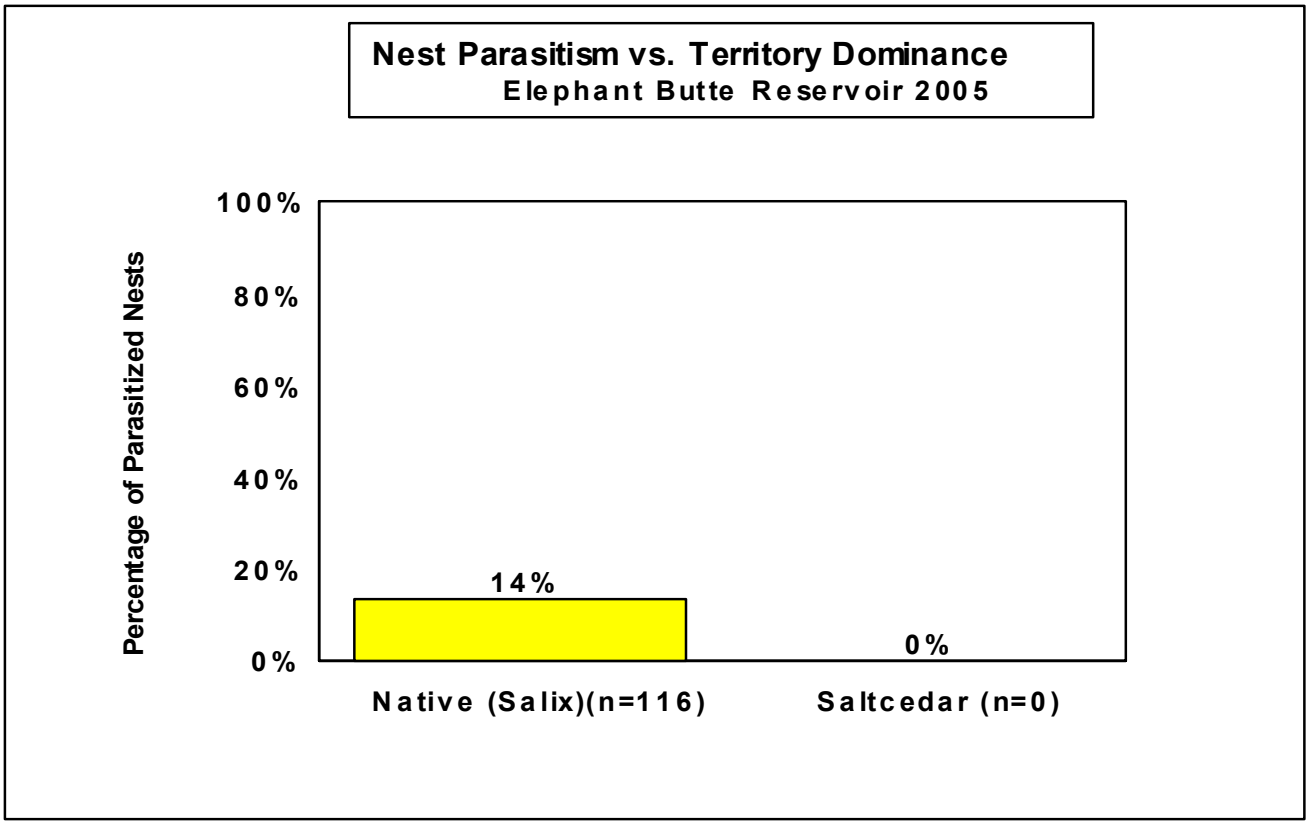

WIFL Nesting Substrate
Elephant Butte Reservoir 2005
(n=127)
Percentage of Nests
100%
80%
60%
40%
20%
0%
70%
30%
0%
Native (Salix)
Saltcedar
Russian Olive

