BUREAU OF RECLAMATION

2024 Southwestern Willow Flycatcher Survey Results – Belen Reach

Middle Rio Grande, New Mexico

February 19, 2025

Prepared for

Bureau of Reclamation, Albuquerque Area Office, NM

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EXECUTIVE SUMMARY

Project Overview

In 2024 the Bureau of Reclamation (Reclamation) retained RJH Consultants, Inc. (RJH) and Tetra Tech, Inc. (Tetra Tech) to conduct presence/absence surveys and nest monitoring for the Federally listed endangered Southwestern Willow Flycatcher (*Empidonax trailli extimus*), or SWFL, within a 6,280-acre study area in the Belen Reach along approximately 30 river miles of the Middle Rio Grande (MRG). This study was designed to inform overall management of the Belen Reach and to support Endangered Species Act (ESA) compliance needs for Reclamation, the Middle Rio Grande Conservancy District, and the New Mexico Interstate Stream Commission. Additionally, survey activities within the Belen Reach contribute to the overall understanding of SWFL distribution within the MRG, population trends, and baseline population data.

Due to potential impacts along the MRG from water management, river infrastructure restoration and maintenance, and conservation work outlined in the MRG Biological Opinion (2016)," project-related surveys" (as outlined in the survey protocol by Sogge et al., 2010) were completed in the Belen Reach. SWFL surveys were conducted five times between May 15 and July 23. Tetra Tech biologists field activities comprised a total of 344.6 observer-hours on SWFL protocol-level surveys in which 182 resident SWFLs were documented, representing 96 territories and 86 pairs. The Belen Reach supported 96 territories in 2024, representing a 1.1 percent increase from 95 territories in 2022.

SWFL nest monitoring was completed between June 24 and August 12, 2024. The nest monitoring program assessed nesting success rates, productivity, depredation, abandonment, and Brown-headed Cowbird (*Molothrus ater*) parasitism. A total of 57 SWFL nests were found and 43 fledged young were documented in the Belen Reach, which resulted in overall nesting success rate of 43%. Nest success dropped by 9 percent in 2024 compared to 2022 results.

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ACRONYMS AND ABBREVIATIONS

Acronyms/Abbreviations	Definition
ac	acre
BHCO	Brown-headed Cowbird
BEVI	Bell's Vireo
BiOp	Biological Opinion
cfs	cubic feet per second
ESA	Endangered Species Act
ft	foot/feet
GIS	Geographic Information Systems
Ha	hectare
km	kilometer
LFCC	Low Flow Conveyance Channel
m	meter
MRG	Middle Rio Grande
NWR	National Wildlife Refuge
Reclamation	Bureau of Reclamation
RM	River Mile
SWFL	Southwestern Willow Flycatcher
Tetra Tech	Tetra Tech, Inc.
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WIFL	Willow Flycatcher

1.0 Introduction

The Southwestern Willow Flycatcher (*Empidonax trailli extimus*), or SWFL, is one of four neotropical migrant subspecies of Willow Flycatcher (others being *Empidonax t. adastus, E.t. brewsterii, E.t. trailli*), or WIFL. The flycatcher subspecies breeds from May to September across the southwestern United States from southern California to west Texas, including New Mexico (USFWS, 1995). Other subspecies move through the southwest during spring and fall migration heading northward or southward, respectively. Southwestern Willow Flycatcher habitat is dense riparian vegetation made up of mid-seral willows (*Salix* spp.) and/or *Tamarix* (salt cedar) species (NMDGF, 2024). The U.S. Fish and Wildlife Service (USFWS) listed the subspecies as Endangered in 1995 under the Endangered Species Act (ESA) due to records indicating precipitous declines in the population (USFWS, 1995). In 1988 the New Mexico Department of Game and Fish (NMDGF) classified the species as Threatened, then reclassified as Endangered in 1996 (NMDGF, 2024). The subspecies is also listed as a species of greatest conservation need by the State of New Mexico (NMDGF, 2024). The Bureau of Reclamation (Reclamation) has been monitoring for endangered SWFLs in the Belen Reach of the Middle Rio Grande (MRG) (approximately 40 river miles) since 2002, of which includes the approximately 29 river miles encompassing the study area discussed in this report (Figure 1).

As part of the Recovery Plan for SWFL, the USFWS defined six recovery units which were further broken into Management Units. The Belen Reach is within the Middle Rio Grande Management Unit, as part of the larger Rio Grande Recovery Unit. Criteria for ESA reclassification and removal from the ESA are established in the recovery plan. Aa minimum number of SWFL territories for contributing to reclassification were set to 100 for the MRG Management Unit and 250 for the Rio Grande Recovery Unit (though overall criteria for downlisting is somewhat adaptive as long as minimum SWFL numbers over specified time periods are met). Habitat maintenance for downlisting is another critical component for downlisting (USFWS, 2002). Critical Habitat designation in this section was updated in 2013 and includes the Rio Grande floodplain from the southern boundary of the Pueblo of Isleta downstream approximately 112 river miles to the upper part of Elephant Butte Reservoir about 9 miles below the overhead powerline crossing near Milligan Gulch (USFWS, 2014).

Reclamation manages water in the MRG and must maintain ESA compliance. In 2016, USFWS issued a final Biological Opinion (BiOp) to Reclamation and its partners (Bureau of Indian Affairs, State of New Mexico, and Middle Rio Grande Conservancy District) in the MRG. To maintain compliance with the BiOp, Reclamation must conduct presence/absence surveys and nest monitoring for SWFLs (USFWS, 2016).

Presence/absence surveys and nest monitoring of SWFLs were completed by Tetra Tech, Inc. (Tetra Tech) biologists under contract with Reclamation in select sites of the Belen Reach of the MRG in 2024. The field work was completed during the breeding season for SWFLs which begins in May with the arrival of birds as they begin establishing territories to August as they finish nesting and begin their southbound migration.

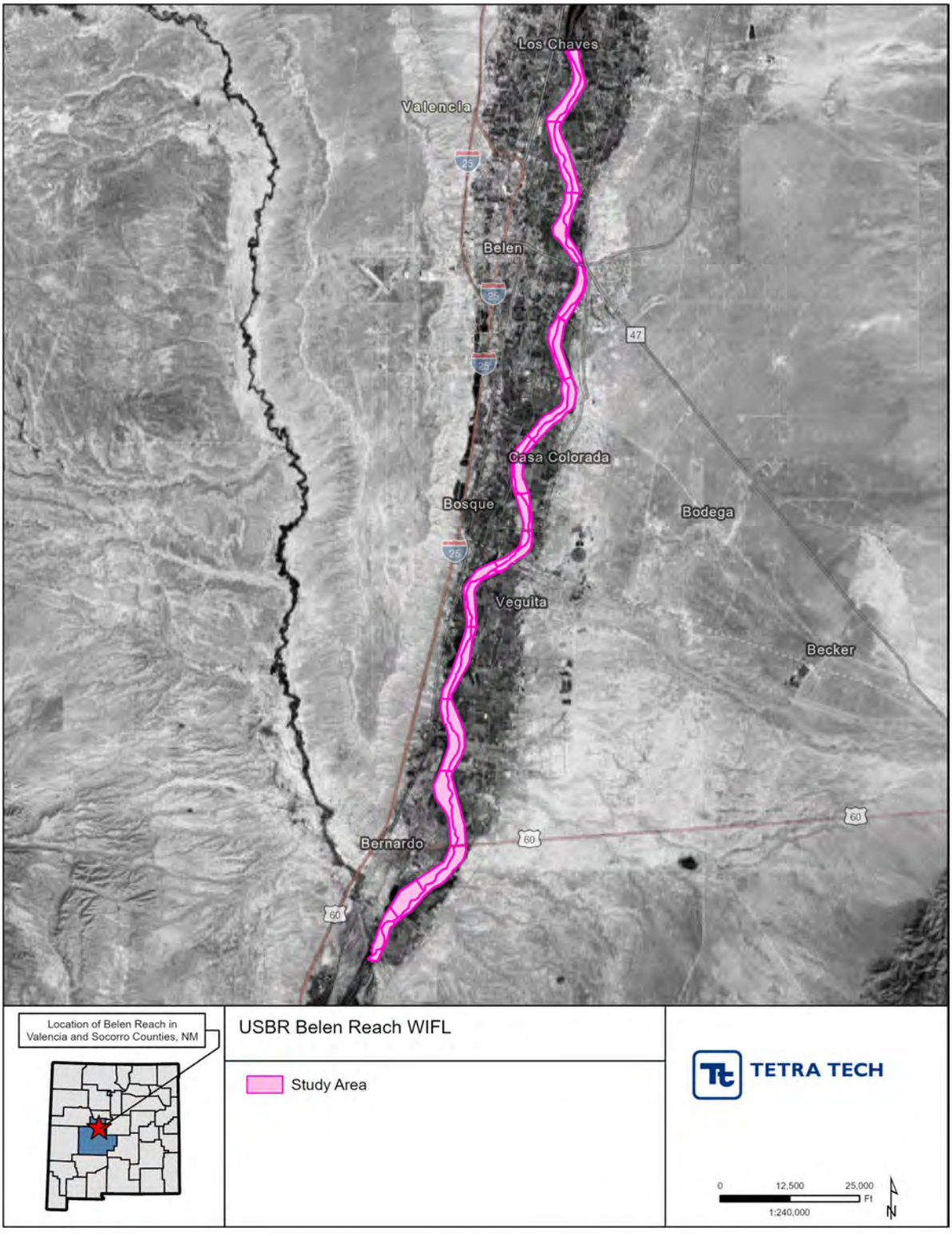

Figure 1. Location of Study Area

1.1 GOALS AND OBJECTIVES

The scope of the 2024 SWFL monitoring field season included the following activities to conduct and complete:

1. SWFL presence/absence surveys at specified sites during the breeding season in accordance with specified protocols;
2. SWFL nest monitoring in accordance with specified protocols;
3. Identification of key habitat parameters.

