

RECLAMATION

Managing Water in the West

2004 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**

April 2005

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.

2004 Southwestern Willow Flycatcher Study Results

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

prepared for

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**U.S. Department of the Interior
Bureau of Reclamation
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Executive Summary

Overview

During the summer of 2004, 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 Isleta Pueblo and Elephant Butte Reservoir. Surveys were performed to contribute to current baseline data of the SWFL along the Middle Rio Grande and also to meet Reclamation's Endangered Species Act (ESA) compliance commitments. There were 274 resident SWFLs documented in 150 territories forming 124 breeding pairs. As in previous years, the San Marcial and Sevilleta reaches were most productive, containing 113 and 19 territories, respectively, and the population as a whole in the Middle Rio Grande Basin is growing.

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 153 nests and fledging at least 187 SWFL young. The Sevilleta reach produced 21 nests and fledged at least 15 SWFL young. Overall, nest variables (success, predation, BHCO parasitism, and productivity) remained similar to 2003.

Other studies were initiated or continued in 2004. These include: (1) Neotropical migrant nest monitoring and point counts, (2) BHCO point counts, (3) livestock grazing study, (4) SWFL habitat suitability assessment, and (5) SWFL nest site vegetation quantification study. These studies are designed to provide further insight into potential threats and habitat requirements of SWFL populations.

Survey Results

Reclamation funded:

- Velarde – 1 territory
- San Acacia – 0 territories
- San Marcial – 113 territories

ESA Collaborative Program funded:

- Belen – 0 territories
- Sevilleta NWR/La Joya – 19 territories
- Escondida – 0 territories
- Bosque del Apache NWR – 1 territory
- Tiffany – 16 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 2003).

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 2004, USFWS proposed Critical Habitat for the SWFL along the Middle Rio Grande from “4.2 miles north of the intersection of Interstate 25 and 40 downstream to the overhead powerline near Milligan Gulch at the northern end of Elephant Butte State Park” (USFWS 2004).

Field 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 2004 presence/absence surveys for SWFLs were conducted at selected sites along the Rio Grande from Velarde downstream to the delta of Elephant Butte



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

Reservoir (Figure 2). Surveys were conducted between May 16 and July 24, 2004. Nest searches and nest monitoring of SWFL nests were conducted in conjunction with survey efforts by permitted biologists. In addition to conducting 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*).

Goals and Objectives

Primary goals of the field studies performed in 2004 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 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.
- Compare breeding success and parasitism rates between SWFL and other riparian-obligate neotropical migrant species.
- 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 2004, the following related studies were either previously conducted or continued in 2004:

- Using a modified Breeding Biology Research and Monitoring Database (BBIRD) protocol (Martin et al. 1997), 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

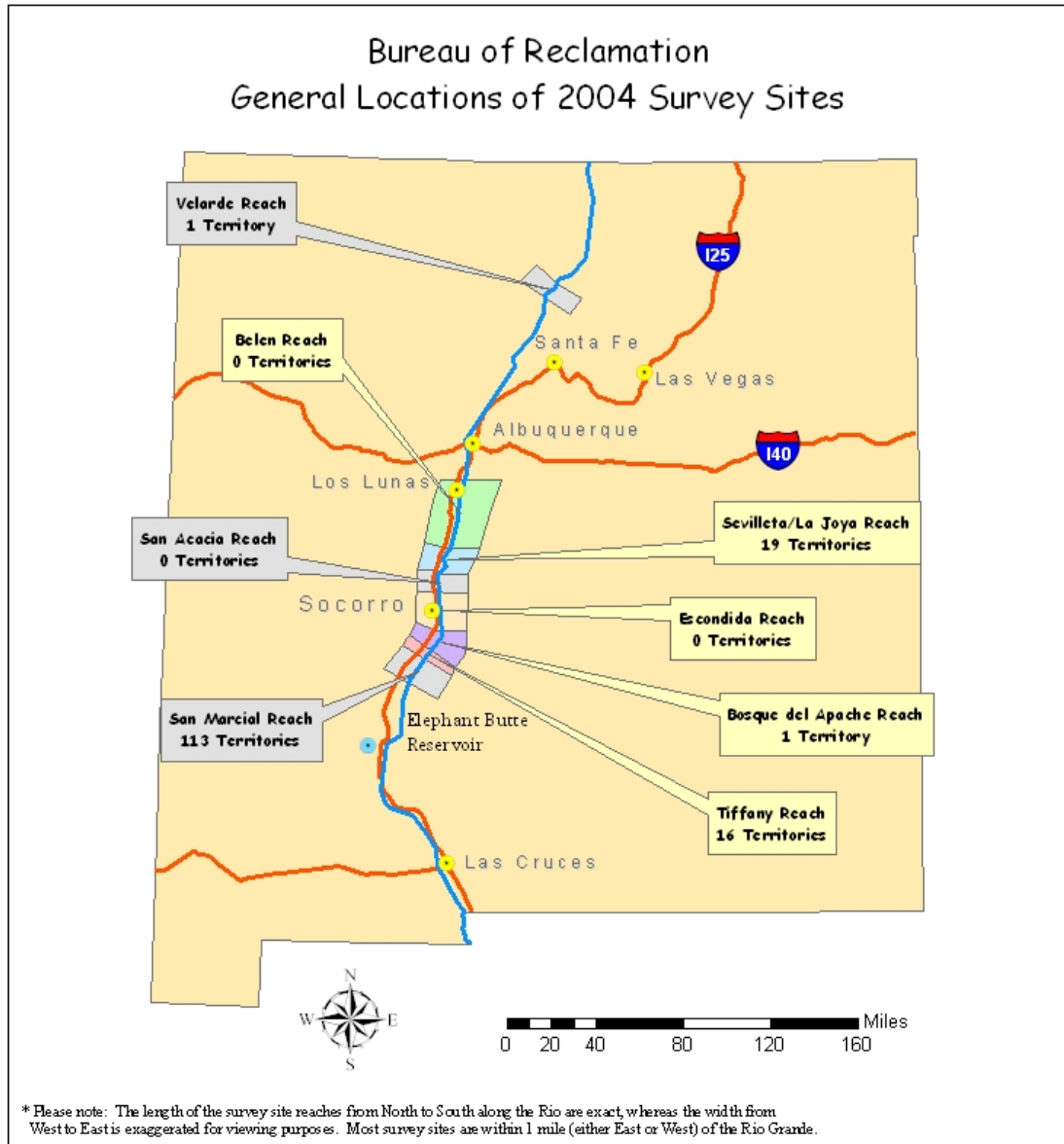


Figure 2. General locations of 2004 survey sites.

- 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 as a component of the *Cowbird Control Program: Middle Rio Grande, New Mexico, 2001* (Ahlers and Sechrist 2002).
- 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 - 2004 data, the areas supporting the greatest mean number of BHCOs were within the Bosque del Apache National Wildlife Refuge (NWR) and Sevilleta NWR—areas not subject to livestock grazing. Livestock grazing was present adjacent to each of these areas, however, and 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: *Browsing Analysis of Riparian Vegetation – Elephant Butte Project Lands* (Ahlers et al. 2003).
 - 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 flown again for aerial photos. 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. In 2003 and 2004, data were gathered at 27 and 49 nests, respectively, 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 gathered in 2004 will be added to the preliminary data analysis performed following the 2003 field season, and a summary report will be prepared.
- In conjunction with SWFL nest monitoring, a hydrology monitoring project was implemented in 2004. Staff gauges were placed at different 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. A photo was taken of each gauge every time data were recorded. Data from this study will be used to determine how closely nesting SWFLs associate with surface water. It will also determine the timing and duration of flood events during the study period. Data will be gathered for another year and presented at the conclusion of the study.

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 2004 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 (Figs. 3 to 10). Table 1 shows a summary of the survey effort within each reach.

Table 1. Number of sites and surveys per reach – Middle Rio Grande 2004

Survey reach	Total sites surveyed	Number of surveys done
Velarde	3	3
Belen	31	3
Sevilleta/La Joya	16	3: SV-11 to SV-15 5: SV-01 to SV-10
San Acacia	6	5
Escondida	13	5
Bosque del Apache	13	3: BA-01 to BA-08 5: BA-09 and BA-10
Tiffany	9	3: LF-21 to LF-24, LF-26, LF-35, and LF-36 5: LF-25 and LF-37
San Marcial	42	5

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 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.

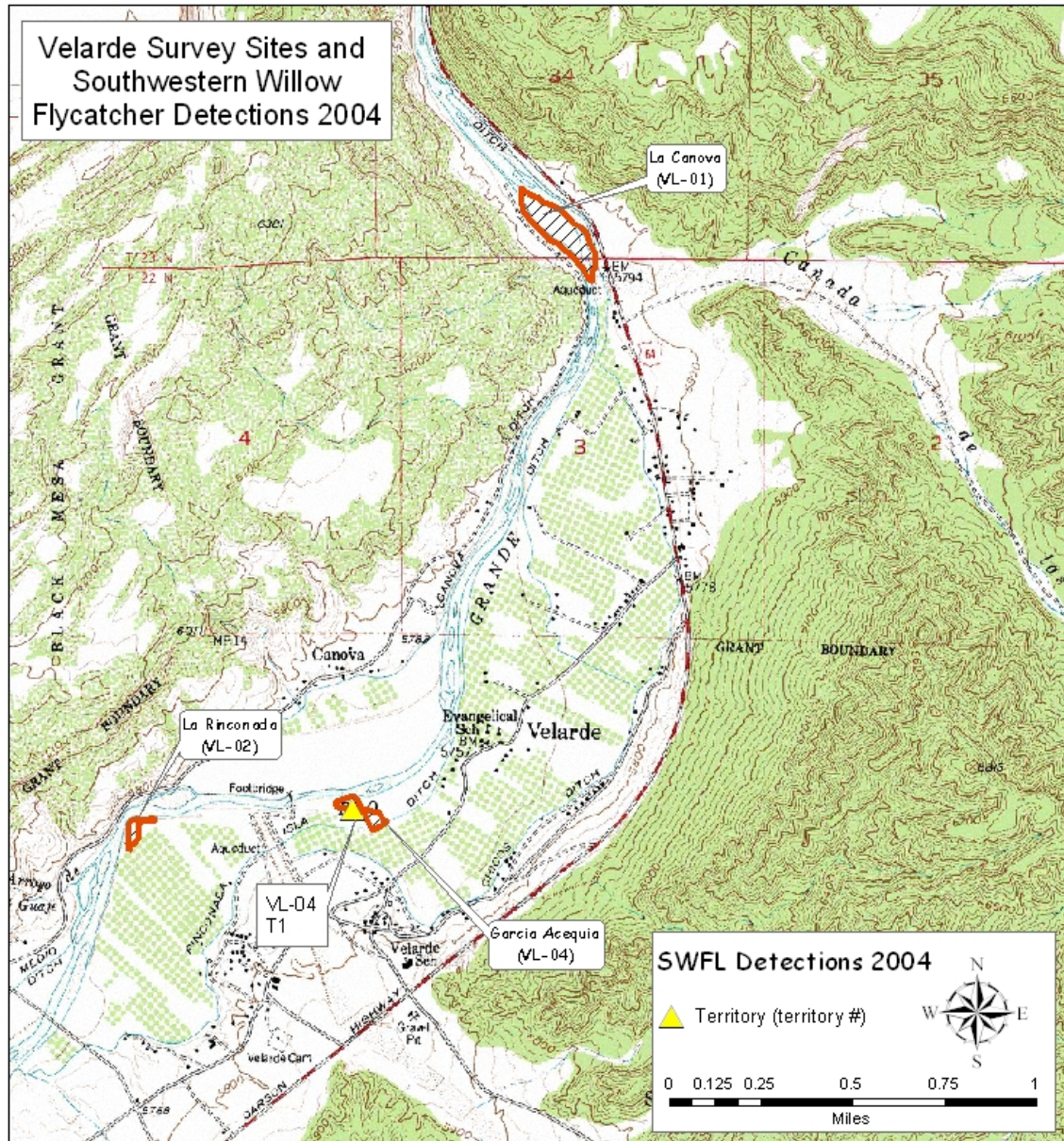


Figure 3. Overview of and SWFL detections within the Velarde survey sites.

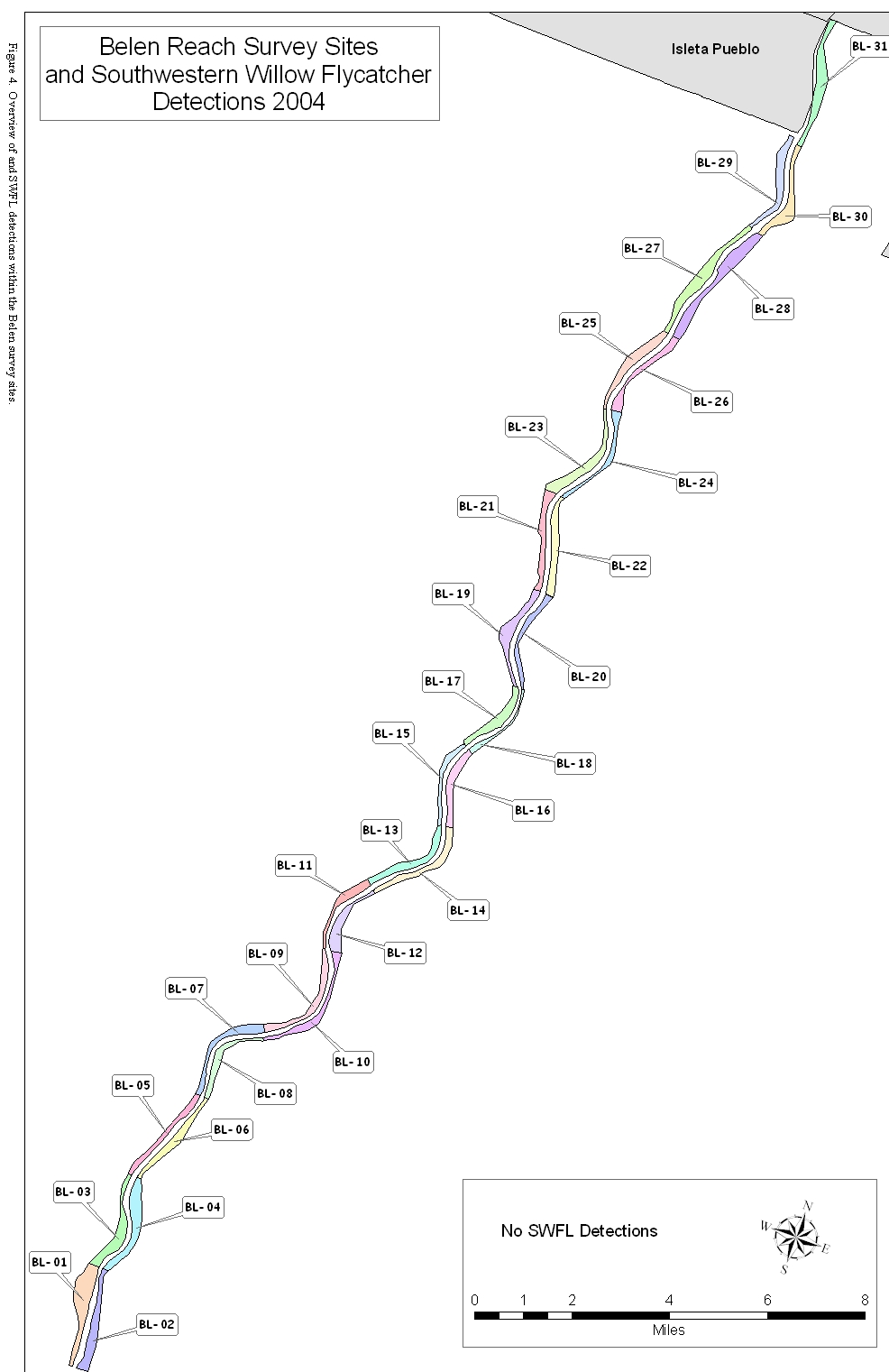


Figure 4. Overview of and SWFL detections within the Belen survey sites.