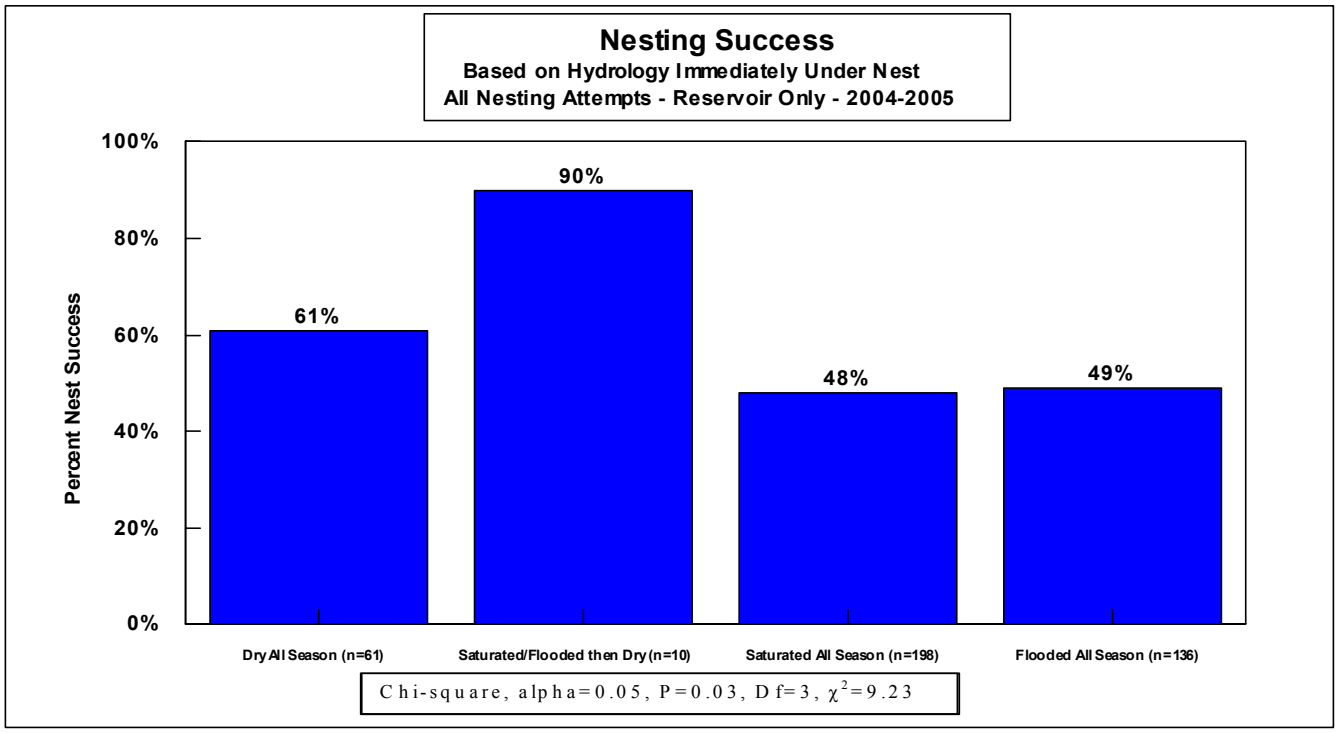

Dominant Vegetation of WIFL Territories
Elephant Butte Reservoir 2005
(n=127)
Percentage of Nests
100%
80%
60%
40%
20%
0%
97%
0%
3%
Native (Salix)
Saltcedar
Mixed