1.2 RELATED STUDIES

Numerous studies on the MRG and across the southwest have been completed since SWFL monitoring began in 1995, including baseline data collection and analysis on SWFL habitat preferences, hydrology, reproduction, and the development of habitat suitability models. The following is a summary of studies referenced in this document:

- Vegetation mapping completed by Reclamation using field-based and geographic information systems (GIS) inventories to develop SWFL habitat suitability models began in 1998 and is continually updated, with the most recent model completed in 2021. Recommendations from this work were to conduct vegetation mapping every 5 years, as stands of SWFL habitat decline over this timescale, and to focus on locations with dynamic changes in habitat conditions (Siegle & Moore, 2022).
- The 2022 MRG SWFL Study provided a large synopsis of baseline population data and trends along select sites of the MRG within the Belen, Sevilleta/La Joya, Escondida, Bosque del Apache, and San Marcial Reaches. This larger dataset provided an overview of presence/absence, nest monitoring trends, hydrology, and habitat associations (Reclamation, 2022).
- A home range study completed for SWFL pre-nesting, nesting, and post-nesting by using telemetry in Roosevelt Lake, Arizona (Cardinal, 2005).
- Vegetation features of SWFL nest sites were evaluated in the MRG from 2004 to 2006 to determine preferred habitat for nesting along select sites and help with future restoration efforts. Data collected from nest plots included shrub and tree density, plant species, vegetation height, and vertical foliage density (Reclamation, 2007).
- A study of the tamarisk leaf beetle (*Diorhabda* spp.) impacts to SWFL habitat was conducted from 2015 to 2019 across six survey sites on the MRG including photographic monitoring and a canopy cover analysis (Reclamation, 2020).
- The Bosque Ecosystem Monitoring Program (BEMP) is a community science program that monitors the health of the Rio Grande bosque annually. Select sites that are monitored fall within the Belen Reach, including BL-17 and BL-20. This is a long-term dataset that includes abiotic factors (depth to groundwater, water levels, precipitation, temperature above and below-ground, and water quality), and biotic factors (litterfall, vegetation cover, surface-active arthropod richness and abundance, and tamarisk leaf beetle distribution) (BEMP, 2024).

2.0 Methods

2.1 STUDY AREA

The study area is located within MRG sites designated by Reclamation, referred to as "Belen Reach" sites, which comprises approximately 29 river miles from river mile 156.5 to river mile 127.5. These are all within the Middle Rio Grande Management Unit as part of the overall Rio Grande Recovery Unit for the SWFL. For the 2024 field effort, surveys were conducted on 29 Belen Reach sites (BL-01 through BL-24 and SV-11 through SV-15, referred to as "study area") and are entirely within designated 2013 SWFL Critical Habitat. It should be noted that this survey effort did not cover all existing Belen Reach sites.

The sites cross the City of Belen and are within the Valencia and Socorro Counties of New Mexico. In the north they start at the community of Los Chaves and extend south to the communities of San Francisco and Contreras along riparian corridors of the Rio Grande, covering approximately 29 river miles. Habitat within the study area is a mixture of burned and unburned sections with typical riparian plant species consisting of Rio Grande cottonwoods (*Populus deltoides* ssp. *wislizenii*), tree willow (S*alix gooddingii*), salt cedar, Russian olive (*Eleagnus angustifolia*) and coyote willow (*Salix exigua*). Generally, study sites contain the Rio Grande on one side and a levee system on the other with some supporting additional channels during high flows.

2.2 PRESENCE/ABSENCE SURVEYS

A SWFL habitat suitability model was issued by Reclamation in 2021 (Siegle & Moore, 2022) and was consulted by field personnel to locate suitable SWFL habitat for surveys. About 1,216 acres of 'moderately suitable' and 814 acres of 'suitable' habitat is present according to the model within the study area. The predominant vegetation classification for 'suitable' habitat in the model was shrub-sized stands of coyote willow ('CW5'). However, sections along the Rio Grande can be dynamic and subject to changing habitat conditions and this data was from 2020-2021, so staff kept note that designations may be slightly outdated. For example, in 2021 decreased growth rates and mortality of vegetation due to drought occurred, which affects the quality and quantity of SWFL habitat. Fire has also been another cause of decline of suitable habitat, which was seen in comparisons between the habitat suitability models from 2016 to 2021 within the Belen Reach (Siegle & Moore, 2022). A few previous fires that have impacted the reach include the Big Hole Fire in 2022, Valencia Forest Fire in 2007, San Francisco Fire in 2003, and La Joya Fire in 2000. Sites that have burned like BL-17 and BL-20 have been monitored by the BEMP since the 2000s. After fires that occurred in 2007 and 2022 within these sites, the Rio Grande riparian ecosystem has had variable responses depending on depths to groundwater, flooding, and human management (e.g. exotic species removal) (BEMP, 2024). Lack of flooding at sites after fires can increase exotic species, as has been seen in sites BL-17 (Valencia Forest site) and BL-20 (Reynolds Forest site) with the growth of tumbleweed and kochia post-fire. Yerba mansa, however, has been shown to recover quickly post-fire. Other sites like Crawford within BL-17, which has had repeated flooding, is exhibiting cottonwoods outcompeting tamarisk. Such observations are important to note for SWFL habitat because the species prefer to occupy younger aged, developing riparian vegetation (3-5 years) with high canopy cover (Siegle & Moore, 2022). Although the SWFL habitat model formed the basis for presence/absence surveys, the entire study area was evaluated for suitable SWFL migratory and breeding habitat. These efforts yielded habitat not identified in the SWFL model that were considered appropriate to conduct presence/absence surveys.

Standard protocol methods by Sogge et al. (2010) were followed for conducting presence/absence surveys by trained and permitted personnel. Surveys were conducted from sunrise to about 11 AM local time, with precautions taken for inclement weather such as high winds and rainstorms. Suitable and moderately suitable habitat for SWFLs was surveyed using a standardized callback method where every ~30-50 meters the following sequence of actions was conducted by field personnel: quiet listening to determine if unsolicited WIFLs are present, followed by a 10-

15 second SWFL vocalization recording broadcast, and then listening quietly for another minute. The "fitz-bew" vocalization was the primary vocalization listened for by surveyors to accurately confirm the presence of WIFL species (and not mistake them for another *Empidonax* or flycatcher). Survey forms were completed daily for each respective site using Esri products: Survey 123 for total daily detections and field remarks and Field Maps to mark detection locations. Additional information recorded at each site visit included the total number of Brown-Headed Cowbirds (*Molothrus ater*) identified by visual and auditory detections, Bell's Vireo (*Vireo bellii*) detection locations, and the presence of tamarisk leaf beetle (*Diorhabda* spp.). Bell's Vireos are listed as Threatened by the State of New Mexico (NMDGF, 2024) and their unique vocalizations allow for easy identification in the field. Additionally, in the first survey period, the presence of all bird species were recorded in surveyor field notes.

Five presence/absence surveys were conducted during the breeding season which is in accordance with the survey protocol's guideline for habitat that could be impacted foreseeably in the future (while three is required for general surveys) (Table 1). The first survey was part of Survey Period 1 and was conducted in mid to late May when SWFLs arrive and are very vocal while establishing territories. The second and third surveys were part of Survey Period 2 and were conducted during June 1-24. Survey Period 3 comprised the fourth and fifth surveys conducted from late June to mid-July. Birds detected in the first survey are either resident or migrant WIFLs as other subspecies or non-residents are passing through. In later surveys, migrants depart and SWFL vocalization decreases during the breeding phase. Surveyor efforts in the latter part of the season (~ third to fifth surveys) focused in on areas where residents were known to be or were previously detected.

Table 1. Survey Periods and Dates for SWFL Monitoring (Sogge, et al., 2010)

Survey Period	Survey Period Dates	Number of Surveys
1	May 15 – May 31	1
2	June 1 – June 24	2
3	June 24 – July 17	2

2.2.1 Territory Designation

Pertinent literature was reviewed to aid with territory size designation, including the survey protocol (Sogge, et al., 2010), a SWFL telemetry home range study from Northern Arizona University (Cardinal, 2005), a 5-year review of the SWFL's ESA status (USFWS, 2014), and descriptions of SWFL ecology (Sogge, et al., 1997; Sogge, 2000; Paxton, et al., 2007). Pertinent scientific literature suggests that early in the season males have larger territories which then substantially reduce during breeding. The estimated range is 0.06 - 2.3 hectare with larger territories reported in areas with larger patches (aka suitable habitat). Cardinal (2005) provided the most concrete data having used telemetry to track SWFLs before, during, and after breeding season. The author found that during nesting, the home range was 0.38 ± 0.08 ha. The pre-nesting data had an average of 0.55 ± 0.2 ha but with one range documented as 65 ha. Post-nesting SWFLs exhibited even larger home ranges. Therefore, a home range of 0.38 ha from Cardinal (2005) was used to help with territory establishment for the breeding season. An upper limit of 2.3 ha was also used as the upper threshold to account for those SWFLs with larger territories, especially during pre-nesting (Sogge, et al., 2010). Migrant flycatchers, those normally detected in only Survey Period 1 and sometimes Survey Period 2, were considered separate detections even if there was some overlap in territory buffers, as surveyors judged them to be separate detections in the field. Generally, professional judgement of the habitat and SWFL presence was also used when delineating territories. The MRG Belen Reach tends to support linear patches of coyote willow dominated stands along the banks that comprised the dominant habitat type for SWFLs in 2024.

WIFLs were grouped into the following categories: migrants, lone males, pairs, and pairs with nests. Migrants were judged to be those flycatchers that were not present after June 15 as determined by Unitt (1987), though some were found to be late migrants. Previous Reclamation reporting used the date of June 10, which was also considered when designating flycatcher resident/migrant categorizations. Lone males, pairs, and pairs with nests were all considered SWFL residents.