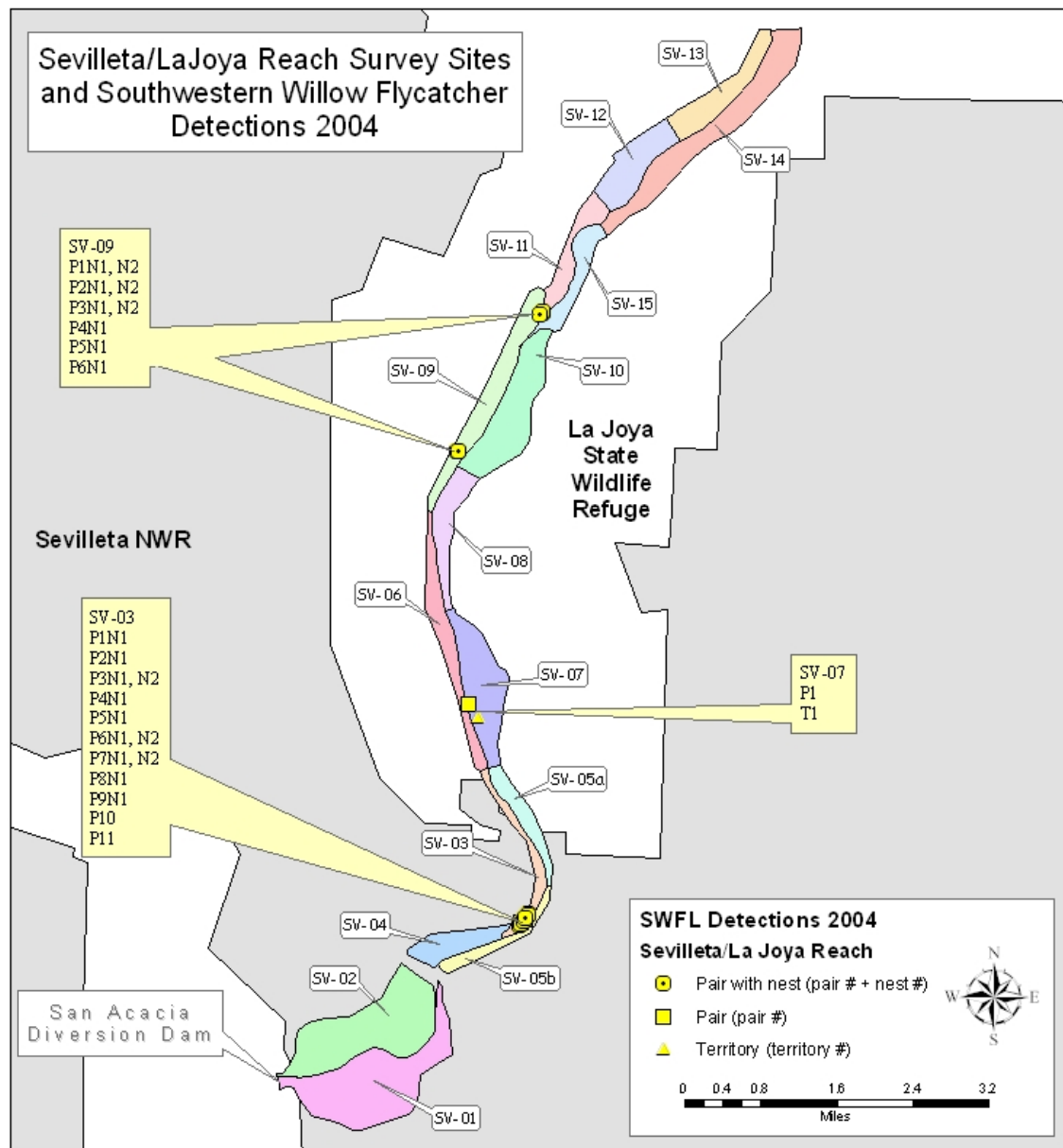


Figure 5. Overview of and SWFL detections within the Seville/La Joya survey sites.

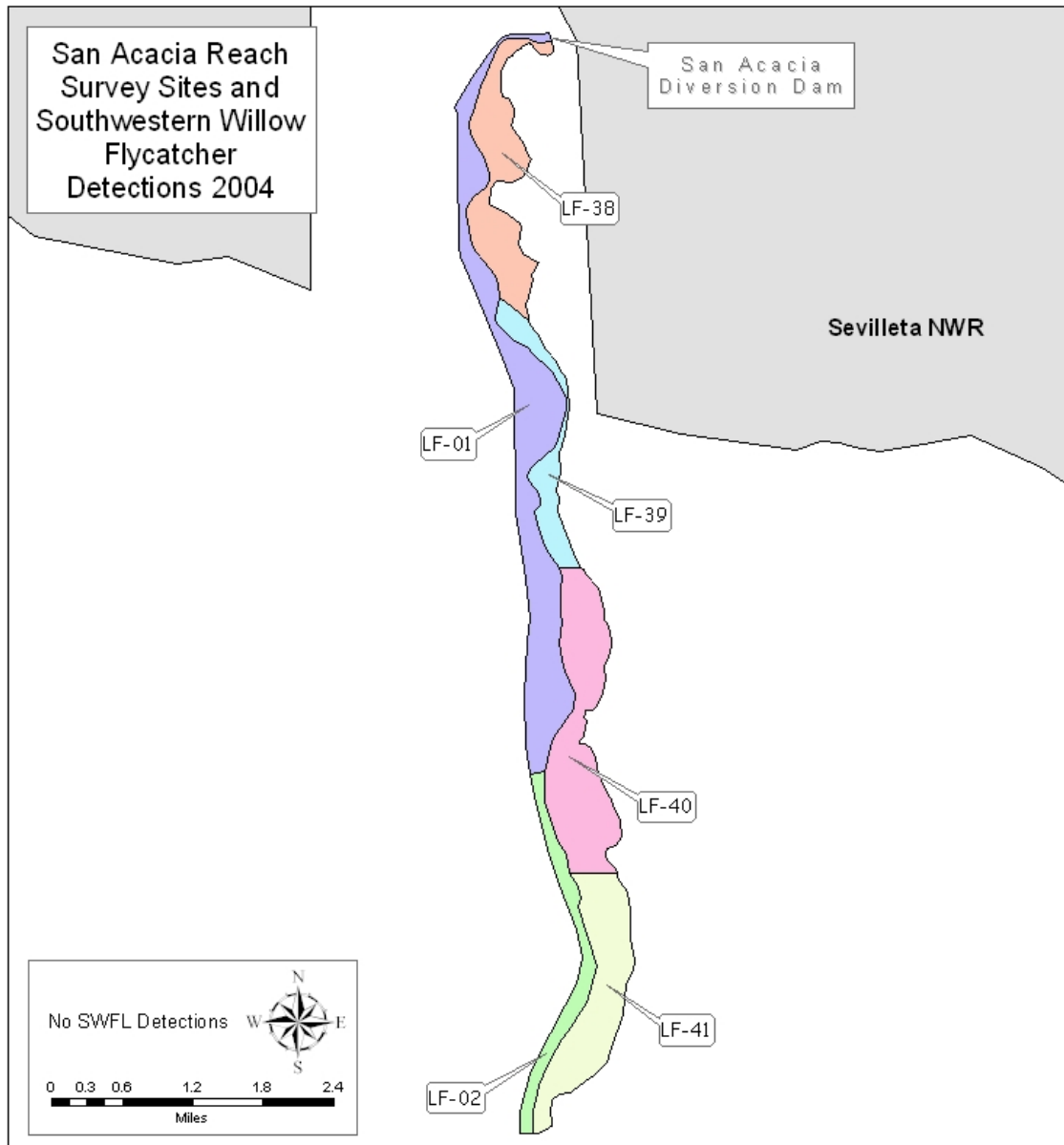


Figure 6. Overview of and SWFL detections within the San Acacia survey sites.

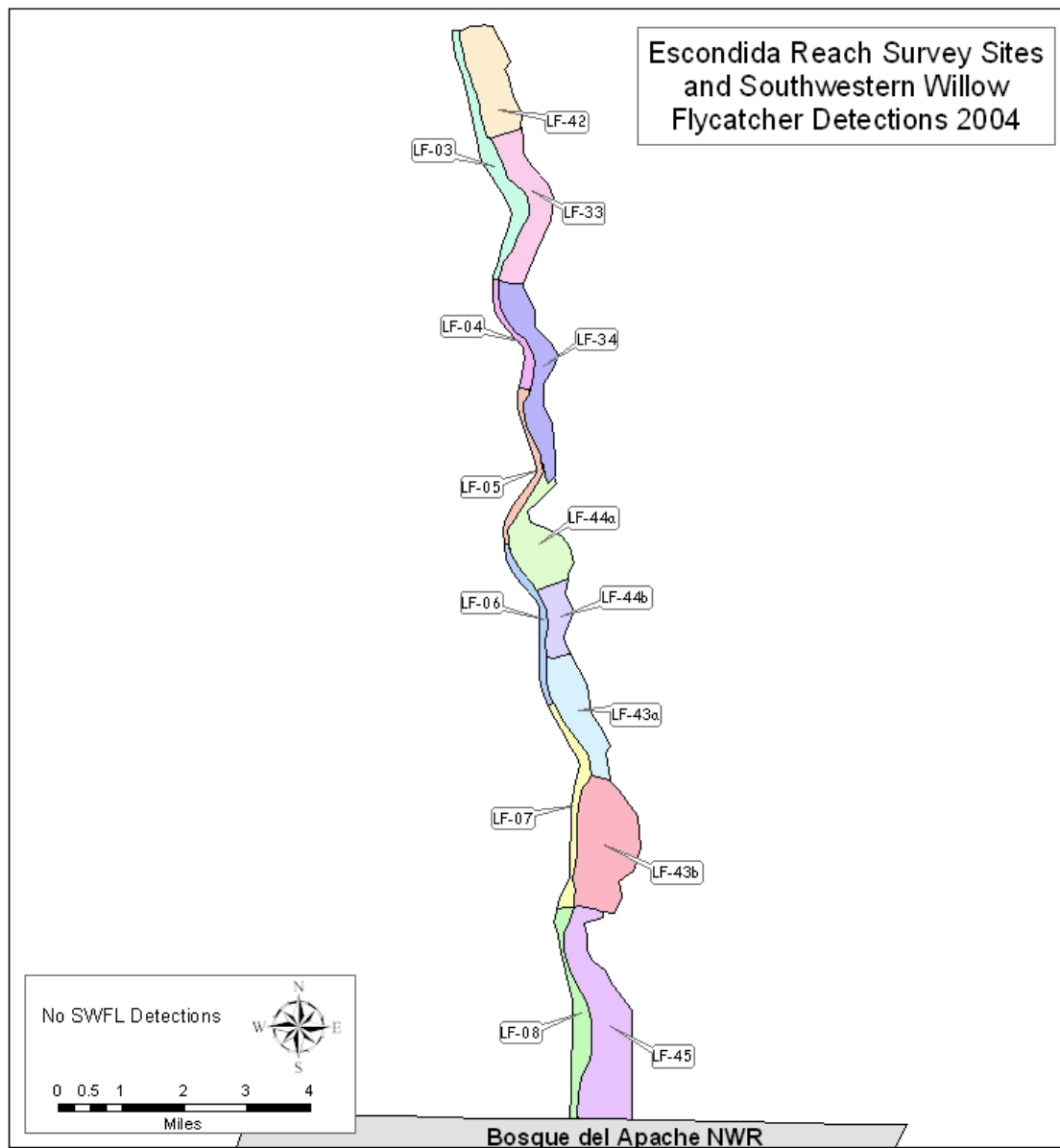


Figure 7. Overview of and SWFL detections within the Escondida survey sites.