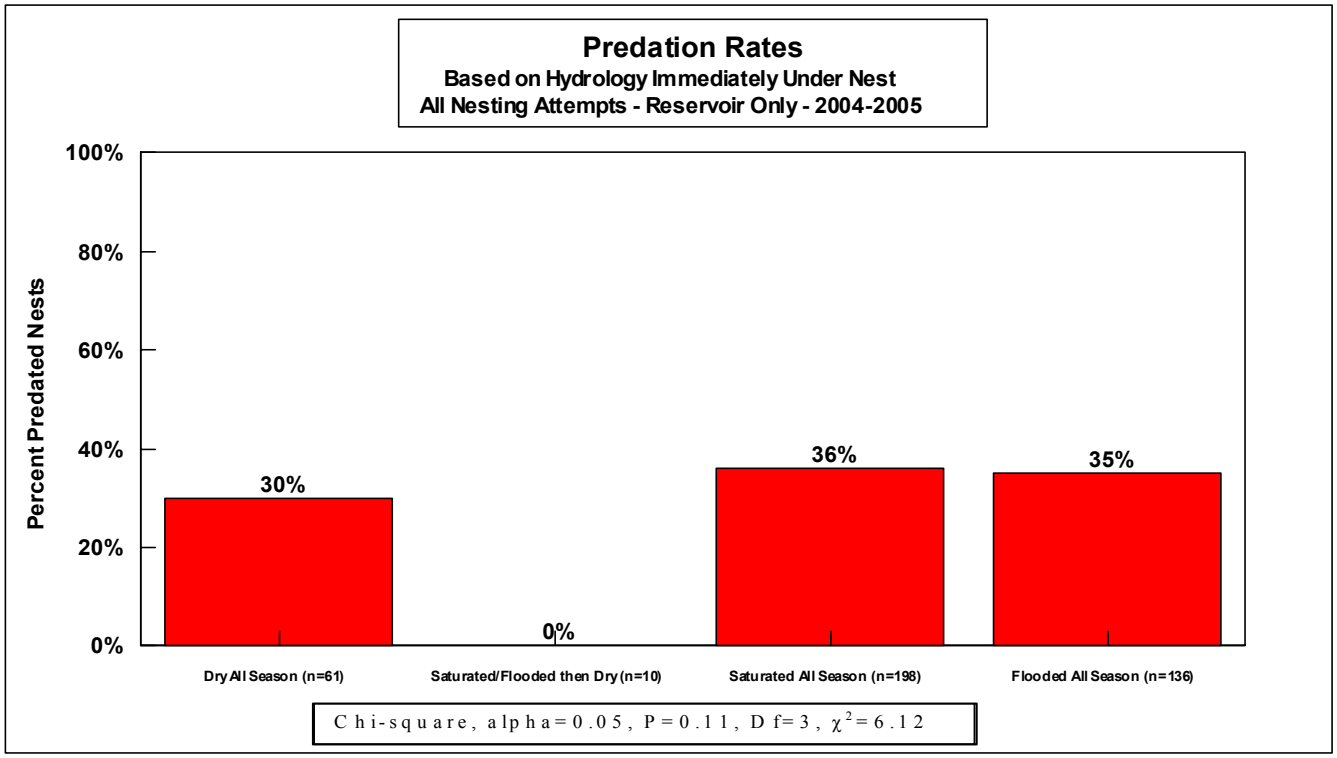

Nest Success vs. Nest Substrate
Elephant Butte Reservoir 2005
Percentage of Successful Nests
100%
80%
60%
40%
20%
0%
59%
51%
Native (Salix) (n=83)
Saltcedar (n=37)