2.3 NEST SEARCHES/MONITORING

Methods described in Martin and Geupel (1993) and Rourke et al. (1999) were followed to conduct all SWFL nest monitoring. Only permitted biologists and trainees under their supervision conducted nest searches and monitoring. Nest searching began in late May when breeding pairs begin to form and nest building is initiated. Pairs were observed for any breeding behaviors, especially communication “whitt” calls and other verbal interactions between the male and female. Nest searching was conducted by observing movement patterns of the birds and cautiously moving towards the location with the most SWFL activity, making sure to limit any disturbance to the habitat as much as possible. Appropriate vegetation (e.g. coyote willows, tree willows, tamarisk, and other species with adequate structure) was inspected from about chest height and above to locate nests, which are differentiated from other birds by their smaller size (8 centimeters high and 8 centimeters diameter) and a neat and tightly woven cup shape usually found within a fork of a branch (Rourke, et al., 1999). If a nest was not located within 20-30 minutes, the surveyor moved on in order to minimize disturbance. When a nest was found, flagging was placed about 10 meters from the nest with descriptive information recorded to guide future surveyors towards the nest location. The flag location was marked in Esri Field Maps software, and a Nest Record Form was initiated in ArcGIS Survey 123 to record all nesting data.

To obtain all relevant data, a mirror mounted on a pole was used to determine the nesting stage (e.g. eggs present, nestlings, Brown-Headed Cowbird eggs or nestling presence). Monitoring was avoided as much as possible during the nest building, egg laying, and fledging date stages to minimize disturbance and avoid depredation or abandonment. Surveyors would also approach nests from different paths on subsequent visits. If a Brown-Headed Cowbird was heard near the nest, the nest would not be mirrored to avoid potential parasitism. Precautions were also taken by moving slowly and carefully to not disturb the nesting substrate and surrounding vegetation, and monitors would not hover with mirrors over the nest for prolonged periods. For each future visit, the nests were again observed with a mirror and data was recorded in the Nest Record Form. In addition to the methods explained by Martin and Geupel (1993) and Rourke et al. (1999), photos and information on breeding chronology and identification from “An Aging Guide for Willow Flycatcher Nestlings” by Paxton and Owen (n.d.) was used to help nest monitoring biologists. This provided a concise procedure that helped differentiate Brown-Headed Cowbird and SWFL eggs and to determine nestling age status. Nesting chronology was estimated by evaluating data over the visits and was used to determine timing of subsequent visits. Visits were timed to occur every 5 days if possible after incubation began. Some sites where there were no initial detections during the first three surveys were surveyed only four times and are noted in field data sheets when appropriate. Monitoring of a nest ceased if nesting was confirmed to be finished for the season, for example if there was a successful fledgling (and too late in season for a re-nest) or confirmed abandonment with two nest checks completed (if logistically possible) (Rourke, et al., 1999).

After field nest monitoring efforts were concluded, the data was evaluated and nest outcomes were grouped into six categories as stated in previous MRG WIFL reporting (Reclamation, 2022): successful, unknown, parasitized, depredated, abandoned, or other. A nest was categorized as successful according to the protocol’s points: young seen fledging or found near nest, parents behaving as if young are nearby (i.e. agitated), or nestlings seen within two days of estimated fledge date. Parasitized indicated the presence of Brown-Headed Cowbird eggs and/or chicks in a SWFL nest. Depredated was determined when nests were knocked over, nest missing, other disturbance observations were made like the presence of eggshells on the ground, or eggs or nestlings missing on subsequent visits when they should have been present. The abandoned category was used for nests deserted with eggs (i.e.

they never hatch), or a nest observed not being used for egg-laying followed by a renest attempt. Unknown was used for those nests with limited data when the outcome could not be determined (e.g. potential depredation occurred if no eggs were ever observed in a nest but not enough data was available to make a determination of depredation). Any other causes of nest failures such as probable storm damage were designated as "other". Nest outcomes and accompanying descriptions were recorded in the nest flag GIS editable layer within ArcGIS Pro.

2.3.1 Hydrology Monitoring

Reclamation began recording hydrological conditions for each nest visit in 2004 at MRG sites to try and better understand the influence of local hydrology on nesting success. This practice was continued by Tetra Tech in 2024 during nest monitoring efforts in the Belen Reach. Hydrology under the nest was recorded using three categories: dry soil, saturated soil, or flooded. To summarize results over the entire breeding season, the records were grouped accordingly: (1) dry all cycle, (2) saturated/flooded then dry, (3) saturated/flooded all cycle, or (4) flooded all cycle under the nest. Another hydrological parameter (distance to water) was added to quantify the average distance to water over the nest cycle. Hydrology data (discharge and gage height) was obtained from U.S. Geological Survey (USGS) stations to better understand the flow over the breeding season.

3.0 Results

3.1 PRESENCE/ABSENCE SURVEY

SWFL presence/absence surveys were conducted between May 15 and July 23. The planned date to complete surveys was July 17, but due to staffing limitations, the season was extended to July 23. USFWS presence/absence survey forms are presented in Appendix A. Over the entire season, 333 WIFLs were detected between May 15 and July 23. Of these, 151 were determined to be migrants based on the date of detection before June 15 and/or their lack of breeding behavior. Remaining birds were determined to be residents made up of 31 pairs, 55 pairs with nests, and 10 lone males, for a total of 96 SWFL territories. Results for each site are listed in Table 2 and presented within five maps over the study area (Figures 2-6). Compared to historical results (Reclamation, 2022), the number of territories and pairs in the Belen Reach slightly increased from 2022 (Figure 7). Willow flycatcher field detections were predominantly within suitable habitat; on average across all reaches 78% of detections were within suitable or moderately suitable habitat (range 0-100%, median 91%). In contrast, there was not an obvious relationship between the number of SWFLs compared to area of habitat availability (R^2 = 0.005; Appendix B).

Table 2. 2024 Willow Flycatcher Survey Detections Within the Belen Reach of the Middle Rio Grande

Site Name	WIFLs Observed [1]	Est. Number of Pairs	Est. Number of *E.t. extimus* [2]	Est. Number of Territories	Nest(s) Found	Nest Success [3]	Comments
BL-01	4	0	0	0	0	N/A	4 migrants
BL-02	8	4	8	4	2	1 successful; 1 unknown	4 pairs
BL-03	10	2	4	2	1	1 failed	6 migrants; 2 pairs
BL-04	6	2	4	2	2	1 successful; 1 unknown	2 migrants; 2 pairs
BL-05	33	13	28	15	9	4 successful; 3 failed; 2 unknown	5 migrants; 13 pairs; 2 unpaired males
BL-06	9	3	6	3	3	3 unknown	3 migrants; 3 pairs
BL-07	21	7	16	9	5	1 successful; 1 failed; 3 unknown	5 migrants; 7 pairs; 2 unpaired males
BL-08	19	6	12	6	5	1 failed, 4 unknown	7 migrants; 6 pairs
BL-09	31	4	8	4	3	1 successful; 2 failed	23 migrants; 4 pairs
BL-10	48	18	39	21	13	4 successful; 7 failed, 2 unknown	9 migrants; 18 pairs; 3 unpaired males
BL-11	6	2	4	2	2	2 successful	2 migrants; 2 pairs
BL-12	10	3	6	3	2	2 failed	4 migrants; 3 pairs
BL-13	13	3	6	3	3	1 successful; 2 failed	7 migrants; 3 pairs
BL-14	10	1	2	1	0	N/A	8 migrants; 1 pair
BL-15	1	0	0	0	0	N/A	1 migrant
BL-16	0	0	0	0	0	N/A	N/A
BL-17	0	0	0	0	0	N/A	N/A
BL-18	0	0	0	0	0	N/A	N/A

2024 Southwestern Willow Flycatcher Survey Results
Belen Reach

Site Name	WIFLs Observed [1]	Est. Number of Pairs	Est. Number of *E.t. extimus* [2]	Est. Number of Territories	Nest(s) Found	Nest Success [3]	Comments
BL-19	1	0	0	0	0	N/A	1 migrant
BL-20	0	0	0	0	0	N/A	N/A
BL-21	2	0	0	0	0	N/A	2 migrants
BL-22	19	3	6	3	0	N/A	13 migrants; 3 pairs
BL-23	1	0	0	0	0	N/A	1 migrant
BL-24	1	0	0	0	0	N/A	1 migrant
SV-11	21	4	10	6	2	2 unknown	11 migrants; 4 pairs; 2 unpaired males
SV-12	11	0	1	1	0	N/A	10 migrants; 1 unpaired male
SV-13	10	3	6	3	1	1 failed	4 migrants; 3 pairs
SV-14	17	2	4	2	0	N/A	13 migrants; 2 pairs
SV-15	21	6	12	6	4	1 successful; 1 failed; 2 unknown	9 migrants; 6 pairs
Belen Reach Summary	**333**	**86**	**182**	**96**	**57**	**16 successful; 21 failed; 20 unknown**	**151 migrants; 86 pairs; 10 unpaired males**

(1) Total number of resident and non-resident Willow Flycatchers detected
(2) Total number of resident Southwestern Willow Flycatchers (pairs and unpaired males)
(3) Categories: successful, failed (depredated, parasitized, abandoned, other – e.g. probable storm event), unknown