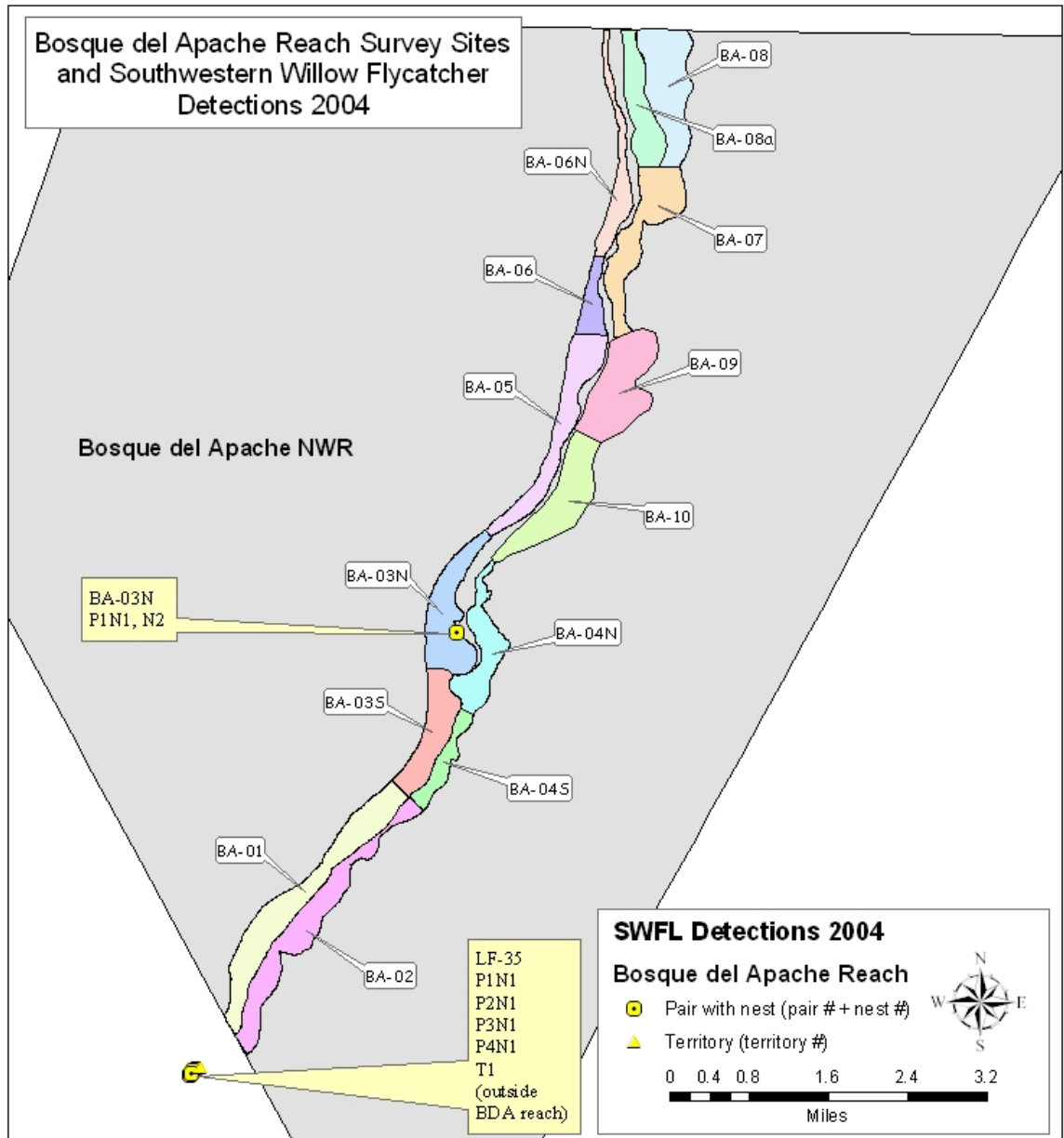


Figure 8. Overview of and SWFL detections within the Bosque del Apache survey sites.

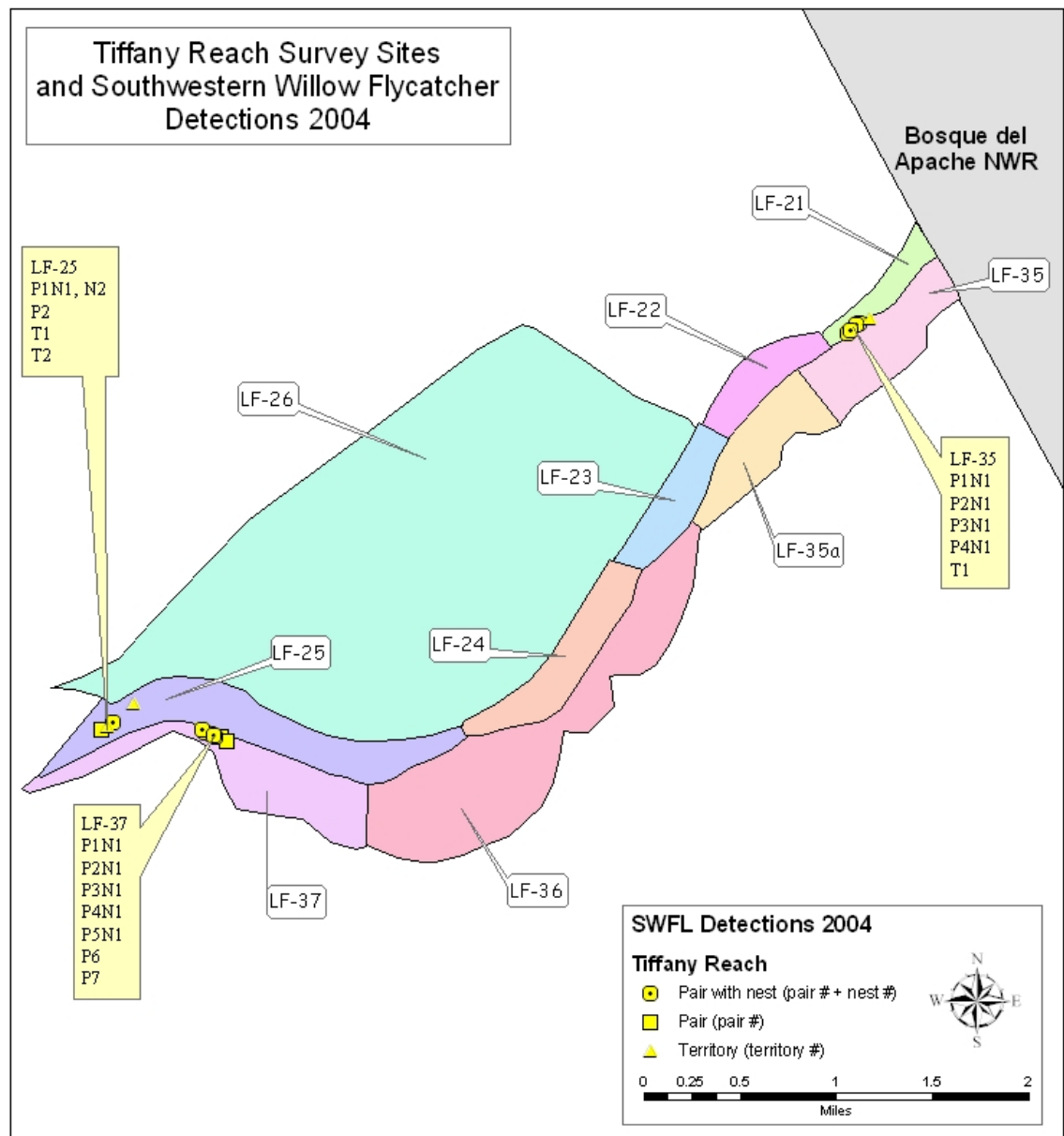


Figure 9. Overview of and SWFL detections within the Tiffany survey sites.

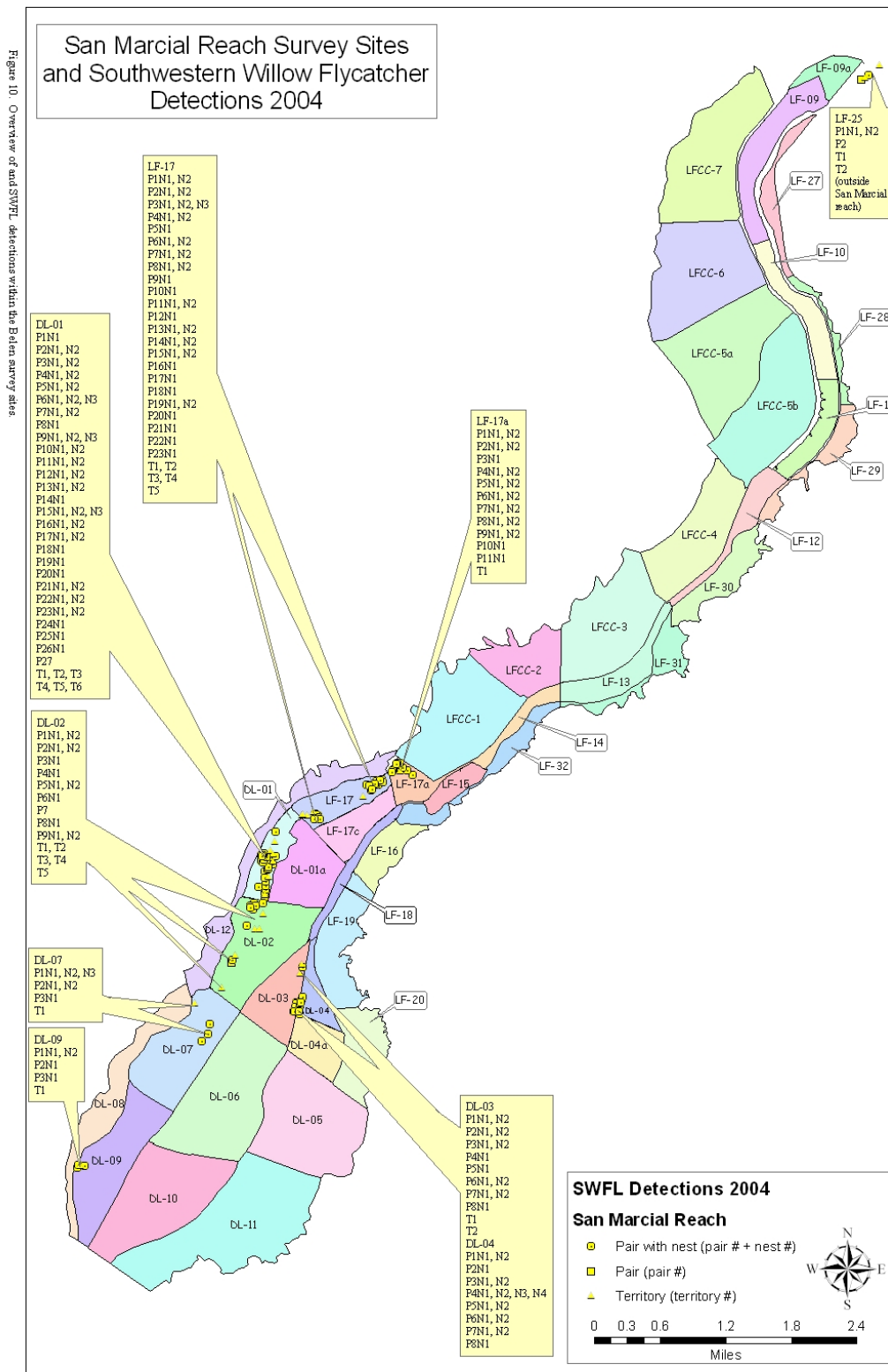


Figure 10. Overview of and SWFL detections within the San Marcial survey sites.

Table 2. SWFL survey schedule for the 2004 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.

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. Most sites surveyed during the 2004 season were generally accessible with dry conditions occurring during most surveys. Several of the southern sites within the San Marcial reach were subject to flooding during the 2004 breeding season, making surveys more difficult.

At the conclusion of a survey, survey data recorded on field forms were transferred to hard copy survey forms. When SWFLs were detected, UTM coordinates were obtained, and the senior onsite biologist was notified. If pairing was confirmed or suspected, a permitted biologist initiated a nest search.

Species of Special Concern

Surveyors were also instructed to document the occurrence 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 fledges young.

In 2002, the practice of adding BHCO eggs from parasitized nests, when necessary and possible, was initiated. This activity was continued in 2004. SWFL eggs were never disturbed and time spent at the nest was minimized. Frequently, it was determined that, based on nesting chronology, the BHCO egg would not have a chance to hatch. In this case, nests were monitored normally to minimize disturbance.

Results

Presence/Absence Surveys

During presence/absence surveys, conducted from May 16 through July 26, 334 WIFLs were documented (210 males and 124 females). Based on detections prior to June 10 and the birds' lack of territorial behavior, 60 were believed to have been migrants (all of which were considered males due to singing). The remaining 274 (150 males and 124 females) were believed to be resident SWFLs.

These 274 SWFLs established 150 territories and 124 pairs. Documented nesting attempts confirmed 115 pairs; they produced 187 nests. Nine additional pairs were observed and, although nesting was suspected, it could not be confirmed in any of these occupied territories. Of the 187 confirmed nesting attempts, 85 were believed successful, 89 failed, and 13 were unknown. Successful nests include those which supported chick(s) 8 to 10 days old on the last nest visit; however, three nests that were not monitored into the late nestling stage were considered likely to have fledged young, and were thus included in the successful nest count. These nests contained nestlings 6 to 8 days old on the last visit of the nesting cycle.

Detection results for 2004 are summarized in Table 3. 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 10, respectively.

During the 2004 season, five surveys were completed in project-related sites, which comprised approximately 56 percent of the sites surveyed. Within these 75 sites, new SWFL territories were found during the fourth or fifth surveys in only 3 sites (SV-03, SV-09, and DL-04). 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.