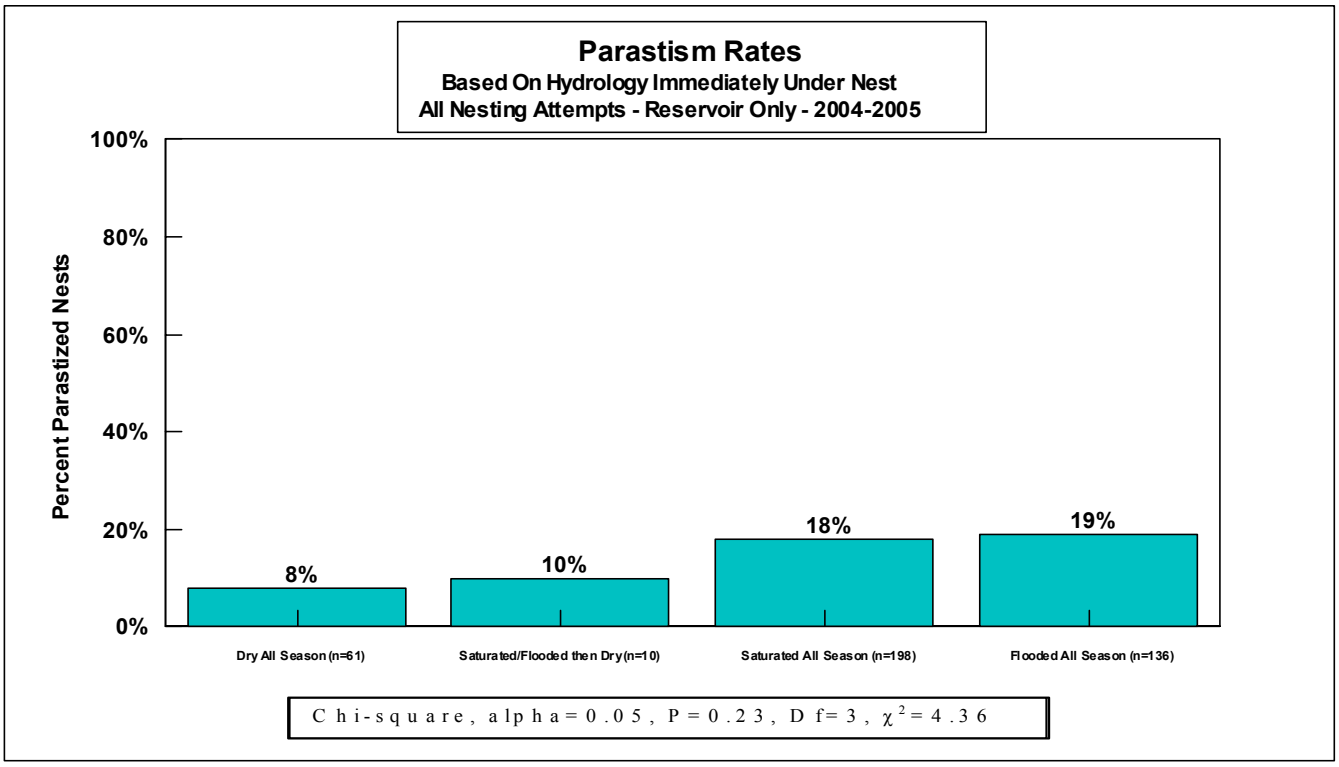

Nest Success vs. Territory Dominance
Elephant Butte Reservoir 2005
Percentage of Successful Nests
100%
80%
60%
40%
20%
0%
57%
0%
Native (Salix) (n=116)
Saltcedar (n=0)

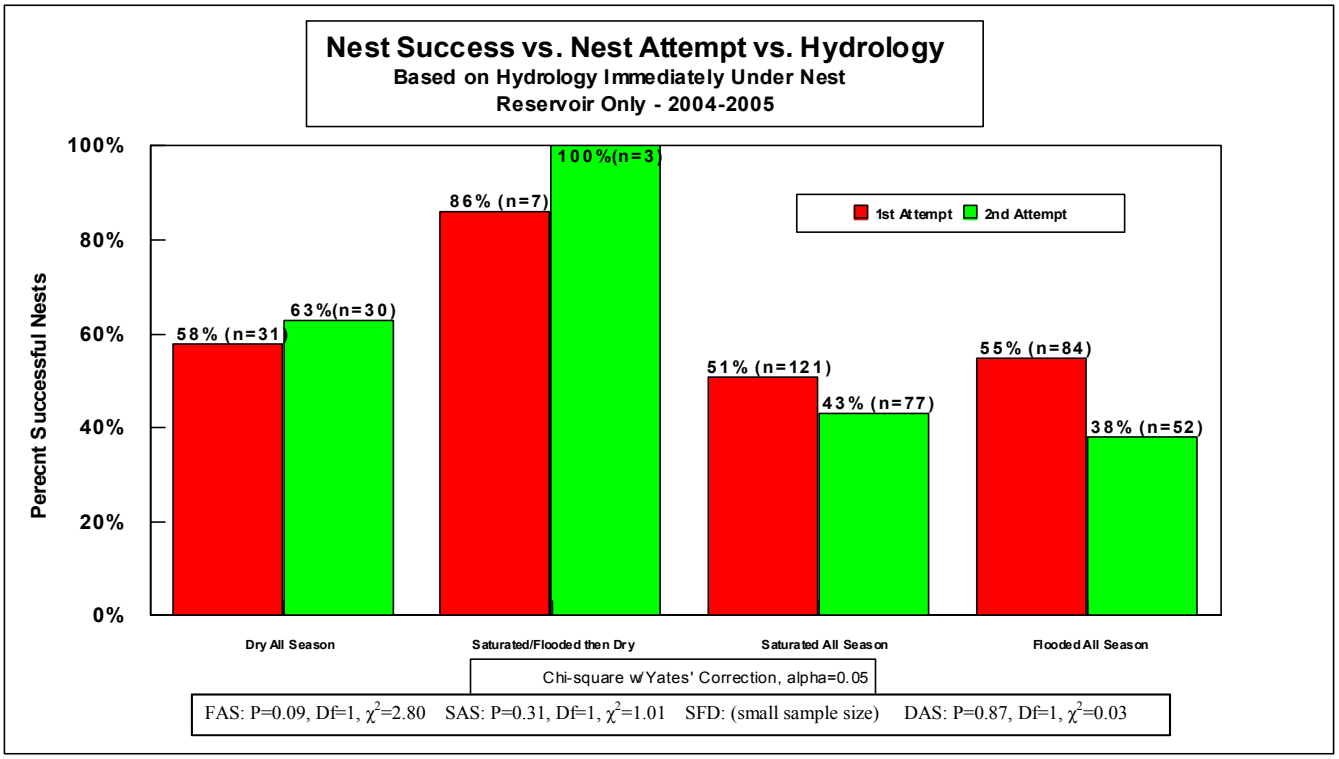

Nest Parasitism vs. Substrate
Elephant Butte Reservoir 2005
Percentage of Parasitized Nests
100%
80%
60%
40%
20%
0%
13%
14%
Native (Salix)(n=83)
Saltcedar (n=37)