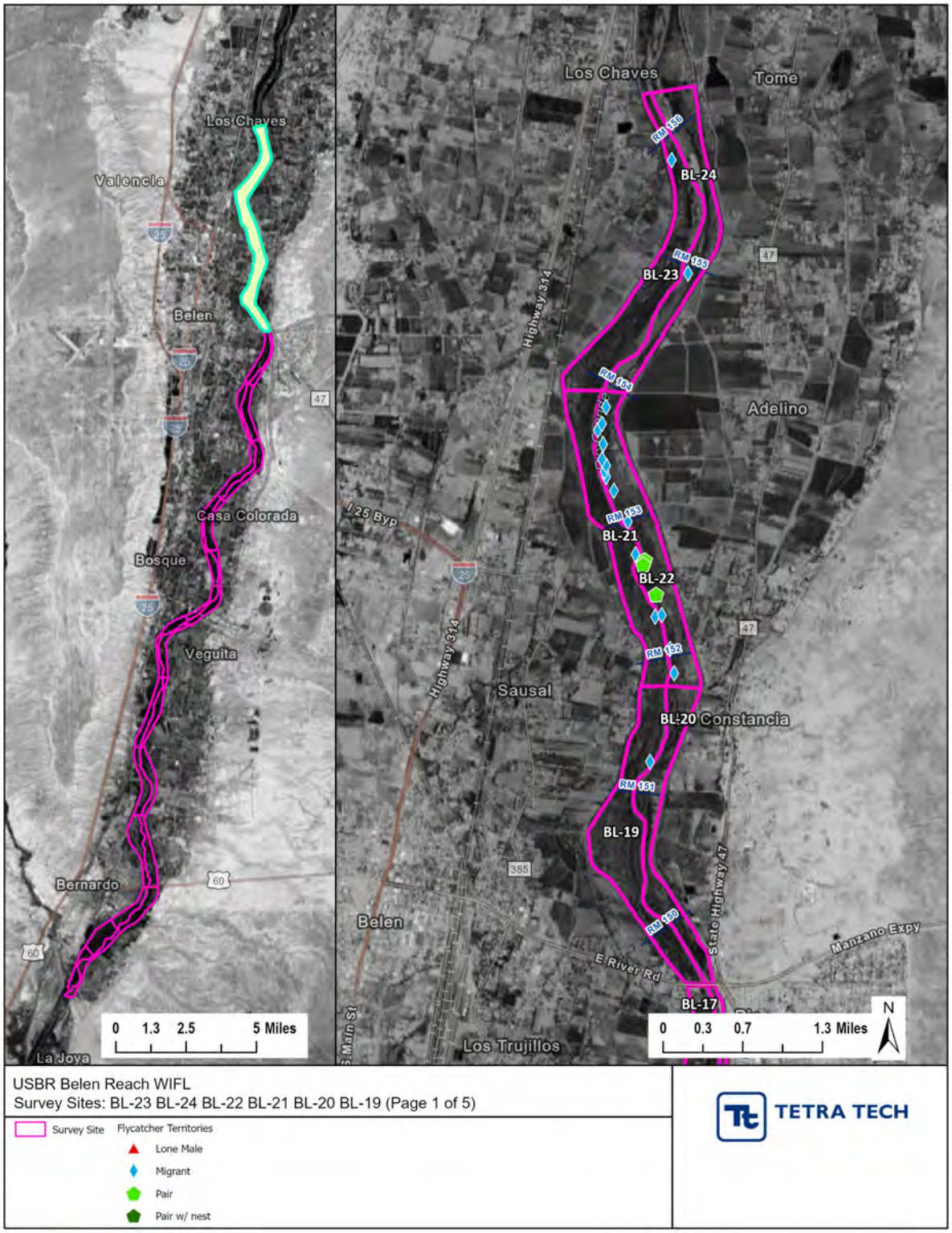

Figure 2. Flycatcher Territories: BL-23, BL-24, BL-22, BL-21, BL-20, BL-19.