Table 3. Summary of WIFL detections – Middle Rio Grande – 2004

Site name	WIFLs observed*	Est. # of pairs	Est. # of <i>E. t. extimus</i> **	Est. # of territories	Nest(s) Found***	Nest success	Comments
VL-02	1 (♂)	0	1 (♂)	1	N/A	N/A	1 unpaired male territory
Velarde reach summary	1 (♂)	0	1 (♂)	1	N/A	N/A	WIFL assumed to be a migrant
BL-02	1 (♂)	0	0	0	N/A	N/A	WIFL assumed to be a migrant
BL-04	1 (♂)	0	0	0	N/A	N/A	WIFL assumed to be a migrant
BL-05	3 (3♂)	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-16	1 (♂)	0	0	0	N/A	N/A	WIFL assumed to be a migrant
Belen reach summary	7 (7♂)	0	0	0	N/A	N/A	All WIFLs assumed to be migrants
SV-01	2 (2♂)	0	0	0	N/A	N/A	Both WIFLs assumed to be migrants.
SV-03	22 (11♂ 11♀)	11	22 (11♂ 11♀)	11	12	Successful (2) Failed (4) Unknown (6)	Nests include 3 re-nests, unknown nests all too high to monitor
SV-07	3 (2♂ 1♀)	1	3 (2♂ 1♀)	2	0	N/A	Pair either did not nest or nest was not found, third SWFL was an unpaired male
SV-09	12 (6♂ 6♀)	6	12 (6♂ 6♀)	6	9	Successful (5) Failed (3) Unknown (1)	Nests include 2 re-nests and 1 second brood
SV-10	5 (♂)	0	0	0	N/A	N/A	WIFLs assumed to be migrants
SV-12	1 (♂)	0	0	0	N/A	N/A	WIFL assumed to be a migrant
SV-13	1 (♂)	0	0	0	N/A	N/A	WIFL assumed to be a migrant
SV-14	3 (3♂)	0	0	0	N/A	N/A	WIFLs assumed to be migrants
SV-15	2 (2♂)	0	0	0	N/A	N/A	Both WIFLs assumed to be migrants
Sevilla/La Joya reach summary	51 (33♂ 18♀)	18	37 (19♂ 18♀)	19	21	Successful (7) Failed (7) Unknown (7)	Total includes 14 migrants, 18 pairs, and 1 unpaired male
LF-39	3 (3♂)	0	0	0	N/A	N/A	WIFLs assumed to be migrants
LF-41	1 (♂)	0	0	0	N/A	N/A	Assumed to be a migrant

2004 Southwestern Willow Flycatcher Study Results

Site name	WIFLs observed*	Est. # of pairs	Est. # of <i>E. t. extimus</i> **	Est. # of territories	Nest(s) Found***	Nest success	Comments
San Acacia reach summary	4 (4♂)	0	0	0	N/A	N/A	All WIFLs assumed to be migrants
LF-04	5 (5♂)	0	0	0	N/A	N/A	WIFLs assumed to be migrants
LF-05	1 (♂)	0	0	0	N/A	N/A	WIFL assumed to be a migrant
LF-06	1 (♂)	0	0	0	N/A	N/A	WIFL assumed to be a migrant
LF-34	1 (♂)	0	0	0	N/A	N/A	WIFL assumed to be a migrant
LF-42	3 (3♂)	0	0	0	N/A	N/A	WIFLs assumed to be migrants
LF-44b	2 (2♂)	0	0	0	N/A	N/A	Both WIFLs assumed to be migrants
LF-45	1 (♂)	0	0	0	N/A	N/A	WIFL assumed to be a migrant
Escondida reach summary	14 (14♂)	0	0	0	N/A	N/A	All WIFLs in this reach assumed to be migrants
BA-01	1 (♂)	0	0	0	N/A	N/A	WIFL assumed to be a migrant
BA-03N	4 (3♂ 1♀)	1	2 (1♂ 1♀)	1	2	Successful (1) Failed (1)	1 pair and 2 migrants, pair produced 2 nests (initial and re-nest)
BA-06S	1 (♂)	0	0	0	N/A	N/A	WIFL assumed to be a migrant
Bosque del Apache reach summary	6 (5♂ 1♀)	1	2 (1♂ 1♀)	1	2	Successful (1) Failed (1)	1 pair and 4 migrants, pair produced 2 nests
LF-21	1 (♂)	0	0	0	N/A	N/A	WIFL assumed to be a migrant
LF-22	2 (2♂)	0	0	0	N/A	N/A	Both WIFLs assumed to be migrants
LF-24	3 (3♂)	0	0	0	N/A	N/A	WIFLs assumed to be migrants
LF-25	6 (4♂ 2♀)	2	6 (4♂ 2♀)	4	2	Successful (1) Failed (1)	2 pairs and 2 unpaired male territories, nest(s) not found for 1 pair, other pair produced 1 nest and 1 re-nest
LF-35	9 (5♂ 4♀)	4	9 (5♂ 4♀)	5	4	Successful (3) Unknown (1)	4 pairs and 1 unpaired male territory, each pair produced 1 nest
LF-37	14 (7♂ 7♀)	7	14 (7♂ 7♀)	7	5	Successful (2) Failed (2) Unknown (1)	7 pairs; nest not found for 2, other 5 each produced 1 nest

Site name	WIFLs observed*	Est. # of pairs	Est. # of <i>E. t. extimus</i> **	Est. # of territories	Nest(s) Found***	Nest success	Comments
Tiffany reach summary	35 (22♂ 13♀)	13	29 (16♂ 13♀)	16	11	Successful (6) Failed (3) Unknown (2)	13 pairs and 3 unpaired male territories
LF-12	4 (4♂)	0	0	0	N/A	N/A	All WIFLs assumed to be migrants
LF-13	1 (♂)	0	0	0	N/A	N/A	WIFL assumed to be a migrant
LF-14	1 (♂)	0	0	0	N/A	N/A	WIFL assumed to be a migrant
LF-17	51 (28♂ 23♀)	23	51 (28♂ 23♀)	28	36	Successful (15) Failed (20) Unknown (1)	23 pairs and 5 unpaired male territories; 36 nests (8 re-nests and 5 second broods)
LF-17a	23 (12♂ 11♀)	11	23 (12♂ 11♀)	12	19	Successful (11) Failed (8)	11 pairs and 1 unpaired male territory; 19 nests (3 re-nests and 5 second broods)
LF-17b	1 (♂)	0	0	0	N/A	N/A	WIFL assumed to be a migrant
LF-18	1 (♂)	0	0	0	N/A	N/A	WIFL assumed to be a migrant
LF-29	1 (♂)	0	0	0	N/A	N/A	WIFL assumed to be a migrant
DL-01	60 (33♂ 27♀)	27	60 (33♂ 27♀)	33	47	Successful (21) Failed (26)	27 pairs, 6 unpaired male territories; 26 pairs produced 47 nests (1 pair did not nest); 14 re-nests and 7 second/third broods
DL-02	23 (14♂ 9♀)	9	23 (14♂ 9♀)	14	12	Successful (3) Failed (9)	9 pairs and 5 unpaired male territories; 8 pairs produced 12 nests (1 pair did not nest); 4 re-nests
DL-03	18 (10♂ 8♀)	8	18 (10♂ 8♀)	10	13	Successful (8) Failed (3) Unknown (2)	8 pairs and 2 unpaired male territories; 13 nests (1 re-nest and 4 second broods)
DL-04	16 (8♂ 8♀)	8	16 (8♂ 8♀)	8	16	Successful (9) Failed (7)	8 pairs produced 16 nests (5 re-nests and 3 second broods)
DL-07	7 (4♂ 3♀)	3	7 (4♂ 3♀)	4	6	Successful (2) Failed (3) Unknown (1)	3 pairs and 1 unpaired male territory; pairs produced 6 nests (3 re-nests)

2004 Southwestern Willow Flycatcher Study Results

Site name	WIFLs observed*	Est. # of pairs	Est. # of <i>E. t. extimus</i> **	Est. # of territories	Nest(s) Found***	Nest success	Comments
DL-09	7 (4♂ 3♀)	3	7 (4♂ 3♀)	4	4	Successful (2) Failed (2)	3 pairs and 1 unpaired male territory; pairs produced 4 nests (1 re-nest)
DL-10	1 (♂)	0	0	0	N/A	N/A	WIFL assumed to be a migrant
DL-12	1 (♂)	0	0	0	N/A	N/A	WIFL assumed to be a migrant
San Marcial reach summary	216 (124♂ 92♀)	92	205 (113♂ 92♀)	113	153	Successful (71) Failed (78) Unknown (4)	92 pairs, 21 unpaired male territories, 11 migrants
Total for all sites surveyed	334 (210♂ 124♀)	124	274 (150♂ 124♀)	150	187	Successful (85) Failed (89) Unknown (13)	124 pairs, 26 unpaired male territories, 60 migrants

(*) When a single WIFL responded to the tape playback, and there was no evidence of pairing, it was considered to be an unpaired male. However, it is possible that some of the WIFLs counted as males may have been females, especially during the migration period.

(**) 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.

(***) 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. Up to four nesting attempts in one season have been documented.

Site Descriptions

The following section contains an overview of the 49 sites where WIFLs, either migrant or resident, were detected during the 2004 season.

Site BA-01 is located on the southern boundary of the Bosque del Apache NWR on the west side of the Rio Grande (UTM NAD 83 Zone 13 south – 3736814 N 325648 E to 3732924 N 322831 E). Habitat is dominated by saltcedar (*Tamarix* sp.) with several interspersed areas of native willows and cottonwoods (*Populus deltoids* ssp. *wislizeni*), primarily along the river and high-flow channels. Some small patches of fairly high quality habitat exist that would be improved by regular overbank flow.

Site BA-03 North is located approximately 7 km north of the southern refuge boundary (UTM NAD 83 Zone 13 south – 3741030 N 327004 E to 3738796 N 326371 E). The entire site is very dry and dominated by dense saltcedar. One riverbar within the site contains some fairly high quality SWFL habitat in the form of mid-age coyote willow (*Salix exigua*), cottonwood, Russian olive (*Eleagnus angustifolia*), and saltcedar. All SWFLs documented in 2004 were found in this patch.

Site BA-06 South is approximately 3.2 km south of the northern boundary of the Bosque del Apache NWR (UTM NAD 83 Zone 13 south – 3745590 N 328829 E

to 3744316 N 328879 E). Habitat within the site consists of a mosaic of saltcedar, coyote willow, and overstory cottonwoods. Native vegetation dominates where hydrology is suitable, primarily along the river. The rest of the site is dominated by dense saltcedar with some opening in the middle of the site. The southern end of the site has been burned within the past few years.

Site BL-02 is immediately north of Highway 60 on the east side of the Rio Grande (UTM NAD 83 Zone 13 south – 3813277 N 334556 E to 3809953 N 335068 E). The habitat is sparse and dominated by saltcedar with occasional patches of overstory cottonwoods. The southern portion of the site has burned recently. Due to the degraded nature of the river channel, this site rarely, if ever, receives overbank flooding.

Site BL-04 is immediately north of site BL-02 on the east side of the river (UTM NAD 83 Zone 13 south – 3816503 N 334543 E to 3813277 N 334556 E). Habitat within this site is sparse and dry, similar to BL-02. The southern 0.8 km near the levee road burned a few years ago.

Site BL-05 is just north of BL-04 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 also burned a few years ago. Habitat along the river is composed of Russian olive and saltcedar, however, the majority of the site is totally unsuitable for SWFL habitation.

Site BL-13 is approximately 13 km south of the town of Belen on the west side of the river (UTM NAD 83 Zone 13 south – 3830765 N 339764 E to 3828298 N 338175 E). Habitat in this site is sparse for the most part. The northern half of the site is composed of open, sandy areas, several cottonwood galleries, and understory Russian olive and saltcedar. The southern portion of the site is contains more cottonwoods and understory. Water has ponded in the southwest corner of the site creating some moderately suitable SWFL habitat composed of dense Russian olive and saltcedar. This site is not likely to receive any overbank flooding.

Site BL-16 is just north of BL-13 on the east side of the river (UTM NAD 83 Zone 13 south – 3833343 N 339996 E to 3830871 N 340218 E). This site is dominated by exotic vegetation in the form of Russian olive (sometimes dense) and saltcedar. There are a few patches of native vegetation such as coyote willow and cottonwood. The site has very little potential for overbank flooding.

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 is currently the most heavily utilized SWFL site in the Middle Rio Grande. Because of this, prior to the 2004 survey season, it was split into two sites, DL-01 and DL-01a, to allow increased attention on the high quality habitat on the western side of this site. Formal surveys were not

conducted within this site. Instead, experienced/permited (nest monitoring) biologists conducted extensive nest searches/surveys. Thorough "survey" results were achieved without the additional disturbance/stress of "formal" surveys. 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 Low Flow Conveyance Channel (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 to DL-01. SWFLs in this site are concentrated in the high quality native habitat on the western edge along the LFCC. However, 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 rest 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 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). This site has been reduced in size (split into DL-04 and DL-04a) since the 2003 survey season to allow for increased attention to the high quality SWFL habitat adjacent to the river. 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. 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.

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.

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 weedy vegetation. This site was either flooded or saturated throughout the survey season.

Site DL-10 is on the southern end of the survey reach bordering the Rio Grande pilot channel on the east and site DL-09 on the west (UTM NAD 83 Zone 13 south – 3713090 N 306690 E to 3711593 N 304811 E). Habitat within the site is composed primarily of low-growing herbaceous vegetation such as cattails (*Typha* sp.), burdock (*Arctium minus*), and other emergent aquatics. However, in a few areas throughout the site, mid-age stands of Goodding's willow exist and provide fairly suitable SWFL habitat. Soil within this site was saturated during the early season, however, the site dried out fairly rapidly due to its disconnection from the pilot channel.

Site DL-12 is a long, narrow strip of habitat that runs adjacent to sites LF-17a, LF-17, DL-01, DL-02 and the northern end of DL-07 on the western side of the LFCC outfall (UTM NAD 83 Zone 13 south – 3719016 N 309039 E to 3715506 N 306009 E). Vegetation within this site varies from dense saltcedar to mature seep willow (*Baccharis salicifolia*) to pockets of mature Goodding's willow and cottonwood. There are several draws feeding into the Rio Grande that contain habitat potentially suitable for breeding SWFLs. Given the proximity of breeding SWFLs on the east side of the LFCC outfall, it is somewhat surprising that breeding SWFLs have not been found here. Much of this site is usually dry, with the exception of the eastern edge immediately adjacent to the LFCC outfall.

Site LF-04 is southeast of Socorro on the west side of the river (UTM NAD 83 Zone 13 south – 3770772 N 326976 E to 3767973 N 327797 E). The majority of this site is composed of sparse stands of saltcedar, occasional overstory cottonwood galleries and Russian olive. There are a few patches of native willows adjacent to the river. This site is used heavily for recreation, evidenced by a large concentration of roads within the site.

Site LF-05 is immediately below site LF-04 on the west side of the Rio Grande (UTM NAD 83 Zone 13 south – 3767973 N 327797 E to 3764011 N 327247 E). Like site LF-04, vegetation is composed primarily of saltcedar, Russian olive, and gallery cottonwoods. Few native willows exist in the site, and it rarely receives overbank flooding.

Site LF-06 is located south of site LF-05 on the west side of the Rio Grande approximately 5 km north of Highway 380 and San Antonio (UTM NAD 83 Zone 13 south – 3764011 N 327247 E to 3759938 N 328405 E). Vegetation within this site is similar to the rest of this reach; primarily saltcedar and Russian

olive with occasional overstory cottonwood galleries. Very little, if any, overbank flooding occurs here.

Site LF-12 is south of Fort Craig on the west side of the Rio Grande (UTM NAD 83 Zone 13 south – 3723102 N 314765 E to 3721226 N 313069 E). A mix of saltcedar, willow, and cottonwood dominate the habitat. This site is periodically subject to overbank flooding during periods of high riverflows. Some highly suitable habitat exists in this site in the form of dense, multi-story Goodding's willow, and it has been inhabited by SWFLs in years past.

Site LF-13 is just south of site LF-12 on the west side of the river between the LFCC and the Rio Grande (UTM NAD 83 Zone 13 south – 3721226 N 313069 E to 3719842 N 311418 E). Habitat is very similar to other sites in the area. Vegetation consists of dense patches of saltcedar interspersed within the overall mosaic of multi-story Goodding's willow and a few overstory cottonwoods. This site receives overbank flooding during periods of high riverflows. Over the past 3 or 4 years, however, this habitat has begun to die back and self-thin due to the lack of high riverflows and a presumably lowered groundwater table.