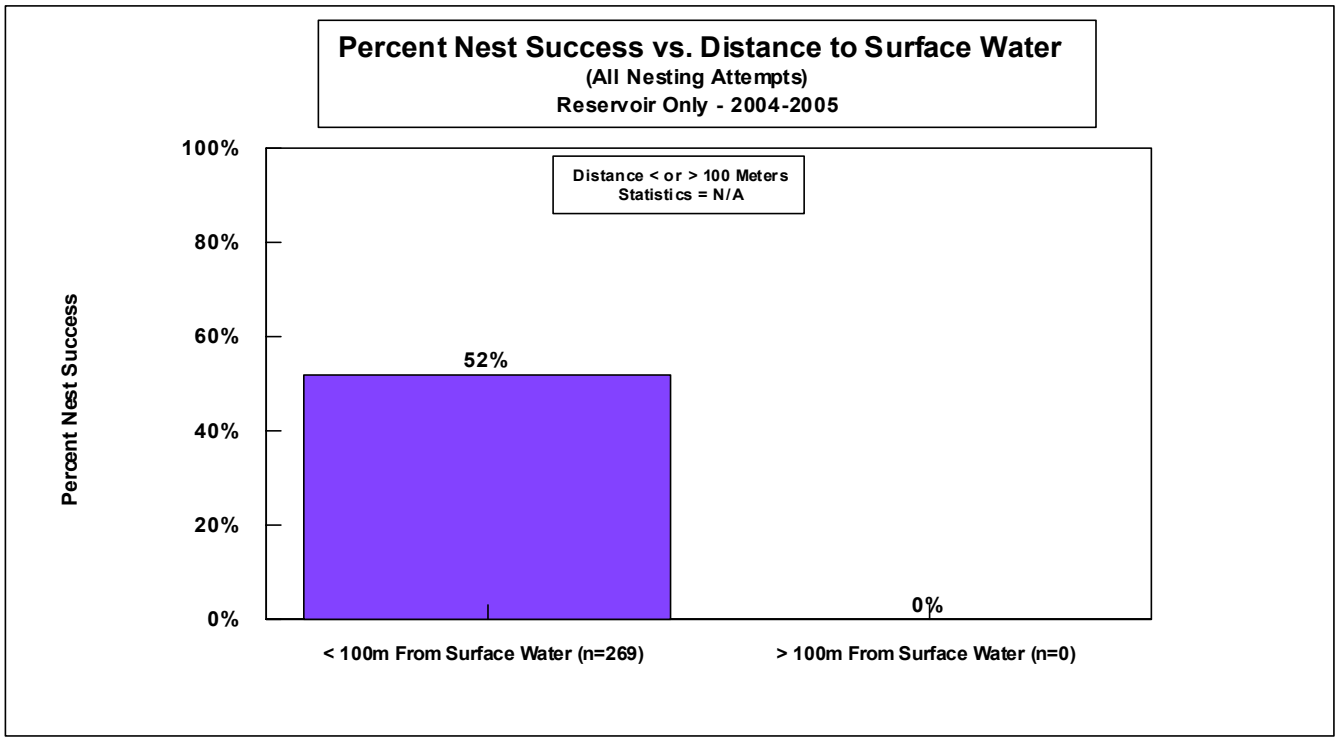

Nest Parasitism vs. Territory Dominance
Elephant Butte Reservoir 2005
Percentage of Parasitized Nests
100%
80%
60%
40%
20%
0%
14%
0%
Native (Salix)(n=116)
Saltcedar (n=0)