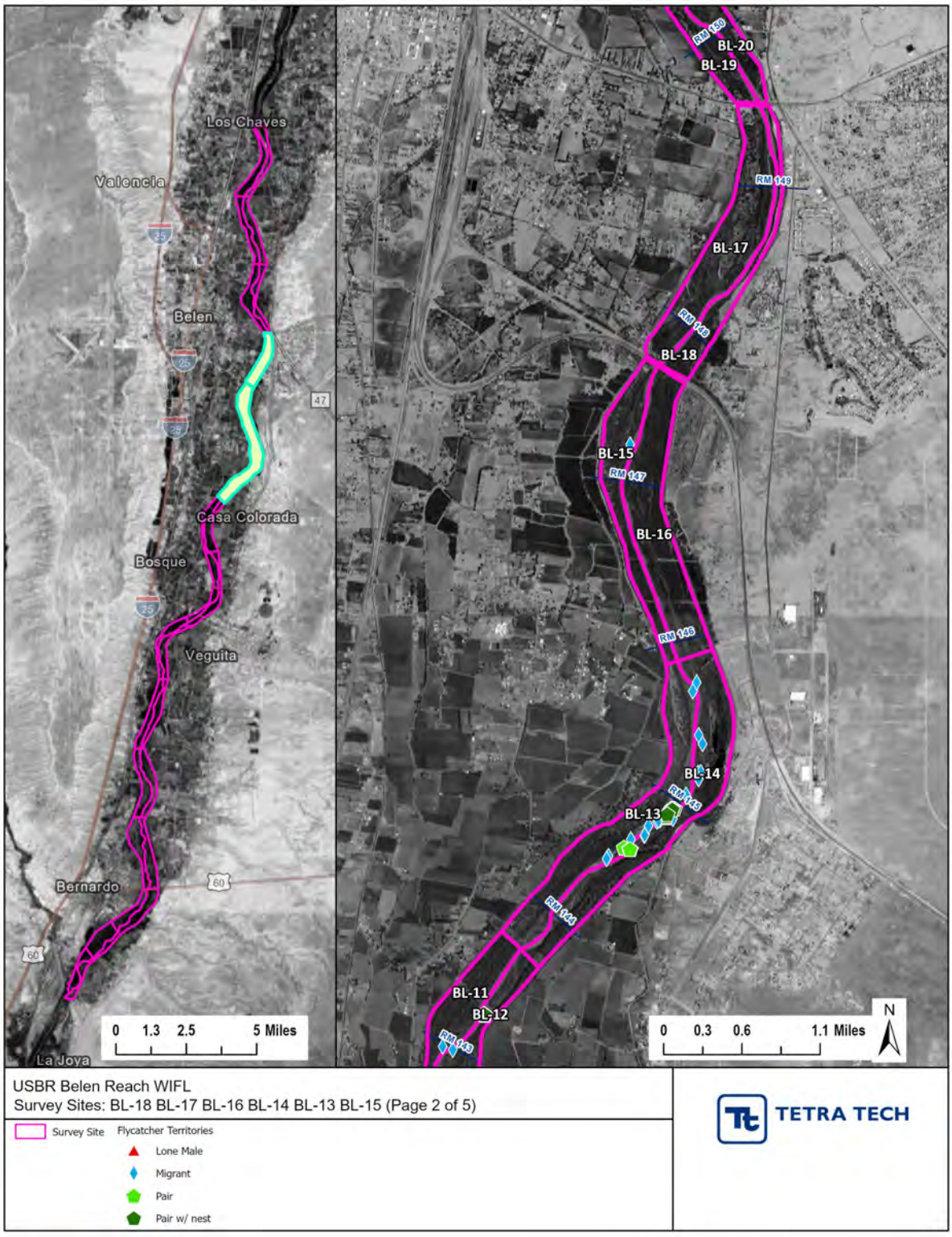

Figure 3. Flycatcher Territories: BL-18, BL-17, BL-16, BL-14, BL-13, BL-15

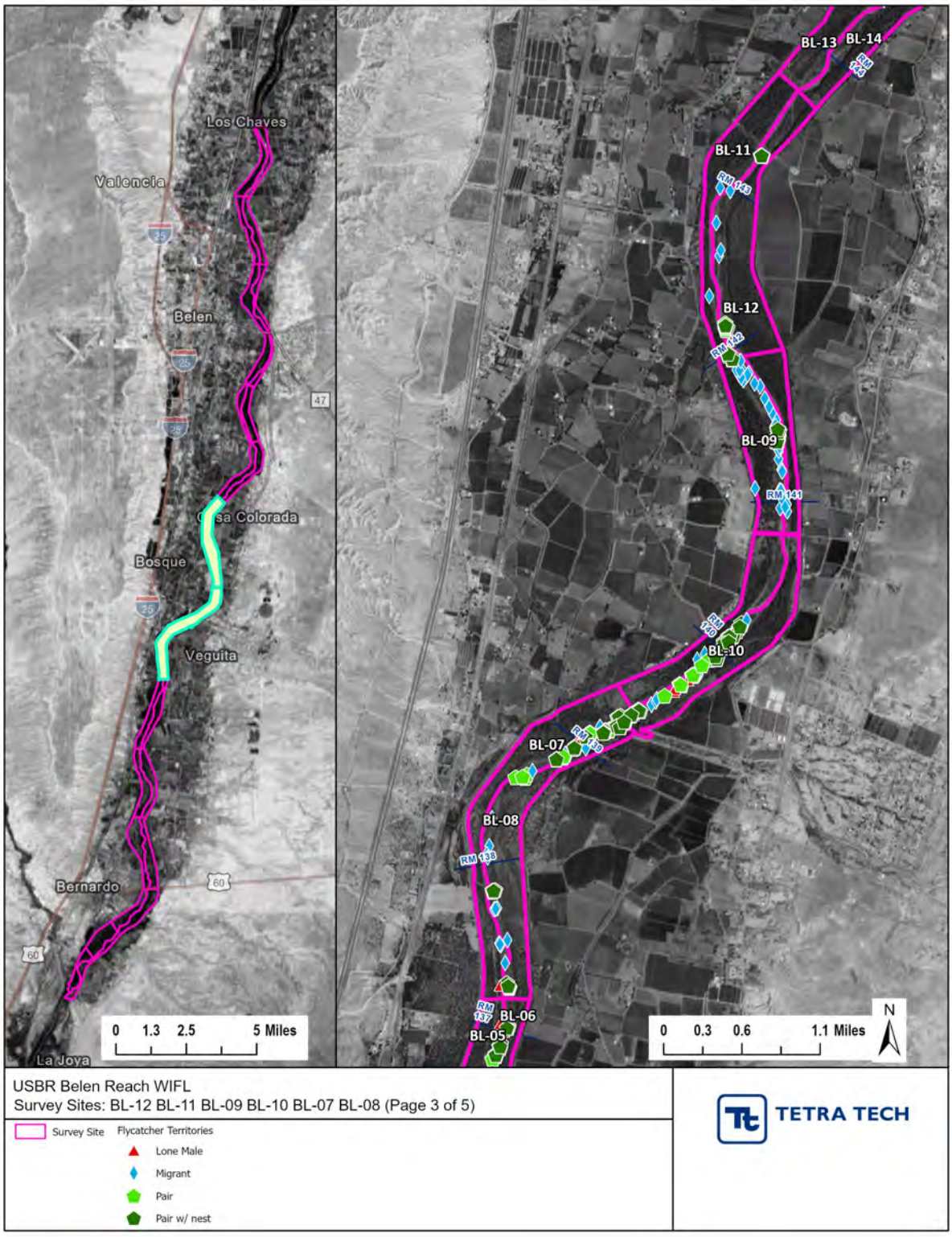

Figure 4. Flycatcher Territories: BL-12, BL-11, BL-09, BL-10, BL-07, BL-08

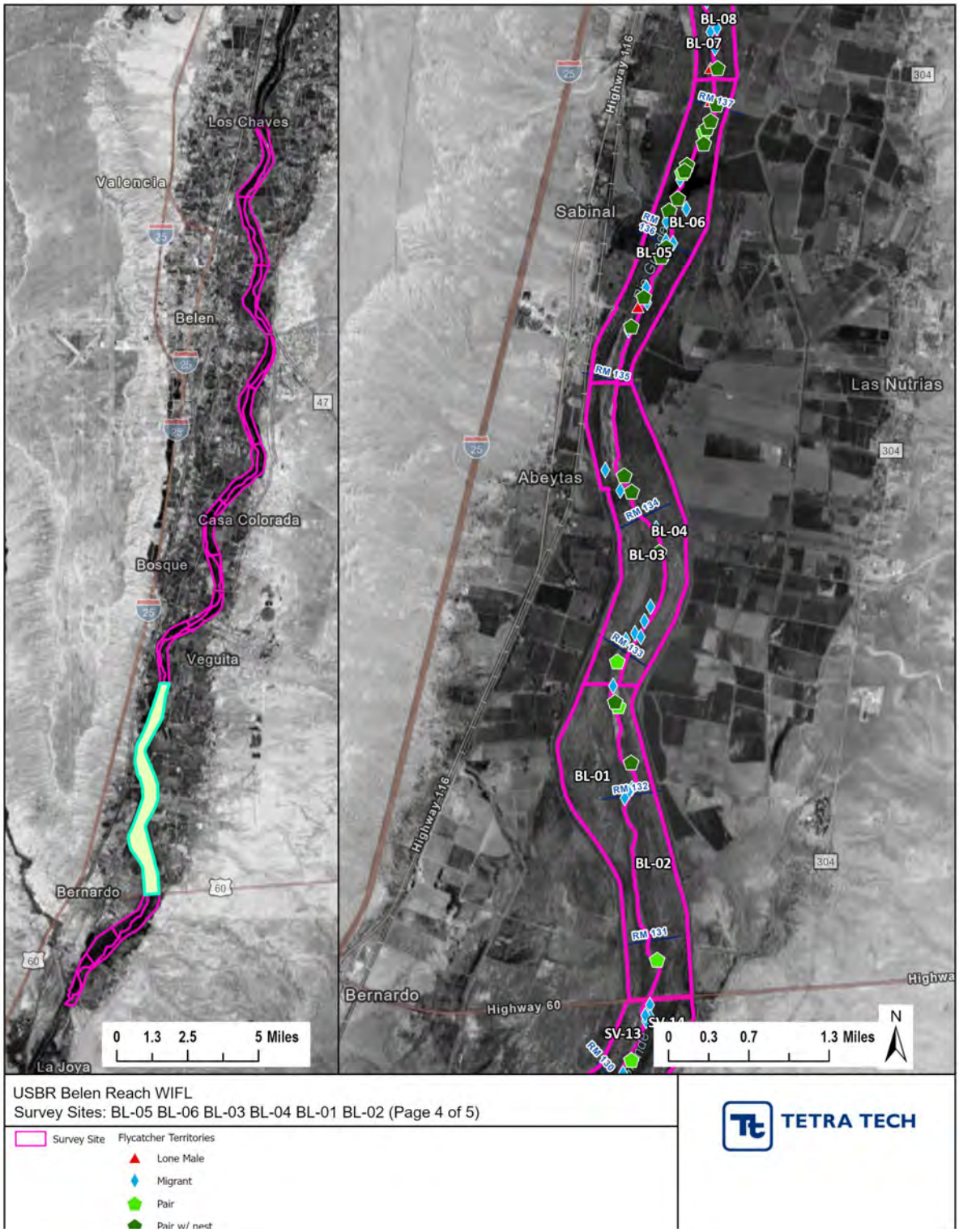

Figure 5. Flycatcher Territories: BL-05, BL-06, BL-03, BL-04, BL-01, BL-02

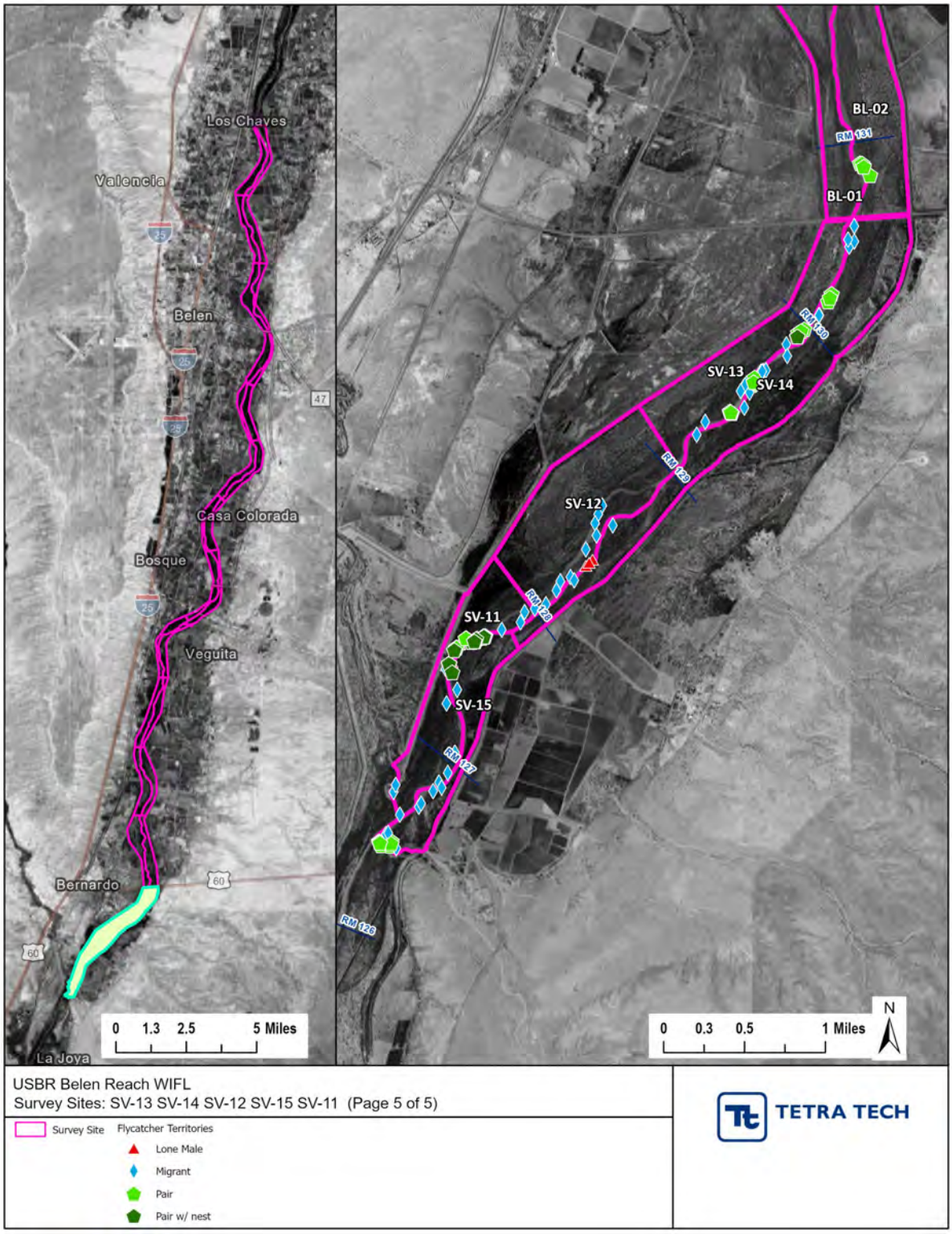

Figure 6. Flycatcher Territories: SV-13, SV-14, SV-12, SV-15, SV-11

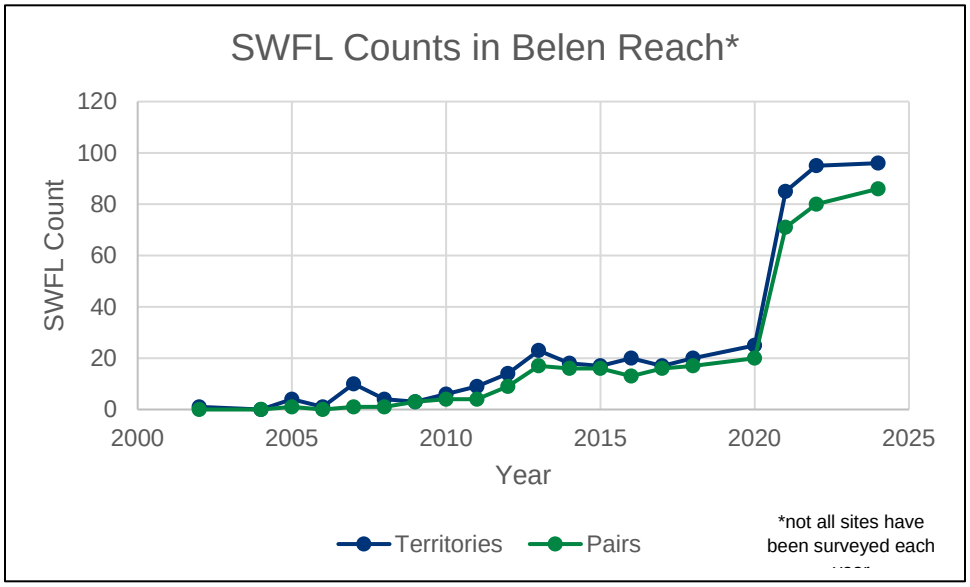

Figure 7. Southwestern Willow Flycatcher Territories in Belen Reach Over Time

Other bird species were recorded incidentally during surveys. Common species were Black-Headed Grosbeaks (*Pheucticus melanocephalus*), Blue Grosbeaks (*Passerina caerulea*), Brown-Headed Cowbirds (*Molothrus ater*), Gray Catbirds (*Dumetella carolinensis*), Mourning Doves (*Zenaida macroura*), Spotted Towhees (*Pipilo maculatus*), White-Winged Doves (*Zenaida asiatica*), Yellow-Breasted Chats (*Icteria virens*), and Yellow Warblers (*Setophaga petechia*). A total of 75 avian species were detected across all sites and an inventory of all species is included in Appendix C. Brown-Headed Cowbirds were detected at all sites. Bell's Vireos were detected in 16 sites within the Belen Reach, with the "SV" sites in the south having the most detections. Furthermore, tamarisk leaf beetle activity was documented at the following sites: BL-02, BL-05, BL-08, BL-12, SV-11, SV-12, SV-14, and SV-15.

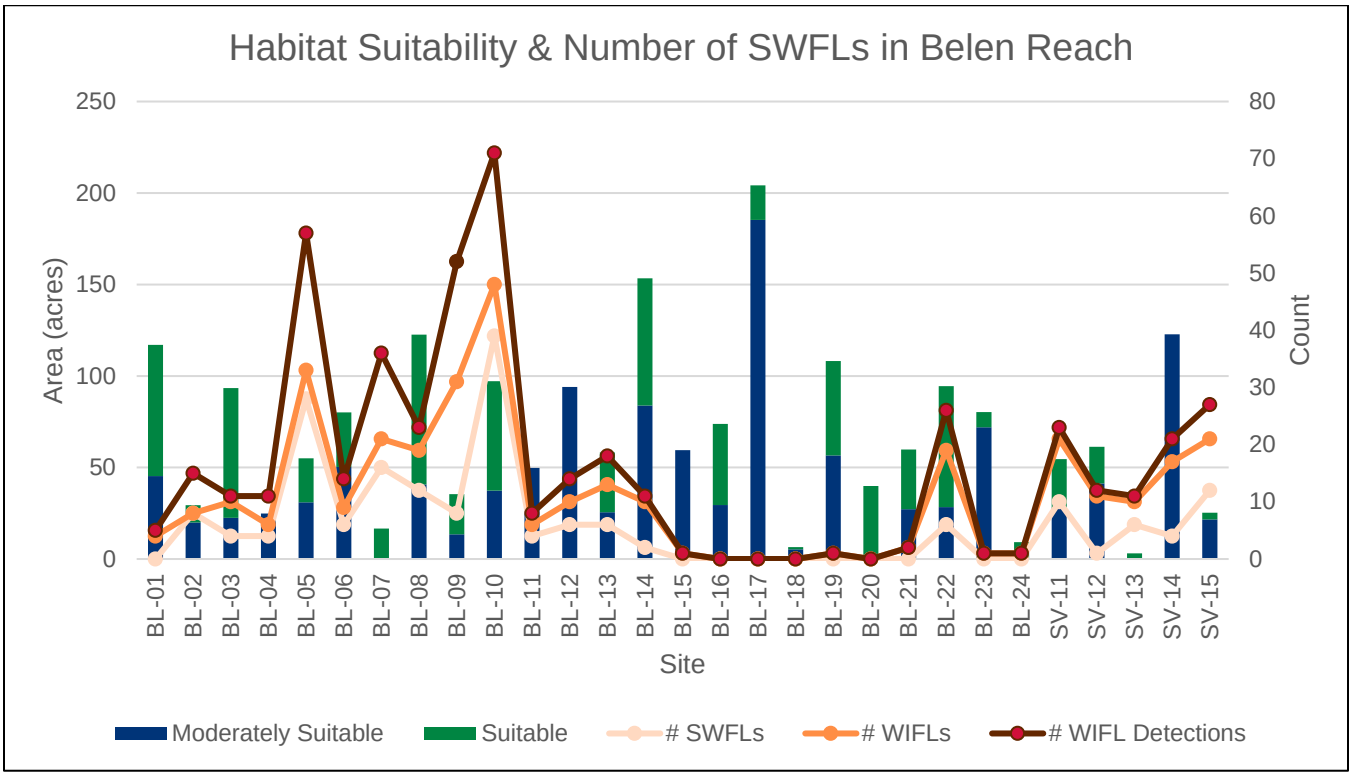

Figure 8. Area of Suitable Habitat and Willow Flycatcher Counts

3.2 NEST SEARCHES/MONITORING

Fifty-seven SWFL nests were found within the study area during the 2024 breeding season. Annual nest monitoring data and 2024 nest data by survey site for Belen Reach can be viewed in Appendix D. Two of these nests were within the territory of one pair, so these were considered re-nesting attempts. Overall, 16 nests were successful, 21 failed (parasitized, abandoned, depredated, or other), and 20 had unknown outcomes. Nests were found for 55 pairs of SWFLs, but an additional 31 pairs were detected; it was suspected that these pairs were also breeding even though surveyors could not locate their nests. As with previous reporting, the number of territories is considered a better measure of breeding activity than total nests found due to variation in surveyor