Site LF-14 is immediately adjacent to the powerline right-of-way south of Fort Craig, on the west side of the Rio Grande (UTM NAD 83 Zone 13 south – 3719842 N 311418 E to 3718850 N 310126 E). This site receives regular overbank flooding during high riverflows and contains some medium quality SWFL habitat. Habitat is composed of mature Goodding's willow interspersed with decadent saltcedar and overstory cottonwoods. Similar to sites LF-12 and 13, habitat within this site has begun to die back due to a reduction in riverflows and a possible lowered water table.

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. Due to water provided by the LFCC outfall, standing water or saturated soil was present in much of this site throughout the 2004 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, 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. 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 2004 survey season.

Site LF-17b was split off from site LF-17 prior to the 2004 survey season. It is composed of the lesser quality habitat to the east of site LF-17 west of the levee road (UTM NAD 83 Zone 13 south – 3718308 N 309016 E to 3717453 N 308282 E). Vegetative composition is a mix of native willows and exotic saltcedar in almost equal proportions. The mature willow vegetation on the east side of the site is decadent and dying due to the lack of water over the past several years, although the site was flooded for most of the 2004 survey season.

Site LF-18 is located between the levee road and the Rio Grande immediately east of LF-17b on the west side of the river (UTM NAD 83 Zone 13 south – 3718295 N 309101 E to 3716332 N 307751 E). Habitat is composed primarily of mature Goodding's willow with little understory. There is also some mature saltcedar encroaching into the southern end. This site receives overbank flooding during high riverflows but has begun to die out and has little understory.

Site LF-21 is located immediately south of the southern boundary of the Bosque del Apache NWR on the west side of the Rio Grande (UTM NAD 83 Zone 13 south – 3732924 N 322831 E to 3732177 N 321944 E). Habitat is a mixture of native and exotic vegetation with the Goodding's willow/cottonwood community and mature saltcedar being codominant. Further from the river, decadent saltcedar becomes dominant. This site was very dry during this season and does not appear to receive much overbank flooding.

Site LF-22 is approximately 2 km south of the southern boundary of the Bosque del Apache NWR on the west side of the river (UTM NAD 83 Zone 13 south – 3732177 N 321944 E to 3731409 N 321097 E). Vegetation is very similar to LF-21 with a mixture of native and exotic vegetation present.

Site LF-24 is approximately 4.5 km south of the southern boundary of the Bosque del Apache NWR on the west side of the river (UTM NAD 83 Zone 13 south – 3730314 N 320381 E to 3728915 N 318915 E). Habitat within the site is composed mainly of exotic vegetation; Russian olive along the river, and saltcedar in the interior and western edge of the site. Very little overbank flooding occurs in this site due to the height of the banks along the river; however, there is occasional standing water due to heavy rains and groundwater. In 2004, this site was surveyed for the first time since 1996.

Site LF-25 is southwest of site LF-24 on the north/west side of the river (UTM NAD 83 Zone 13 south 3728915 N 318915 E to 3728665 N 315388 E). This site included the "Condo Site," which was last surveyed in 1996, and was named for its abundance of nesting SWFLs at the time. Since then, habitat within the site has matured to the point where the once highly suitable willow habitat has somewhat outgrown the needs of nesting SWFLs. Currently, the habitat in this

site is a mixture of large, mature patches of Goodding's willow within a mosaic of saltcedar and Russian olive. Portions of this site hold water in the form of groundwater or floodwater.

Site LF-29 lies 4.5 km south of the railroad bridge on the east side of the Rio Grande (UTM NAD 83 Zone 13 south – 3724199 N 315543 E to 3722449 N 314325 E). This site is characterized by patchy vegetation dominated by a mixture of saltcedar and Goodding's willow. Much of this site lacks any significant understory, particularly in areas that contain mature stands of Goodding's willow or cottonwood. It receives fairly regular overbank flooding which promotes dense growth of willows along the river channel. Native vegetation is replaced by exotic species with increasing distance from the river.

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 berm running through the middle of the site that acts as a barrier to floodwaters and even the western side of the site doesn't appear to receive much overbank. This site was also 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 surveyed 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 held standing water during the early part of the survey season.

Site LF-39 is located approximately 4 km south of the San Acacia Diversion Dam on the east side of the river (UTM NAD 83 Zone 13 south – 3788630 N 325523 E to 3784915 N 326338 E). This site is a narrow, sparsely vegetated site containing mostly saltcedar with a few cottonwoods and Russian olives also present. It was dry throughout the entire 2004 survey season.

Site LF-41 is immediately north of the Escondida Bridge on the east side of the river (UTM NAD 83 Zone 13 south – 3780743 N 326482 E to 3777172 N 325979 E). Habitat is very similar to LF-39 and 42, being composed primarily of varying densities of saltcedar with occasional Russian olive and cottonwood.

Site LF-42 is located on the east side of the river immediately south of the Escondida Bridge (UTM NAD 83 Zone 13 south – 3777172 N 325979 E to 3774396 N 326810 E). Habitat within this site is a mixture of mature saltcedar,

Russian olive, and gallery cottonwood. Very little overbank flooding occurs due to the highly incised banks. Due to landowner issues, this site was only surveyed once during the 2004 season.

Site LF-44b is a small site (1.8 km long) located approximately 7 km north of Highway 380 on the east side of the river (UTM NAD 83 Zone 13 south – 3762828 N 327956 E to 3761109 N 328195 E). Habitat in this site is dominated by saltcedar, very dense and decadent in the southern half and sparser in the northern half. There are several linear patches of cottonwoods running through the site and also patches of upland species like mesquite (*Prosopis* sp.). This site is very dry and doesn't receive much overbank flooding.

Site LF-45, immediately south of Highway 380 on the east side of the road, is the first site north of the Bosque del Apache NWR (UTM NAD 83 Zone 13 south – 3754715 N 328897 E to 3749317 N 329107 E). Various densities of saltcedar, much of which burned a few years ago, dominate habitat within this site. There are several patches of mature Russian olive adjacent to the river and a few large cottonwood galleries.

Site SV-01 is just upstream of the San Acacia Diversion Dam on the east side of the Rio Grande (UTM NAD 83 Zone 13 south – 3793719 N 328870 E to 3792140 N 326238 E). Near the river, the site is composed of patches of dense coyote willow, Russian olive, saltcedar, and cottonwoods interspersed with sparse patches of understory saltcedar and willow. Away from the river, the southern end is primarily dry, dense saltcedar, while the northern end is very sparse and contains little vegetation.

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-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. It is in these patches that SWFLs were discovered in 2004. 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-10, located on the east side of the Rio Grande, immediately downstream of the confluence with the Rio Puerco (UTM NAD 83 Zone 13 south – 3804841 N 330669 E to 3802524 N 329275 E), contains very little habitat suitable for breeding SWFLs. The majority of the habitat in this site is sparse saltcedar with occasional Russian olives (usually adjacent to the river) and cottonwoods. The eastern half of the site is particularly sparse and sandy. There are a few high-flow channels that occasionally receive overbank flooding, however, most of the site is dry.

Site SV-12 is located 2 km south of Bernardo and Highway 60 on the west side of the Rio Grande (UTM NAD 83 Zone 13 south – 3808021 N 333055 E to 3806837 N 331875 E). Habitat within this site is also very sparse and composed almost entirely of saltcedar. There are a few cottonwoods and several Russian olives closer to the river. The site is very dry and rarely, if ever, receives overbank flooding.

Site SV-13 is located immediately south of Highway 60 and Bernardo (UTM NAD 83 Zone 13 south – 3809930 N 334520 E to 3808021 N 333055 E). Habitat within this site is very similar to that of SV-12; very sparse saltcedar composes most of the habitat with a few Russian olives and cottonwoods near the river.

Site SV-14 is located immediately south of Highway 380 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 flood plain. 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.

Site SV-15 is south of SV-14, adjacent to the Rio Puerco confluence (UTM NAD 83 Zone 13 south – 3806618 N 331677 E to 3804617 N 330394 E). Like most of the northern SV sites, habitat in site SV-15 is composed primarily of sparse saltcedar with occasional willows and cottonwoods. The San Juan Riverside Drain is the southern and eastern boundary of this site and provides an additional hydrologic component. However, most of this site is high and dry during normal riverflows.

Site VL-02 (also called La Rinconada) is a small site (0.52 hectare) located adjacent to the town of Velarde in northern New Mexico (UTM NAD 27 Zone 13

south – 4001207 N 410670 E). In 2004, the SWFL territory was at a site about 20 to 50 m upstream of the patch that was known to be occupied by a breeding pair of SWFLs from 1995-2000, then subsequently abandoned. This new site is contiguous with the previous site and is on a narrow “island” between the Rio Grande and a narrow slough. This slough probably serves as a drain for the adjacent irrigated agriculture. The entire habitat patch is on the river side of a recently constructed flood-control berm. The slough contained a moving stream of water about 0.5 meter (m) deep and supports a developing dense stand of emergent wetland vegetation and coyote willow (2 to 3 m tall). Dense Russian olive (3 to 5 m tall) with an overstory of scattered Siberian elm and Rio Grande cottonwood dominate the adjacent “island.” Thistle, whitetop, and other invasive weeds dominate the herbaceous understory. The entire area is bordered by irrigated orchards and hayfields on the east side, resulting in a narrow strip (10 to 20 m wide) of riparian habitat. The previously occupied habitat patch downstream still maintains habitat suitability of dense willow understory and cottonwood/box elder (*Acer negundo*) overstory. However, the willows have been thinned from beaver activity and probably drought.

Species of Special Concern

Occurrences of special status species were recorded in all survey reaches except the Belen reach. Results for the Sevilleta/La Joya, San Acacia, Escondida, Bosque del Apache, Tiffany, and San Marcial reaches are presented in Figures 11 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 24 and 25 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 LF-27. No Common Ground-Doves were detected during the 2004 season.

Nest Searches/Monitoring

In 2004, Reclamation personnel monitored a total of 187 nests in the Middle Rio Grande. Of these, 85 were successful, 89 failed, and 13 were unknown (mostly due to nest height and the inability to monitor). Thirty-two nests were parasitized, and BHCO eggs were added and replaced in 16 nests (Table 4). Of those 16 nests, 9 failed directly due to BHCO parasitism (i.e., abandoned after parasitism or BHCO nestlings outcompeted SWFLs for food), 5 were predated, and 2 fledged SWFL young (neither nest hatched a BHCO egg). Of the other 16 parasitized nests in which BHCO egg manipulation was either impossible or not warranted, 7 failed directly due to BHCO parasitism, 5 were predated, 1 was abandoned, and 3 fledged SWFL young (1 of which fledged SWFLs and a BHCO

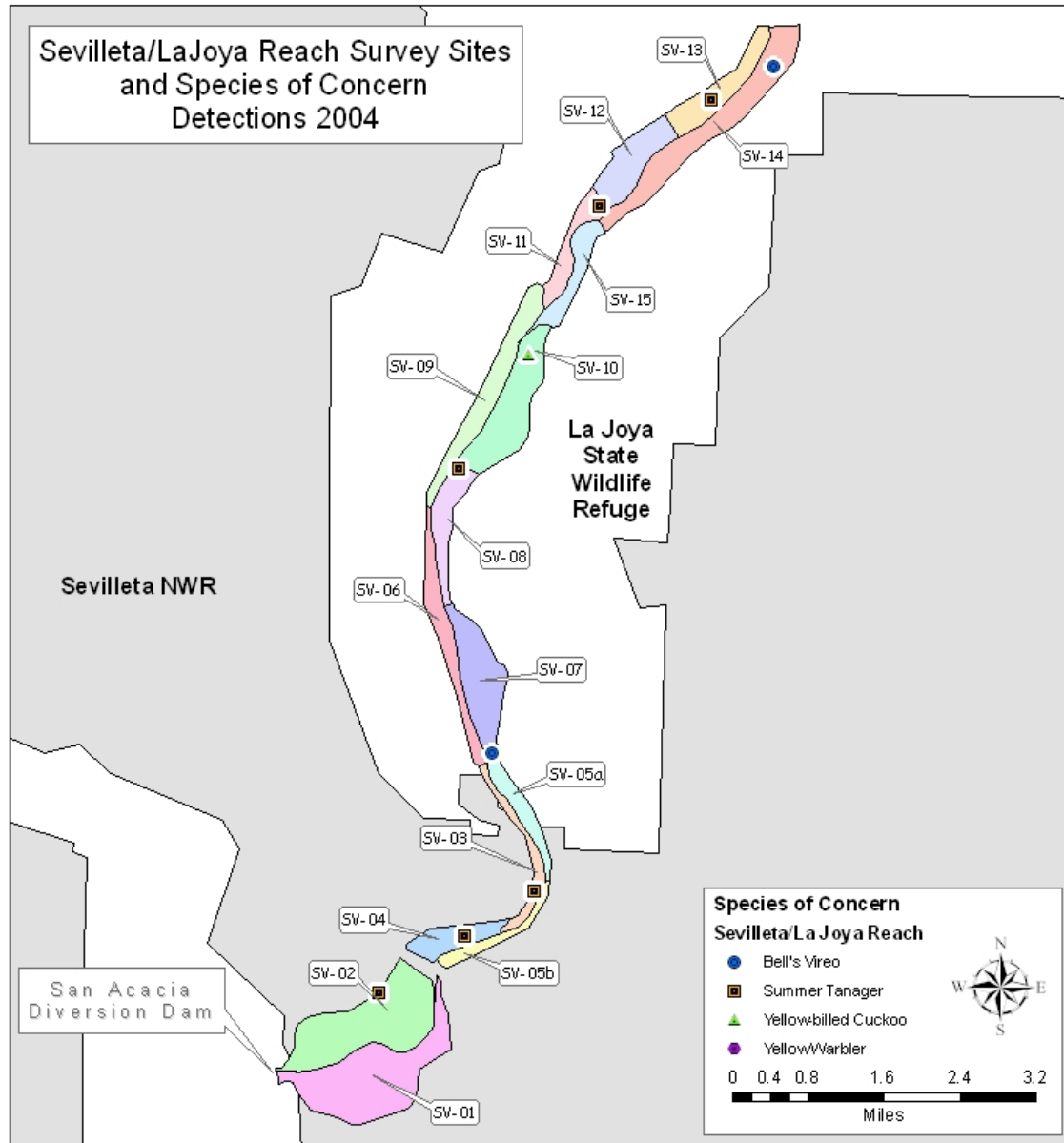


Figure 11. Species of concern occurrences – Sevilleta/La Joya – 2004.