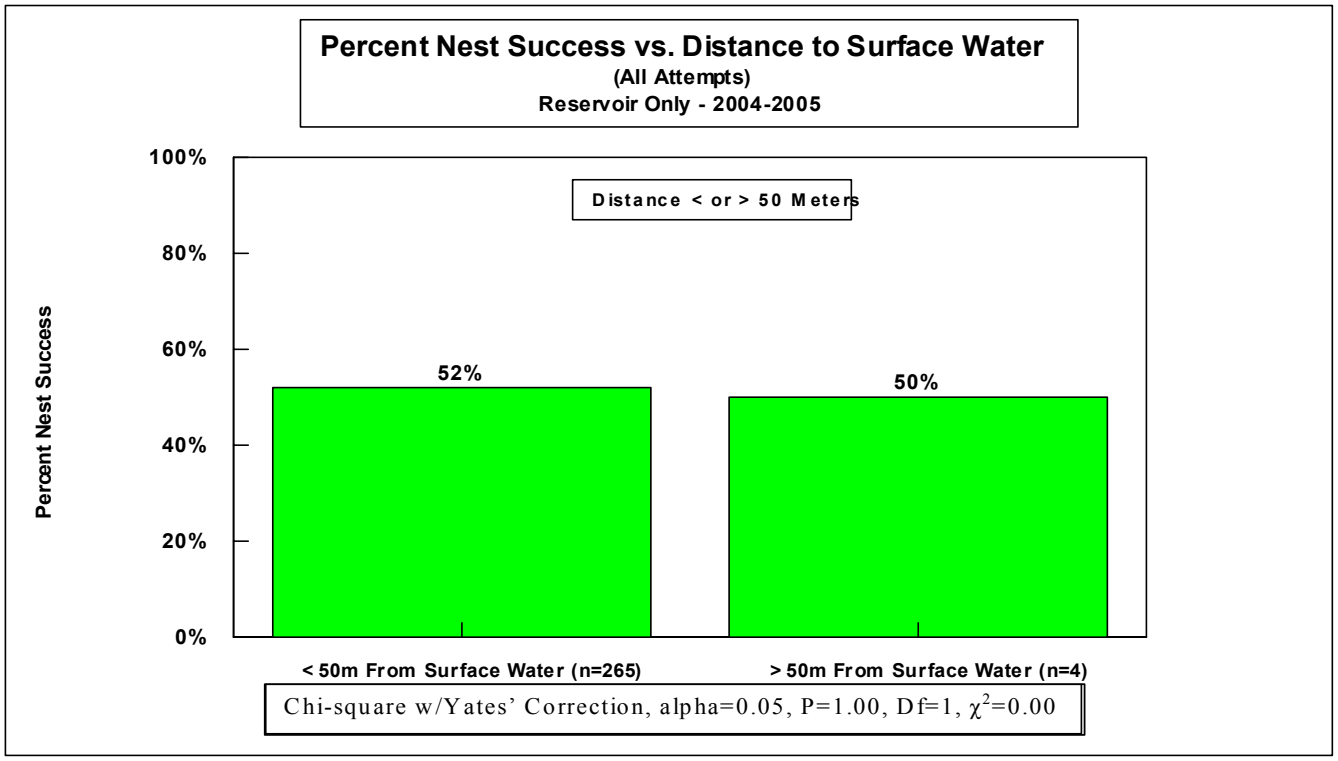

Nesting Success
Based on Hydrology Immediately Under Nest
All Nesting Attempts - Reservoir Only - 2004-2005
Percent Nest Success
100%
80%
60%
40%
20%
0%
61%
90%
48%
49%
Dry All Season (n=61)
Saturated/Flooded then Dry (n=10)
Saturated All Season (n=198)
Flooded All Season (n=136)
Chi-square, alpha=0.05, P=0.03, Df=3, χ^2=9.23