efforts and ability to locate nests. Of the observed successful nests, 43 chicks were estimated to have fledged. The majority of nesting substrate consisted of *Salix*-dominated patches, and accordingly, most nests were found in *Salix* species (coyote willows and tree willows). Five nests were in salt cedar and one in a Russian olive tree. No tamarisk leaf-beetle was observed on or within 20 meters of the nests on salt cedar. Table 2 includes a site-by-site summary of nests and Table 3 below lists the overall summary.

Table 3. 2024 Nest Monitoring Summary for the Belen Reach of the Middle Rio Grande

Summary	Total # (%)	# Nests in *Salix* substrate	# Nests in salt cedar substrate	# Nests in Russian Olive substrate	# Nests in *Salix*-dominated patches	# Nests in mixed patches
# Nests found	57	51	5	1	53	4
# Parasitized (%)*	7 (19%)	7	0	0	7	0
# Depredated (%)*	9 (24%)	7	2	0	8	1
# Abandoned (%)*	2 (5%)	1	1	0	2	0
# Other (%)*	3 (8%)	3	0	0	3	0
# Unknown success **	20	6	0	0	6	0
# Successful (%)	16 (43%)	15	0	1	15	1
Estimated total # chicks fledged	43	40	0	3	40	3
Estimated productivity (# chicks per successful nest)	2.7	2.7	0	--	2.7	--

*Some nests were parasitized, depredated, abandoned, or other issues caused them to fail
** Unknown outcomes were not included in the nest variable calculation.

3.2.1 Hydrology Monitoring

Hydrology under each nest was recorded using four classes: dry all cycle, saturated/flooded then dry, saturated/flooded all cycle, or flooded all cycle under nest. Of the 57 nests discovered and monitored in the 2024 breeding season, 53 were dry all cycle under the nest comprising 93% of the total. Only 2 nests were saturated/flooded all cycle and 2 were saturated/flooded then dry. All nests were within 50 meters of surface water or pooled water with an average distance of 11.5 meters. As the summer progressed, the Belen Reach of the MRG water levels declined steadily. High volume precipitation events temporarily increased water levels throughout the season. The highest surge was on June 30 with 2,640 cubic feet per second (ft^3/s) recorded at the Rio Grande USGS station near Bosque Farms (Station 08331160), north of the Belen Reach. On May 15, the recorded discharge at the station was 1970 ft^3/s and by the end of the season on August 15 the discharge had dropped to 36.2 ft^3/s. Flows for the season are shown below on Figure 9.