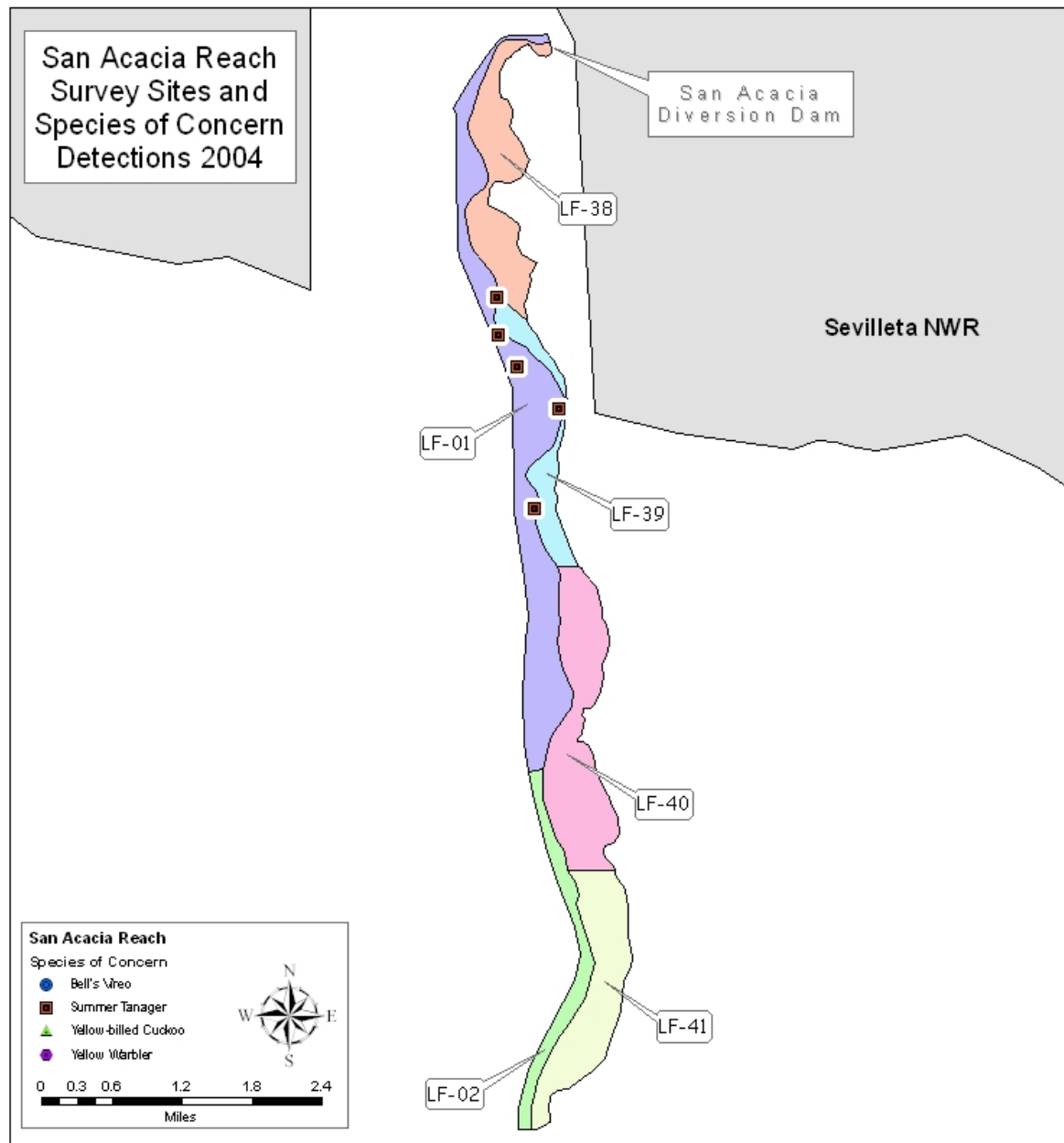


Figure 12. Species of concern occurrences – San Acacia reach – 2004.

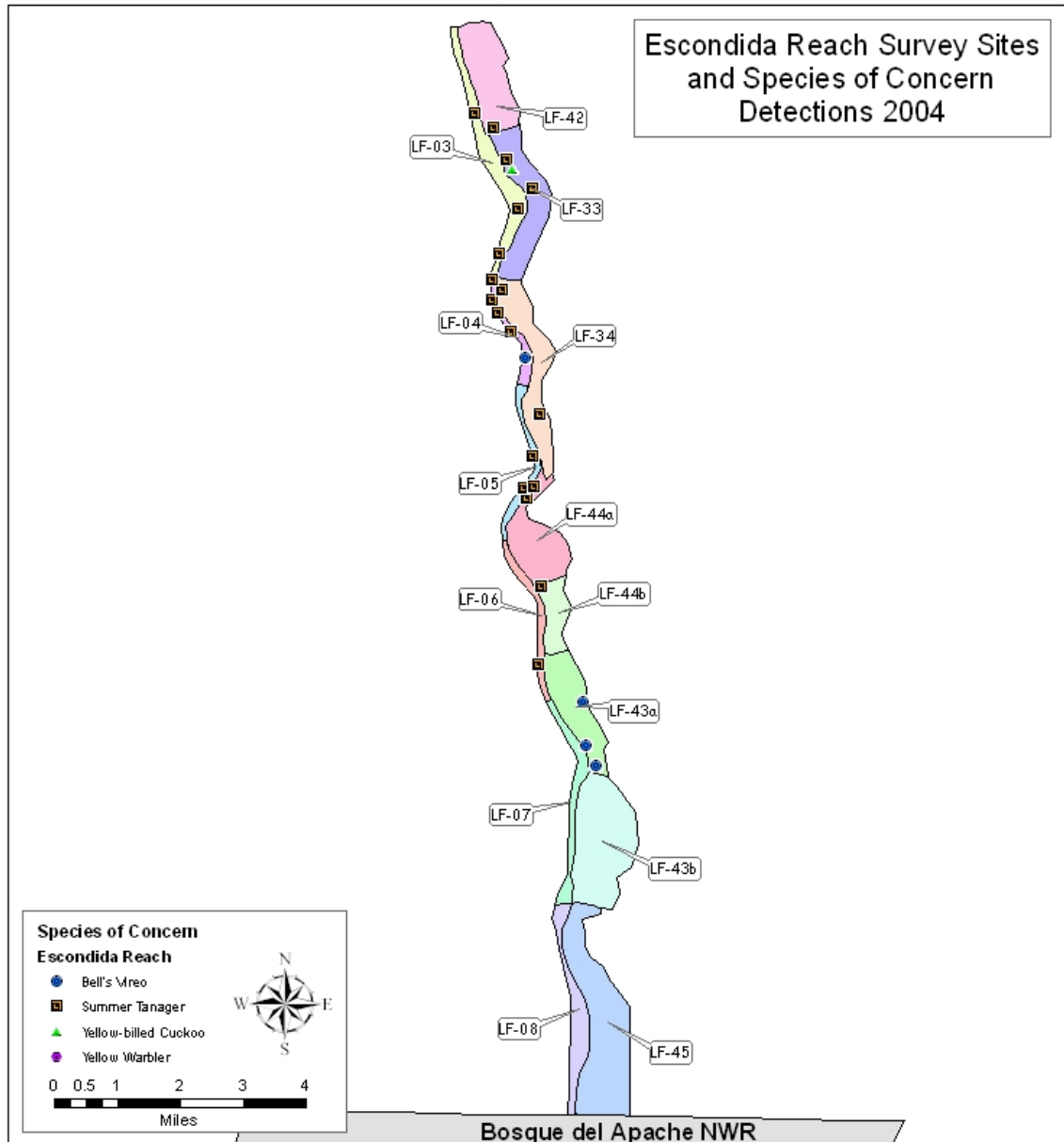


Figure 13. Species of concern occurrences – Escondida reach – 2004.

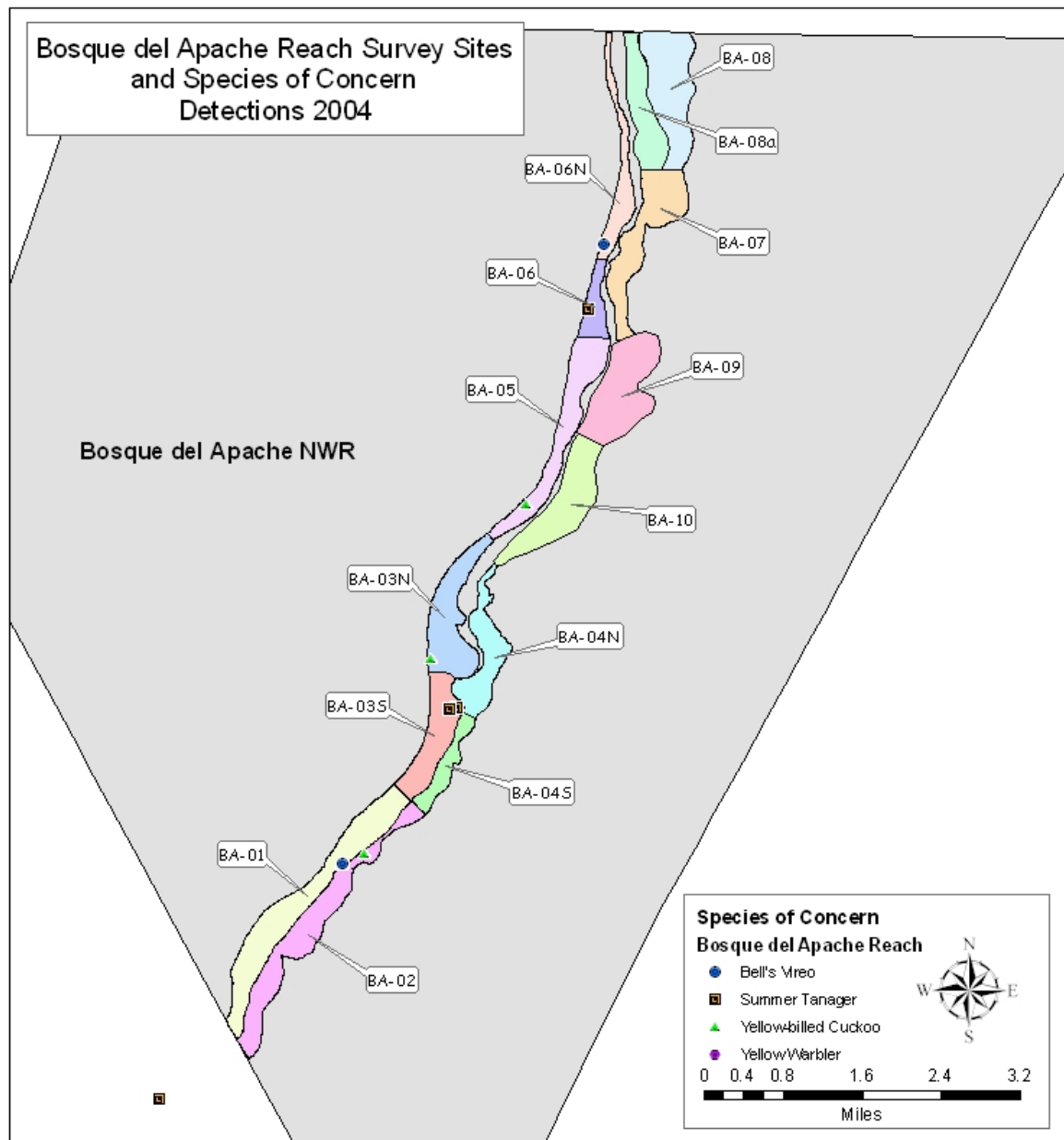


Figure 14. Species of concern occurrences – Bosque del Apache reach – 2004.

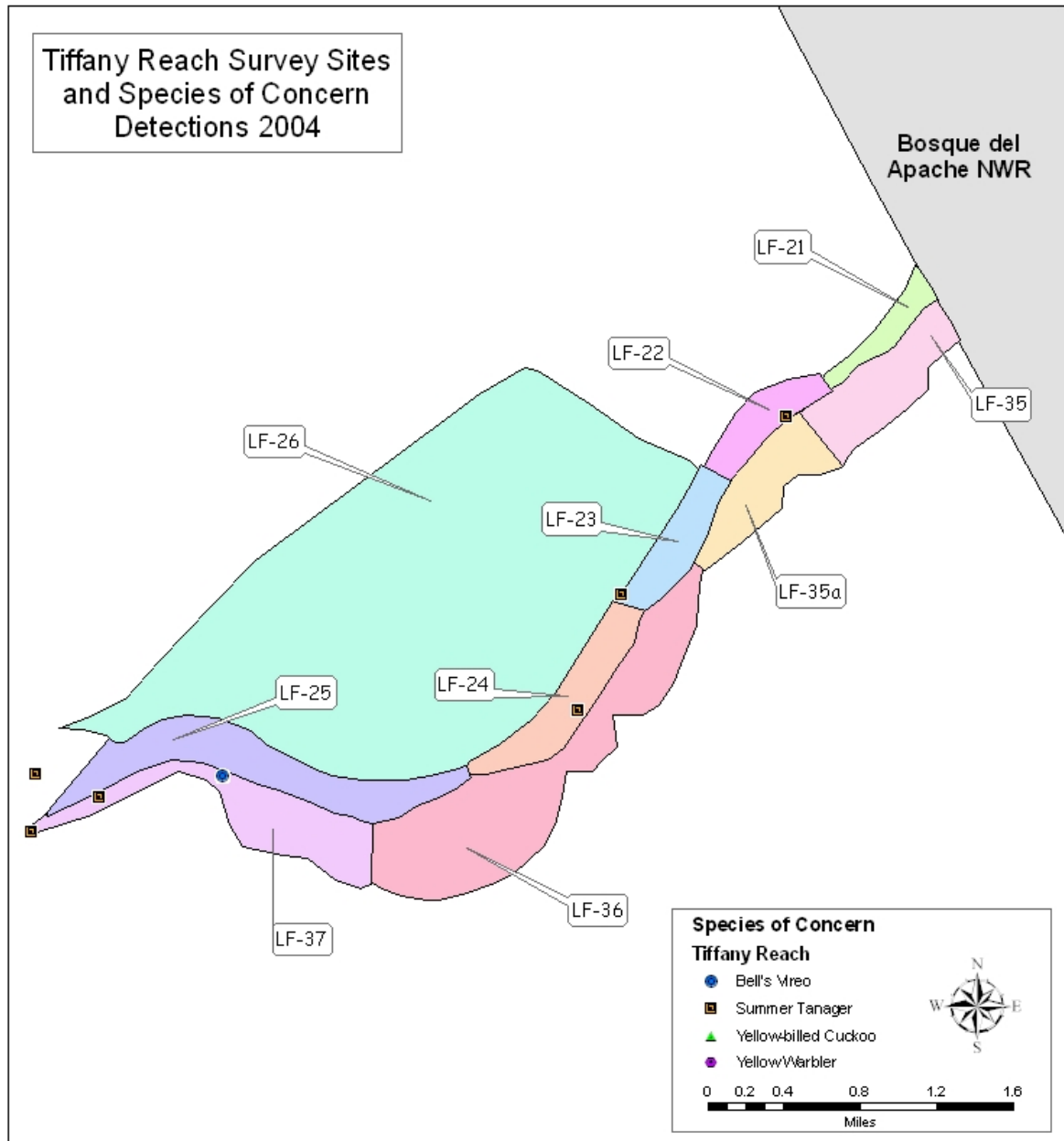


Figure 15. Species of concern occurrences – Tiffany reach – 2004.