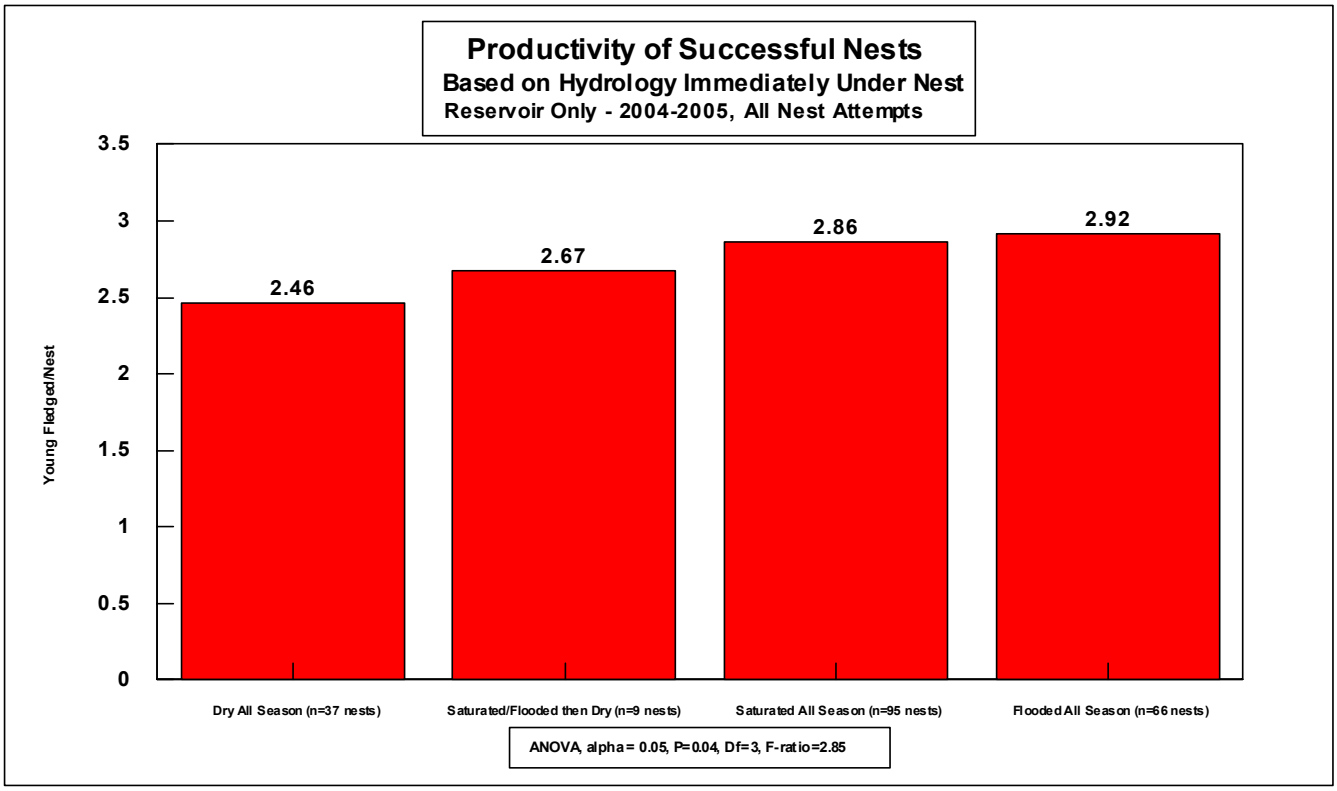

Predation Rates
Based on Hydrology Immediately Under Nest
All Nesting Attempts - Reservoir Only - 2004-2005
Percent Predated Nests
100%
80%
60%
40%
20%
0%
30%
0%
36%
35%
Dry All Season (n=61)
Saturated/Flooded then Dry (n=10)
Saturated All Season (n=198)
Flooded All Season (n=136)
Chi-square, alpha=0.05, P=0.11, Df=3, χ^2=6.12