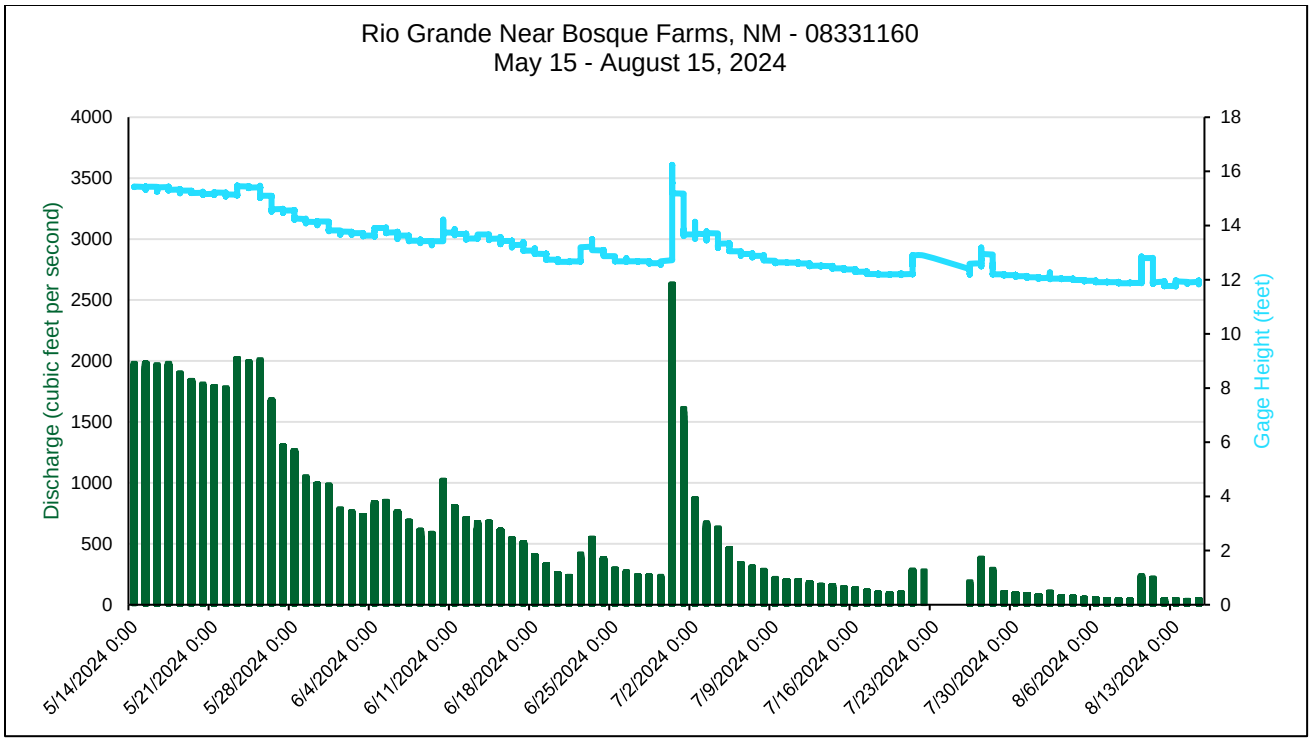

Figure 9. Flows in the Rio Grande Floodway near Bosque Farms, NM

4.0 DISCUSSION

4.1 PRESENCE/ABSENCE SURVEYS

Overall, the number of SWFLs that had been previously documented in the Belen Reach has not declined and remains at a steady level during the year of 2024 as shown in Figure 7. The Belen Reach sites from 2024 alone nearly achieved the recovery goal of 100 territories, with 96 territories, for the Middle Rio Grande Management Unit. Similar habitat use patterns from previous survey documentation were noted, with SWFLs predominantly occupying coyote willow patches and occasionally mixed stands containing willows, cottonwoods, Russian olive, and salt cedar. These areas of coyote willows were adjacent to the river on bars and terraces, and islands cut by channels. For example, BL-10 had multiple islands cut by channels with breeding SWFLs. Vegetated islands and bank-attached bars have become a distinct feature of the MRG over time. An ecological assessment of six islands/bars in 2023 north of the Belen Reach found that age and location (i.e. hydrogeomorphology) are likely important factors in determining vegetation cover (i.e. coyote willow in younger stands and cottonwood and elm in older stands), and extent of exotic species cover which has implications for habitat available to SWFLs (Wagner, et al., 2024).

The sites that had more than 10 SWFLs, from least to greatest, include SV-15, BL-08, BL-07, BL-05, and BL-10. Sites BL-05 and BL-10 had substantially more SWFLs with 28 and 39, respectively. Ten sites had no resident SWFLs. Furthermore, BL-09 had the most WIFL migrants (aka non-resident SWFLs), followed by SV-14 and BL-22. Some WIFL migrants may be a WIFL subspecies that are migrating through the MRG before arriving to their respective breeding habitat. Maintaining habitat for WIFL migrants is thus also important and can contribute to the overall recovery of the SWFL.

In 2024, the total area of suitable habitat available did not correlate with SWFL or WIFL detections, however, there is a high percentage of WIFLs and SWFLs within mapped suitable and moderately suitable habitat (78% on average). Results in this report suggest the tree/mid-canopy vegetative density and overall height in addition to the

proximity to surface water and/or moist soil may be more important than sheer area available, as has been concluded to be important for nesting in previous MRG reporting (Reclamation, 2007). There will likely be shifts in the future on the location of suitable habitat as the river ebbs and flows, deposits sediment, and the various age cohorts of coyote willow stands change. Additionally, field observations found evidence of younger coyote willow patches which may become suitable habitat in the future for breeding SWFLs (e.g. BL-21, BL-24). Lastly, shifts in suitable habitat or the type of habitat may be swift in the future with external stressors like drought and wildfires; wildfires can increase non-native coverage within riparian habitats (Smith, et al., 2006).

4.2 NEST SEARCHES/MONITORING

A total of 57 nests were found, and 37 had known outcomes with 43% successfully fledging young (Table 3). Previous reporting by Reclamation stated that nest success rates of 50 percent or greater have generally been associated with gaining populations (Reclamation, 2022), so this rate should be monitored in the subsequent years to determine populations trends over successive breeding seasons. In 2022, results in the Belen Reach showed the presence of 43 successful nests that contributed to a 52 percent nesting success rate and 106 total fledged chicks. There was a clear preference for nesting in native substrate during the 2024 breeding season, with 93 percent placing their nests in *Salix*-dominated patches and 7 percent in mixed substrate patches.

An small proportion of nests were abandoned (5%), or 2 nests, which were both found in *Salix*-dominated territories.. It is not clear what caused the birds to abandon nests. Nest monitoring was avoided early in the season to minimize disturbance and abandonment. However, there is always the risk of human disturbance, and there are likely other causes of abandonment like predators in the area. Our data suggests nest depredation was an issue with 24% of nests. Nest parasitism was observed for 19% of nests. Two of the nests depredated were located in salt cedar which may not provide the structure to conceal nests and young in the manner like dense coyote willow stands. Furthermore, Brown-Headed Cowbirds were detected in all sites. Dry conditions were likely a substantial contributor to nest depredation and parasitism rates as most nests lacked moist soil or open water underneath them for the majority of the season. Predators have a better chance of accessing nests in drier conditions and Brown-Headed Cowbird parasitism has been found to be higher in dry conditions (Reclamation, 2022). Though it cannot be asserted for certain that the three nests in the 'other' category failed due to storm events, two of the nests appeared drenched with rain, one had observations of deceased fledglings, and a third was missing immediately following a storm.

No *Diorhabda* was found on salt cedar nesting substrates and within 20 meters of them, however evidence of *Diorhabda* herbivory was noted within eight survey sites spread across the Belen Reach (Figure 10).

Figure 10. Images of defoliation of salt cedar on Rio Grande floodplain

The *Diorhabda* species may spread to other locations or already be present but went undetected. For example, TLB monitoring in 2023 by the BEMP observed TLB in BL-17 (Valencia Cleared site) and BL-20 (Reynolds Forest

site) (BEMP, 2024). These sites were not observed to have TLB in the 2024 SWFL surveys. Furthermore, a photo study detected tamarisk beetles in BL-10 in 2016 and canopy cover was found to decline that summer due to defoliation though recovery was observed in the following years from 2017-2019 with no detections of tamarisk leaf beetle (Reclamation, 2020). Defoliation by *Diorhabda* could negatively impact salt cedar-dominated nesting habitat and provide a habitat "trap" in which SWFLs initiate breeding in intact salt cedar stands, which are subsequently defoliated later in the nesting period causing reductions in canopy cover and increased nest exposure. The presence of *Diorhabda* should be noted in future monitoring.

4.2.1 Hydrology Monitoring

Breeding SWFLs are reliant on moist conditions and flooding to sustain optimal riparian habitat consisting of dense shrub-like understory and a canopy of larger trees near open water. The MRG, in most areas, is a human-managed single-thread channel with well-defined banks and a flat floodplain, though some islands and bars are present that experience reduced flows (USFWS, 2002). The MRG has a variable flow regime and the river channel periodically dries during the summer. The drying of the river and reduction in overbank flows can be detrimental to generating and maintaining adequate nesting habitat for flycatchers (USFWS 2016). In 2024, limited river drying occurred that resulted in sections of habitat occupied by SWFLs that became spatially disjunct from the wetted sections of the river. Furthermore, 93 percent of nests were found to be above dry conditions all cycle. Given that the presence of water is so important for habitat, food, and decreases the chances of depredation and brood parasitism for SWFLs, the hydrology should be continually monitored and evaluated against breeding success.

5.0 Conclusions

The 2024 presence/absence surveys and nest monitoring of SWFLs conducted within the Belen Reach of the MRG yielded a count of 96 territories, including 55 observed breeding pairs, 31 additional pairs, and 10 lone males. It is assumed that the total number of territories is a more reliable measure of breeding activity providing a much higher number for general breeding estimates. The territories are consistent with the 2022 documentation of 95 territories, which is just below the overall recovery goal of 100 SWFL territories for the entire Middle Rio Grande Management Unit (covering the Rio Grande from upstream of Cochiti Reservoir down to Elephant Butte Dam). A total of 57 nests were found and the majority, 89 percent, nested within native *Salix*-substrate. Five nests were in salt cedar and one in Russian olive, which continues to show a preference of native nesting substrate and the limited use of nonnative substrate for nesting by SWFLs. Overall, the number of territories found is promising, however, the nest success rate was lower than in previous years. Although tamarisk leaf beetle presence was noted within the study area, it is not assumed to have impacted SWFL nesting. The drying of the river and dynamic water elevation changes documented over the season indicate the need for continued monitoring of hydrological conditions given the SWFL's unique habitat requirements for breeding that are intricately linked to vegetation and hydrology. Continued presence/absence surveys and nest monitoring are recommended to maintain ESA compliance and support the understanding of the status of the SWFL within the context of dynamic ecosystem conditions, documented use of nonnative substrate, and varied success rates of SWFL breeding pairs between recent years.