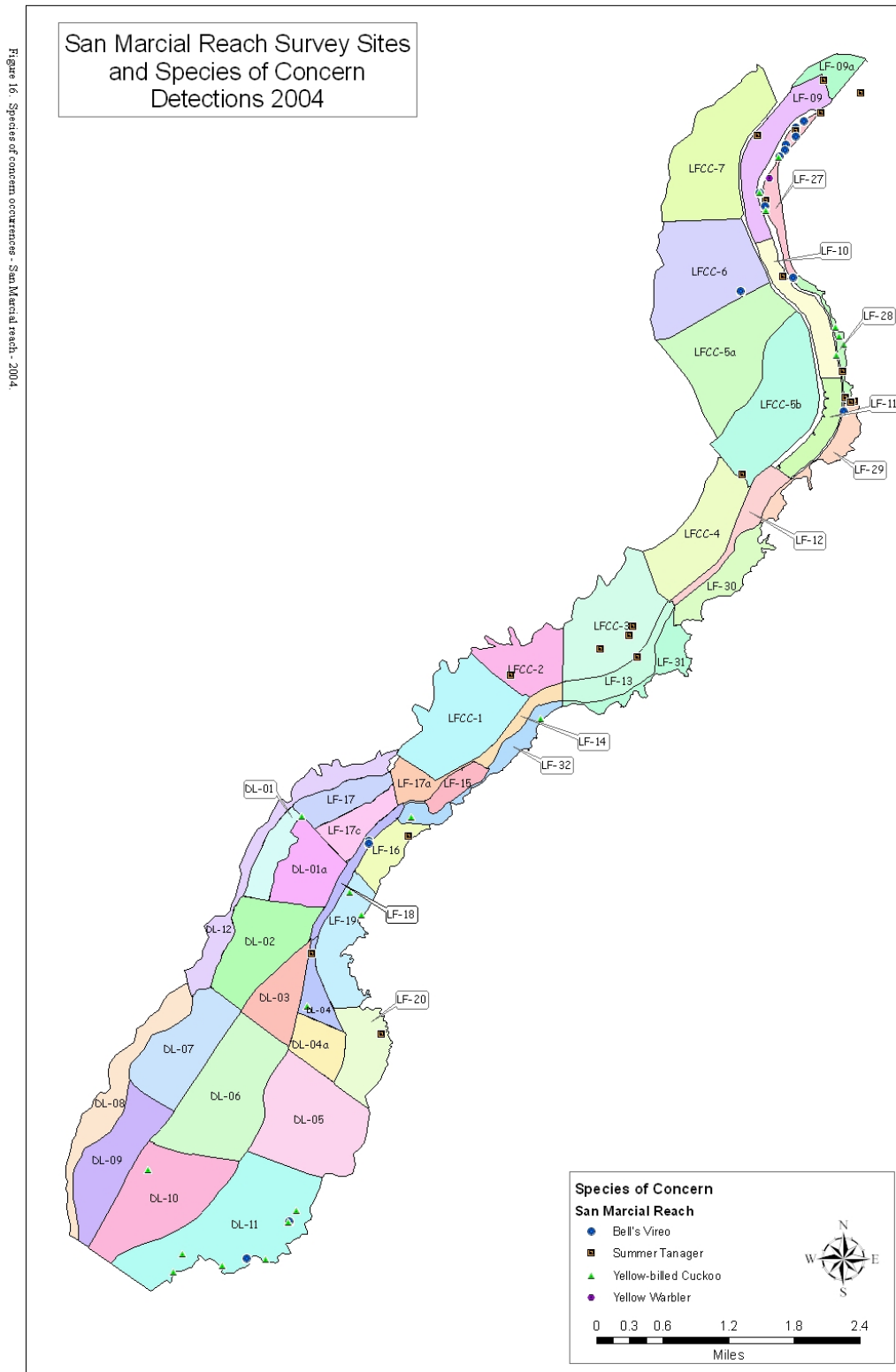


Figure 16. Species of concern occurrences – San Marcial reach – 2004.

Table 4. Summary of parasitized SWFL nests in the Middle Rio Grande – 2004

Fate of Nest	Number of Nests (n=32)*
Failed directly due to parasitism	16
BHCO egg(s) addled and replaced	16
Predated w/o addling	5
Predated after addling	5
Fledged SWFLs w/o addling	3
Fledged SWFLs after addling	2
Abandoned w/o addling	1
Abandoned after addling	0

* Nest numbers in table do not equal total (32) 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.

simultaneously). The following is a reach-by-reach and site-by-site summary of the SWFL nest monitoring efforts of 2004:

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, this reach is dominated by exotic species (saltcedar and Russian olive). This reach supported 19 territories and 18 SWFL pairs during the 2004 season. Twenty-one nests were discovered; 5 were re-nests and 1 was a second brood. Seven nests were successful, seven failed, and the outcome of seven was unknown. At least 15 young are believed to have successfully fledged from these nests. Five nests were parasitized; three were successful and two were predated. BHCO eggs from two of the parasitized nests were addled. Of these, one was successful and one was predated. 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 2004:

SV-03 - Eleven pairs produced 12 nests during the 2004 breeding season. Pairing was confirmed for nine pairs by the presence of nesting activity, and two pairs never nested (or the nest was never discovered). Three re-nests were documented. Two nests were assumed to be successful, four were predated, and six had unknown outcomes. The prevalence of unknown outcomes in this site is attributed to the height at which these SWFLs often place their nests. Monitoring nests higher than 5 m is very difficult to do without severely disturbing the nests, particularly in dense vegetation. Two nests were parasitized. Three young were assumed to have fledged from this site.

SV-09 – Six pairs produced nine nests in this site during the 2004 breeding season, including two re-nests and one second brood. Five of the nests were successful, two were predated, one was abandoned, and the fate of one was unknown. Three nests were parasitized and 12 SWFLs were assumed to have fledged from this site.

Bosque del Apache reach

One nesting pair of SWFLs was documented in site **BA-03N**. They produced two nests; one was predated and then parasitized early in the nesting cycle, and the re-nest successfully fledged three SWFL young. See Appendix B for detailed nest site and nest monitoring data forms.

Tiffany reach

Thirteen SWFL pairs produced 11 nests in this reach, including one re-nest. Ten pairs were verified by documented nesting activity and nests were not found for the other three pairs. Six nests were successful, one nest was predated, one was abandoned after being built, one failed due to BHCO parasitism, and two were unknown. Fourteen fledglings were assumed to have fledged from this reach. One nest in this reach was parasitized, the BHCO egg was added, and the nest was subsequently abandoned and predated. See Appendix B for detailed nest site and nest monitoring data forms.

LF-25 – Two pairs were documented in this site. One produced two nests, and nesting was not documented by the other pair. One nest was successful, fledging two SWFLs, and the other was abandoned after being constructed. Neither nest was parasitized.

LF-35 – Four pairs in this site each produced one nest. Three nests were successful, and the outcome of one was unknown. None of the nests was parasitized, and six SWFLs were assumed to have fledged from this site.

LF-37 – Seven pairs were documented in this site. Five of the pairs produced one nest each, and nesting was not documented for the other two. Two of the nests were successful, one was predated, one was abandoned after being parasitized, and the fate of one was unknown. The parasitized nest contained one SWFL egg and one BHCO egg; upon discovery, the BHCO egg was added, and the nest was abandoned soon thereafter.

San Marcial reach

A total of 92 pairs and 153 nests (including 41 re-nests and 22 second broods) were documented in this reach in 2004. Eighty-nine pairs were confirmed by the presence of nesting activity, the other 3 did not construct nests or nests were not found. Fledging of SWFL young occurred in 71 of the 153 nests, 48 were predated, 15 were abandoned, 15 failed directly due to parasitism, and the fates of 4 were unknown. The 89 SWFL pairs in this reach produced 187 fledglings.

This reach contained 25 parasitized nests; 15 failed directly due to BHCO parasitism, 7 were subsequently predated, 1 was abandoned, and 2 successfully fledged young WIFLs. Thirteen of the parasitized nests were accessible enough and timed right to mandate addling; 8 failed directly due to BHCO parasitism, 4 were subsequently predated, and 1 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 2004 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 contained 27 nesting pairs that produced 47 nests, including 14 re-nests and 7 second or third broods. Twenty-one nests were determined to be successful and 26 failed; 15 were predated, 7 failed directly due to BHCO parasitism, and 4 were abandoned. Eleven nests were parasitized. BHCO eggs were added and replaced in five nests, four of which failed directly due to BHCO parasitism and one was predated. Of the other six, two were predated, one was abandoned, and three failed directly due to BHCO parasitism. At least 60 SWFLs were assumed to have fledged from this site.

DL-02 – Nine pairs were documented in this site; eight by documented nesting, and one by observing pair interaction. The 8 pairs produced 12 nests, including 4 re-nests. Three nests successfully fledged young, five were predated, three were abandoned, and one failed due to BHCO parasitism. Two nests were parasitized. Of these two, one was abandoned after parasitism, and the second was predated after adding the BHCO egg. Nine SWFLs were assumed to have fledged from this site.

DL-03 – Eight pairs were documented in this site by confirmed nesting. Thirteen nesting attempts, including 1 re-nest and 4 second broods, were monitored. Of these, eight were successful, two were predated, one failed directly due to BHCO parasitism, and the fate of two were unknown. Two nests were parasitized; one was predated, and one failed directly due to BHCO parasitism. Twenty-two SWFLs fledged from this site.

DL-04 – This site contained 8 nesting pairs that produced 16 nests, including 5 re-nests and 3 second broods. Nine of the nests were successful, five failed due to predation, one was abandoned, and one failed due to BHCO parasitism. Only one nest was parasitized and was abandoned soon after. Twenty SWFLs fledged from this site.

DL-07 – Three pairs in this site produced six nests (three re-nests). Two nests successfully fledged young, three were predated, and the fate of one was unknown. No nests were parasitized and a total of four SWFLs fledged.

DL-09 – Three pairs in this site produced four nests, including one re-nest. Two nests were successful, one was predated, and one failed due to BHCO parasitism. Two nests in this site were parasitized; one fledged three SWFLs after the BHCO egg was added and the other was abandoned soon after parasitism. Five SWFLs fledged from this site.

Table 5. Summary of SWFL nest monitoring (1994-2004) - 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 (10%)*	1 (5%)	2 (10%)*	2	14 (74%)	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 (50%)	≥126	2.6
2004	113	92	153**	25 (17%)*	48 (32%)*	15 (10%)*	4	71 (48%)	187	2.6

* Some nests were parasitized, predated, and/or abandoned.

** Some pairs re-nested after failed attempt or attempted a second, third, or fourth brood.

LF-17 – This site contained 36 nests from 23 SWFL pairs, including 8 re-nests and 5 second broods. Fifteen nests were assumed to have successfully fledged SWFL young, 9 were predated, 7 were abandoned, 4 failed directly due to BHCO parasitism, and the fate of 1 was unknown. Seven nests were parasitized in this site; two were predated after parasitism, three were abandoned, one failed after the BHCO egg hatched but SWFL eggs did not hatch, and one nest successfully fledged SWFLs after being parasitized with nestlings already in the nest. Of the seven parasitized nests, BHCO eggs were added in six of them. Of these six, all failed. A total of 37 SWFLs were assumed to have fledged from this site in 2004.

LF-17a – Eleven pairs in this site produced 19 nests (3 re-nests and 5 second broods). Of these, 11 were successful and 8 were predated. No nests were parasitized and 30 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 lows of zero and one in 2002 and 2004, respectively (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

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 2004

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
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
Belen	n/s	n/s	n/s	n/s	n/s	n/s	n/s	1 T 0 P	n/s	0
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
San Acacia	n/s	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
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
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
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
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

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.

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 very 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, however, they usually do not exhibit the width or height structure suitable for resident SWFLs. This, in combination with the fact that the reach receives very little overbank flooding and the nearest occupied habitat is between 8 and 35 km from sites in this reach, makes it unlikely that this reach will hold a significant number of resident SWFLs in the near future.

Sevilleta/La Joya reach

SWFLs in the Sevilleta/La Joya reach were first documented in 1999, and territory numbers have steadily increased since then. During the 2004 season, the entire reach was surveyed again. As can be seen in Table 6, territory and pair numbers increased from 2003 to a total of 19 and 18, respectively. Habitat within this reach, particularly within site SV-03 where the bulk of the territories occur, has not changed in the past 5 years. The fact that this population keeps 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.

The fact that this population has not only persisted but expanded is also of significant interest due to the type of habitat within this reach. Decadent 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. Furthermore, this site rarely receives overbank flooding. 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 medium 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 2004, 14 WIFLs were documented in this reach, and all were considered migrants. Surveys were suspended in site LF-42 after the first survey. During this survey on May 19, three WIFLs were documented. Due to the lack of habitat quality within this site, similar to that stated above, it is probable that these birds were migrants and would not have established territories within this site. Thus, in 2004 no territories were discovered in this reach, and it is unlikely that any SWFLs will occupy this reach in the near future unless major changes occur to the habitat and/or hydrology.

Bosque del Apache reach

The active flood plain within the Bosque del Apache NWR was surveyed in its entirety in 2004. Six WIFLs were documented. Four were determined to be migrants and two formed a breeding pair that produced two nests and fledged three young. This pair was located in an entirely different site from the pair located in this reach in 2003. This change of nest sites suggests there is suitable habitat available to nesting SWFLs on the Bosque del Apache, if only immigrating individuals from other local populations can find suitable habitat and establish territories. In future years, the areas that have been utilized for nesting have potential for the establishment of local populations.