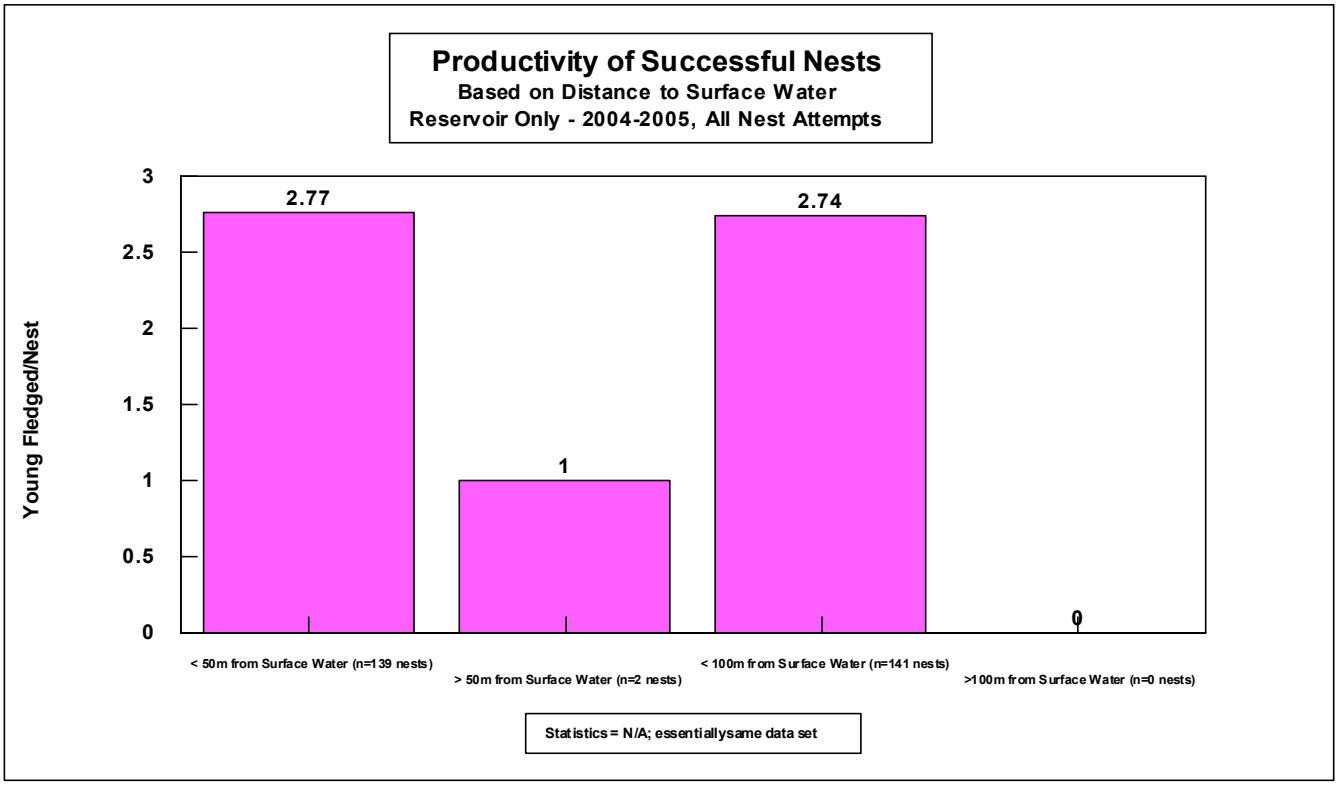

Parastism Rates
Based On Hydrology Immediately Under Nest
All Nesting Attempts - Reservoir Only - 2004-2005
Percent Parastized Nests
100%
80%
60%
40%
20%
0%
8%
10%
18%
19%
Dry All Season (n=61)
Saturated/Flooded then Dry (n=10)
Saturated All Season (n=198)
Flooded All Season (n=136)
Chi-square, alpha=0.05, P=0.23, Df=3, χ²=4.36


Nest Success vs. Nest Attempt vs. Hydrology
Based on Hydrology Immediately Under Nest
Reservoir Only - 2004-2005
Perecnt Successful Nests
100%
80%
60%
40%
20%
0%
1st Attempt
2nd Attempt
58% (n=31)
63%(n=30)
86% (n=7)
100%(n=3)
51% (n=121)
43% (n=77)
55% (n=84)
38% (n=52)
Dry All Season
Saturated/Flooded then Dry
Saturated All Season
Flooded All Season
Chi-square w/Yates' Correction, alpha=0.05
FAS: P=0.09, Df=1, χ²=2.80 SAS: P=0.31, Df=1, χ²=1.01 SFD: (small sample size) DAS: P=0.87, Df=1, χ²=0.03


Percent Nest Success vs. Distance to Surface Water
(All Nesting Attempts)
Reservoir Only - 2004-2005
Distance < or > 100 Meters
Statistics = N/A
Percent Nest Success
100%
80%
60%
40%
20%
0%
52%
0%
< 100m From Surface Water (n=269)
> 100m From Surface Water (n=0)


Percent Nest Success vs. Distance to Surface Water
(All Attempts)
Reservoir Only - 2004-2005
Distance < or > 50 Meters
Percent Nest Success
100%
80%
60%
40%
20%
0%
52%
50%
< 50m From Surface Water (n=265)
> 50m From Surface Water (n=4)
Chi-square w/Yates' Correction, alpha=0.05, P=1.00, Df=1, χ^2=0.00


Productivity of Successful Nests
Based on Hydrology Immediately Under Nest
Reservoir Only - 2004-2005, All Nest Attempts
Young Fledged/Nest
3.5
3
2.5
2
1.5
1
0.5
0
2.46
2.67
2.86
2.92
Dry All Season (n=37 nests)
Saturated/Flooded then Dry (n=9 nests)
Saturated All Season (n=95 nests)
Flooded All Season (n=66 nests)
ANOVA, alpha = 0.05, P=0.04, Df=3, F-ratio=2.85


Productivity of Successful Nests
Based on Distance to Surface Water
Reservoir Only - 2004-2005, All Nest Attempts
Young Fledged/Nest
3
2.5
2
1.5
1
0.5
0
2.77
1
2.74
0
< 50m from Surface Water (n=139 nests)
> 50m from Surface Water (n=2 nests)
< 100m from Surface Water (n=141 nests)
>100m from Surface Water (n=0 nests)
Statistics = N/A; essentiallysame data set