Tiffany reach

In 2004, a comprehensive survey of this reach was conducted for the first time since 1996. Thus, it is unclear what the trend of this population has been over the past several years. The nesting population found in the "Condo site" in 1996 appears to have radiated to several adjacent sites. Three sites held resident SWFLs during the 2004 season, with the largest population being seven territories in a site (LF-37) across the river from site LF-25 (the "Condo site"). It appears that as habitat in site LF-25 matured, some birds moved to adjacent habitat. The habitat in site LF-25 is medium-age, medium-density saltcedar with a sparse overstory of occasional Goodding's willow. It is these types of presumably marginal habitat that, when in proximity to a population of SWFLs, can become successful breeding habitat.

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 2004. Since 1995, SWFL territories and available habitat below the railroad bridge have increased greatly (Tables 5 and 6). Territories are located almost exclusively within the conservation pool of Elephant Butte Reservoir in the high quality native habitat between sites LF-17a and DL-09 where the combination of hydrology and vegetation provides optimal habitat. As habitat continues to mature within the delta of Elephant Butte Reservoir as the reservoir pool recedes, it is likely that this population will continue to expand. However, sites such as LF-27 and LF-14 that formerly supported SWFL territories but no longer do, may now be less attractive to SWFLs due to a lack of overbank flooding and the proximity of higher quality habitat in the delta area. A combination of less water and aging vegetation has caused these sites to lose the vertical stratification and density that is characteristic of high quality SWFL habitat. This situation appears to have contributed to SWFLs moving to more suitable areas.

Nest Searches/Monitoring

Sevilleta/La Joya reach

SWFL nesting during the breeding season of 2004 was the most prolific of any year since SWFLs were discovered in this reach in 1999 (Table 7). The abundance of pairs and nests monitored was greater than in the past 5 years. There are, however, several variables that could be explored within this reach including average nesting height and BHCO parasitism.

Table 7. Reach-by-reach summary of SWFL nests in lands surveyed by Reclamation between 1995 and 2004

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

n/s = not surveyed

⁽¹⁾ Nest monitoring results from 1995 and 1996 in the Tiffany reach are from the NMNHP. 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.

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.

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. Five nests (36 percent of known outcomes, $n = 14$) were parasitized as compared to 25 in the San Marcial reach (16 percent, $n = 153$). This difference is likely due to habitat differences and the greater density of BHCOs in the Sevilleta/La Joya reach (Moore and Ahlers 2003).

Bosque del Apache reach

One nesting pair produced two nests in this reach in 2004. Again, this territory was in a different location from the nesting pair in 2003. Ideally, with a few additional nesting pairs and the absence of high predation and parasitism rates, this small population could potentially expand into the available habitat in the next 5 to 10 years to become a self-sustaining population. Similar to the Sevilleta/La Joya and San Marcial reaches, it appears that there is more suitable habitat than is currently occupied.

One interesting fact regarding the pair found in this site is that both nests were placed in seep willow (*Baccharis* sp.). This is the first time on the Middle Rio Grande that seep willow has been documented as a SWFL nesting substrate.

Tiffany reach

This reach contains a significant portion of the SWFL nesting activity in the Middle Rio Grande. Whether the number of nests found in 2004 differs greatly from previous years is unknown due to the lack of survey and nest monitoring data from the past seven years. Regardless, this population seems to be stable and appears to be experiencing a high rate of nest success. It is likely that if these conditions continue, this population should expand and be a potential source population for the surrounding areas.

Similar to the Sevilleta/La Joya reach, nests in this reach have a tendency to be placed higher in the substrate than in the San Marcial reach, resulting in a greater proportion of nests with unknown fates due to observer inaccessibility. The reason for this nest placement is currently unknown, however, it is likely due to predation pressure or habitat availability.

San Marcial reach

During the 2004 survey season, 153 SWFL nests were documented. This is a significant increase over 2003 and continues a dramatic increase over the past seven years (Tables 5 and 7). 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 over the following four 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 experienced by both adults and fledglings, and consistently high rates of pair nesting success. However, 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. 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 2004 no cowbird trapping was done, and the parasitism rate among San Marcial SWFL nests ranged from 16 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 flood plain, 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 2004 breeding seasons, 378 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 6 years, a total of 454 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 2004. Statistical comparisons between categories were made using Chi-square tests. The following comparisons were considered: nesting success vs. nest substrate and dominant territory vegetation and BHCO parasitism vs. nest substrate and dominant territory vegetation. Between 1999 and 2004, 37 nests (8.1 percent) were in saltcedar-dominated territories, 364 (80.2 percent) were in *Salix*-dominated territories, and 53 (11.7 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 (54.5 percent, n = 356) areas were no more successful than those placed in saltcedar-dominated (60.0 percent, n = 30) or mixed-dominance areas (51.0 percent, n = 49) ($\chi^2 = 0.61$, df = 2, P = 0.74). 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). A significant difference was documented between at least two of the habitat types ($\chi^2 = 6.15$, df = 2, P = 0.05). Based on observed parasitism rates, it can be assumed that the differences are between *Salix*-dominated territories (14.0 percent, n = 356) and both saltcedar-dominated (26.7 percent, n = 30) and mixed-dominance territories (24.5 percent, n = 49). A possible explanation of this occurrence would be habitat quality. SWFLs evolved in native stands of vegetation and are likely more able to conceal and defend their nests in this habitat.

Productivity of nests, defined as number of birds fledged per successful nest, in *Salix*-dominated habitats was slightly greater (2.59 fledged birds/nest, n = 194) than nests located in both mixed-dominance territories (2.36 fledged birds/nest, n = 25)

Table 8. Habitat comparison of SWFL nesting within the Middle Rio Grande – 1999 to 2004

Territory Vegetation Type		
Number of nests in exotic dominated territories	37	8.1% of total
Number of nests in <i>Salix</i> sp. dominated territories	364	80.2% of total
Number of nests in mixed dominance territories	53	11.7% of total
Nest Substrate Species		
Number of nests in <i>Salix</i> sp. substrate	261	57.5% of total
Number of nests in <i>Baccharis</i> sp. substrate	2	<1.0%
Number of nests in saltcedar substrate	171	37.7% of total
Number of nests in Russian olive substrate	20	4.4% of total
Nest Substrate/Territory Vegetation Combination		
Number of nests in saltcedar substrate within <i>Salix</i> sp. dominated territories	109	(29.9% of 364 nests)
Number of nests in <i>Salix</i> sp. substrate within saltcedar or mixed dominated territories	6	(6.7% of 90 nests)
Nest Success Per Nest Substrate Species		
Percentage of successful nests in <i>Salix</i> sp. substrate	55.5%	(140 out of 254 nests successful)
Percentage of successful nests in <i>Baccharis</i> sp. substrate	50.0%	(1 out of 2 nests successful)
Percentage of successful nests in saltcedar substrate	55.0%	(88 out of 160 nests successful)
Percentage of successful nests in Russian olive substrate	66.7%	(12 out of 18 nests successful)
Nest Success Per Territory Vegetation Type		
Percentage of successful nests in <i>Salix</i> sp. dominated territories	54.5%	(194 out of 356 nests successful)
Percentage of successful nests in saltcedar dominated territories	60.0%	(18 out of 30 nests successful)
Percentage of successful nests in mixed dominance territories	51.0%	(25 out of 49 nests successful)
Cowbird Parasitism Per Nest Substrate Species		
Percentage of nests parasitized in <i>Salix</i> sp. substrate	14.5%	(37 out of 255 nests parasitized)
Percentage of nests parasitized in <i>Baccharis</i> sp. substrate	50.0%	(1 out of 2 nests parasitized)
Percentage of nests parasitized in saltcedar substrate	18.6%	(29 out of 156 nests parasitized)
Percentage of nests parasitized in Russian olive substrate	16.7%	(3 out of 18 nests parasitized)
Cowbird Parasitism Per Territory Vegetation Type		
Percentage of nests parasitized in <i>Salix</i> sp. dominated territories	14.0%	(50 out of 356 nests parasitized)
Percentage of nests parasitized in saltcedar dominated territories	26.7%	(8 out of 30 nests parasitized)
Percentage of nests parasitized in mixed dominance territories	24.5%	(12 out of 49 nests parasitized)
Productivity Per Territory Vegetation Type		
Productivity ⁽¹⁾ of all nests (n=194) found in <i>Salix</i> sp. dominated territories	2.59/nest	(502 young from 194 nests)
Productivity of all nests (n=18) found in saltcedar dominated territories	2.17/nest	(39 young from 18 nests)
Productivity of all nests (n=25) found in mixed dominance territories	2.36/nest	(59 young from 25 nests)
Productivity Per Nest Substrate Species		
Productivity of all nests (n=140) found in <i>Salix</i> sp. substrate	2.56/nest	(358 young from 140 nests)
Productivity of all nests (n=1) found in <i>Baccharis</i> sp. substrate	3.00/nest	(3 young from 1 nest)
Productivity of all nests (n=88) found in saltcedar substrate	2.43/nest	(214 young from 88 nests)
Productivity of all nests (n=12) found in Russian olive substrate	2.08/nest	(25 young from 12 nests)
Productivity Compared to Nest Substrate Species and Territory Vegetation Type		
Productivity of nests in <i>Salix</i> substrate within <i>Salix</i> sp. dominated territories	1.96/nest	(269 young from 137 nests)
Productivity of nests in saltcedar substrate within <i>Salix</i> sp. dominated territories	2.65/nest	(151 young from 57 nests)
Productivity of nests in saltcedar substrate within saltcedar dominated territories	2.17/nest	(39 young from 18 nests)
Total SWFL nests monitored	454	

⁽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 – 2004 – Middle Rio Grande

Comparison	Chi-square Tests ($\alpha = 0.05$)		P-value
	χ^2 value	Degrees of freedom	
Success and dominant territory vegetation	0.61	2	0.74
Parasitism and dominant territory vegetation*	6.15	2	0.05
Success and substrate species	0.96	3	0.81
Parasitism and substrate species	2.87	3	0.41
Parasitism by survey reach	5.65	2	0.06

* denotes statistical significance documented

Table 10. Details of parasitism comparisons performed on SWFL nest data from 1999 - 2004 in the Middle Rio Grande

Parasitism comparison	Chi-square Tests with Yates' Correction ($\alpha = 0.05$)		P-value
	χ^2 value	Degrees of freedom	
Salix-dominated vs. saltcedar-dominated territories	2.53	1	0.11
Salix-dominated vs. mixed-dominance territories	2.86	1	0.09
Saltcedar-dominated vs. mixed-dominance territories	0.00	1	1.00
Sevilleta/La Joya vs. San Marcial*	4.71	1	0.03
Sevilleta/La Joya vs. Tiffany	0.43	1	0.51
Tiffany vs. San Marcial	0.00	1	1.00

* denotes statistical significance documented

and saltcedar-dominated habitats (2.17 fledged birds/nest, $n = 18$). 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 80.2 percent of SWFL nests over the past 5 years were found in *Salix*-dominated areas, 37.7 percent of all nests and 29.9 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*), 55.0 percent (saltcedar), and 66.7 percent (Russian olive). No statistically significant difference was found to exist between any substrate classes ($\chi^2 = 0.96$, $df = 3$, $P = 0.81$). Additionally, parasitism rates between nests placed in the three different substrates (*Salix* 14.5 percent, saltcedar 18.6 percent, and Russian olive 16.7 percent) were similar ($\chi^2 = 2.87$, $df = 3$, $P = 0.41$). Productivity of SWFL nests in *Salix* (2.55 fledged birds/nest, $n = 140$) and saltcedar (2.40 fledged birds/nest, $n = 88$) was slightly greater than those located in Russian olive substrate (2.08 fledged birds/nest, $n = 12$).

When comparing five 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 (27.3 percent, $n = 55$) appears to be greater than that experienced by nesting SWFLs within the San Marcial reach (14.7 percent, $n = 375$). Parasitism data from the three nesting reaches (Sevilleta/La Joya, Tiffany, and San Marcial) were compared and no significant differences were found ($\chi^2 = .0593$, $df = 2$, $P = 0.06$) (Table 9). However, when individual reaches are compared (Table 10), a significant difference in parasitism rates appears 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 seven years in four different study reaches (Sevilleta/La Joya, San Acacia, Bosque del Apache, and San Marcial). Data from 1998 to 2003 consistently showed that the mean number of either-sex and female cowbird detections per point were 3 to 3.5 times greater within the Sevilleta/La Joya reach than within the San Marcial reach (Moore and Ahlers 2003). The Sevilleta/La Joya reach supported the greatest density of female cowbirds compared to all other monitored reaches within the Middle Rio Grande and this could be responsible for the increased parasitism rate. However, in 2004 the San Marcial reach exhibited both the highest 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

After reviewing nesting data from the past five years, another area of concern could be the apparent decline in nest success rates in the largest population of SWFLs in the delta of Elephant Butte reservoir (Table 5). Individual nest success rates have declined from highs of 100 percent and 91 percent in 1999 and 2000, respectively, to 48 percent in 2004 (Attachment). This decline could be cause for concern. However, 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, adding or removal of BHCO eggs from parasitized SWFL nests is a practice that was begun in 2002 and continued through 2004. Of the 64 SWFL nests parasitized in 2002, 2003, and 2004, BHCO eggs were added or removed from 31 nests, 6 of which successfully fledged SWFL young (19.4 percent success). Parasitized nests over the past six seasons in the Middle Rio Grande that were unaltered were not as successful. Of 43 parasitized nests monitored, 36 failed, 6 successfully fledged young, and 1 BHCO egg was built-over by the adult SWFLs and subsequently fledged young—a 16.3 percent success rate. Although this is not a statistically significant difference, adding 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.
- Efforts should be made to access areas previously unsurveyed in order to assess the total population of SWFLs within suitable habitat.

Periodic Surveys

- Periodic surveys (every three to five 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 territory and macroscale level—to determine components characteristic of SWFL breeding areas where populations are expanding, remaining stable, or becoming extirpated.

Non Survey-related

- Data analysis should be completed on the nest site quantification study initiated in 2003. 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. In the 2004 survey, 149 territories were documented in the Middle Rio Grande Management

Unit: 19 in the Sevilleta/La Joya reach, 1 in the Bosque del Apache reach, 16 in the Tiffany reach, and 113 in the San Marcial reach. Thus, even without considering the territories occurring on the Isleta Pueblo (14 documented in 2000; NMNHP 2000), the recovery goal for the Middle Rio Grande Management Unit has already been reached. However, additional population growth is needed in other Management Units for recovery objectives to be met within the Rio Grande Recovery Unit.

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