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APPENDIX A: 2024 USFWS WILLOW FLYCATCHER PRESENCE/ABSENCE SURVEY FORMS

APPENDIX B: WILLOW FLYCATCHER FIELD DETECTION COUNT WITHIN SUITABLE HABITAT

Site Name	# WIFL Detections	% WIFL Detections in Moderately Suitable Habitat	% WIFL Detections in Suitable Habitat	% Total Detections in Suitable & Moderately Suitable Habitat
average	**--**	**28%**	**49%**	**78%**
median	**--**	**21%**	**56%**	**91%**
BL-01	5	0%	80%	80%
BL-02	15	40%	33%	73%
BL-03	11	36%	55%	91%
BL-04	11	91%	0%	91%
BL-05	57	23%	56%	79%
BL-06	14	21%	57%	79%
BL-07	36	0%	72%	72%
BL-08	19	0%	96%	96%
BL-09	31	12%	71%	83%
BL-10	48	8%	83%	92%
BL-11	6	25%	75%	100%
BL-12	10	21%	0%	21%
BL-13	13	0%	100%	100%
BL-14	10	18%	73%	91%
BL-15	1	100%	0%	100%
BL-16	0	n/a	n/a	n/a
BL-17	0	n/a	n/a	n/a
BL-18	0	n/a	n/a	n/a
BL-19	1	0%	0%	0%
BL-20	0	n/a	n/a	n/a
BL-21	2	50%	50%	100%
BL-22	19	4%	88%	92%
BL-23	1	0%	100%	100%
BL-24	1	0%	0%	0%
SV-11	21	70%	13%	83%
SV-12	11	42%	58%	100%

Site Name	# WIFL Detections	% WIFL Detections in Moderately Suitable Habitat	% WIFL Detections in Suitable Habitat	% Total Detections in Suitable & Moderately Suitable Habitat
SV-13	10	0%	36%	36%
SV-14	17	76%	19%	95%
SV-15	21	70%	15%	85%

APPENDIX C: BIRD SPECIES LIST FOR STUDY AREA

Common Name	*Scientific Name*	Code	Number of Sites Present*
American kestrel	*Falco sparverius*	AMKE	1
American robin	*Turdus migratorius*	AMRO	14
Ash-throated Flycatcher	*Myiarchus cinerascens*	ATFL	13
Bank Swallow	*Riparia riparia*	BANS	2
Barn Swallow	*Hirundo rustica*	BARS	1
Bell's Vireo	*Vireo bellii*	BEVI	16
Belted Kingfisher	*Megaceryle alcyon*	BEKI	1
Bewick's Wren	*Thryomanes bewickii*	BEWR	13
Black Phoebe	*Sayornis nigricans*	BLPH	4
Black-capped Chickadee	*Poecile atricapillus*	BCCH	4
Black-chinned hummingbird	*Archilochus alexandri*	BCHU	12
Black-crowned Night-Heron	*Nycticorax nycticorax*	BCNH	3
Black-headed Grosbeak	*Pheucticus melanocephalus*	BHGR	20
Blue Grosbeak	*Passerina caerulea*	BLGR	18
Blue Jay	*Cyanocitta cristata*	BLJA	1
Broad-tailed Hummingbird	*Selasphorus platycercus*	BTHU	1
Brown-headed Cowbird	*Molothrus ater*	BHCO	29
Bushtit	*Psaltriparus minimus*	BUSH	9
Canada Goose	*Branta canadensis*	CCGO	2

Common Name	*Scientific Name*	Code	Number of Sites Present*
Cattle Egret	*Bubulcus ibis*	CAEG	1
Chipping Sparrow	*Spizella passerina*	CHSP	1
Cliff Swallow	*Petrochelidon pyrrhonota*	CLSW	2
Common Black Hawk	*Buteogallus anthracinus*	COBH	4
Common Gallinule	*Gallinula galeata*	COGA	1
Common Raven	*Corvus corax*	CORA	3
Common Yellowthroat	*Geothlypis trichas*	COYE	14
Cooper's hawk	*Accipiter cooperii*	COHA	1
Curve-billed Thrasher	*Toxostoma curvirostre*	CBTH	1
Downy Woodpecker	*Picoides pubescens*	DOWO	3
Dusky Flycatcher	*Empidonax oberholseri*	DUFL	1
European Starling	*Sturnus vulgaris*	EUST	1
Gambel's Quail	*Callipepla gambelii*	GAQU	3
Gray Catbird	*Dumetella carolinensis*	GRCA	17
Great Blue Heron	*Ardea herodias*	GBHE	1
Great Egret	*Ardea alba*	GREG	1
Greater Roadrunner	*Geococcyx californianus*	GRRO	5
Green Heron	*Butorides virescens*	GRHE	7
Hairy Woodpecker	*Picoides villosus*	HAWO	1

Common Name	*Scientific Name*	Code	Number of Sites Present*
House Finch	*Haemorhous mexicanus*	HOFI	6
House Sparrow	*Passer domesticus*	HOSP	1
House Wren	*Troglodytes aedon*	HOWR	3
Killdeer	*Charadrius vociferus*	KILL	1
Lesser Goldfinch	*Spinus psaltria*	LEGO	3
Lucy's Warbler	*Leiothlypis luciae*	LUWA	5
Mallard	*Anas platyrhynchos*	MALL	7
Mourning Dove	*Zenaida macroura*	MODO	17
Northern Flicker	*Colaptes auratus*	NOFL	10
Northern Mockingbird	*Mimus polyglottos*	NOMO	8
Orange-crowned Warbler	*Leiothlypis celata*	OCWA	3
Phainopepla	*Phainopepla nitens*	PHAI	1
Red-winged Blackbird	*Agelaius phoeniceus*	RWBL	10
Ring-necked Pheasant	*Phasianus colchicus*	RNEP	7
Say's Phoebe	*Sayornis saya*	SAPH	1
Snowy Egret	*Egretta thula*	SNEG	2
Song Sparrow	*Melospiza melodia*	SOSP	6
Spotted Sandpiper	*Actitis macularius*	SPSA	3
Spotted Towhee	*Pipilo maculatus*	SPTO	21

Common Name	*Scientific Name*	Code	Number of Sites Present*
Summer Tanager	*Piranga rubra*	SUTA	14
Swainson's Hawk	*Buteo swainson*	SWHA	3
Turkey Vulture	*Cathartes aura*	TUVU	1
Verdin	*Auriparus flaviceps*	VERD	3
Violet-green Swallow	*Tachycineta thalassina*	VGSW	1
Warbling Vireo	*Vireo gilvus*	WAVI	4
Western Kingbird	*Tyrannus verticalis*	WEKI	6
Western Meadowlark	*Sturnella neglecta*	WEME	7
Western Screech Owl	*Megascops kennicottii*	WESO	1
Western Tanager	*Piranga ludoviciana*	WETA	5
Western Wood-Pewee	*Contopus sordidulus*	WEWP	10
White-breasted Nuthatch	*Sitta carolinensis*	WBNU	4
White-winged Dove	*Zenaida asiatica*	WWDO	16
Willow Flycatcher	*Empidonax traillii*	WIFL	25
Wilson's Warbler	*Cardellina pusilla*	WIWA	4
Yellow Warbler	*Setophaga petechia*	YEWA	19
Yellow-billed Cuckoo	*Coccyzus americanus*	YBCU	1
Yellow-breasted Chat	*Icteria virens*	YBCH	22

*not all sites were surveyed as thoroughly as others

APPENDIX D: ANNUAL NEST MONITORING TABLE

Year	# Territories	# Pairs	# Nests found*	# Nests parasitized (%)**	# Nests depredated (%)**	# Nests abandoned (%)**	Unknown success	# Successful nests (%)	Estimated total # chicks fledged	Estimated productivity (# chicks per successful nest)
2002	1	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2003	N/S									
2004	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2005	4	1	2	1 (50%)	0	1 (50%)	0	1 (50%)	2	2.0
2006	1	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2007	10	1	2	1 (50%)	2 (100%)	0	0	0	0	N/A
2008	4	1	1	0	0	0	0	1 (100%)	3	3.0
2009	3	3	3	0	1 (50%)	0	1	1 (50%)	1	1.0
2010	6	4	3	1 (33%)	2 (67%)	0	0	0	0	N/A
2011	9	4	3	0	0	1 (50%)	1	1 (50%)	3	3.0
2012	14	9	10	0	1 (10%)	0	0	9 (90%)	18	2.0
2013	23	17	22	2 (9%)	7 (32%)	1 (5%)	0	14 (64%)	36	2.6

Year	# Territories	# Pairs	# Nests found*	# Nests parasitized (%)**	# Nests depredated (%)**	# Nests abandoned (%)**	Unknown success	# Successful nests (%)	Estimated total # chicks fledged	Estimated productivity (# chicks per successful nest)
2014	18	16	14	0	4 (29%)	0	0	10 (71%)	26	2.6
2015	17	16	17	1 (7%)	2 (13%)	1 (7%)	2	11 (73%)	31	2.8
2016	20	13	21	1 (7%)	6 (46%)	2 (15%)	8	4 (31%)	14	3.5
2017	17	16	27	3 (11%)	16 (59%)	1 (4%)	0	8 (30%)	21	2.6
2018	20	17	17	0	5 (38%)	0	4	7 (54%)	20	2.9
2019	N/S									
2020	25	20	23	2 (13%)	2 (13%)	1 (7%)	8	10 (67%)	28	2.8
2021	85	71	86	12 (27%)	27 (61%)	0	42	11 (25%)	23	2.1
2022	95	80	108	9 (11%)	29 (35%)	4 (5%)	25	43 (52%)	106	2.5
2024	96	86	57	7 (19%)	9 (24%)	2 (5%)	20	16 (43%)	43	2.7
Total	468	375	416	40 (13%)	113 (36%)	14 (4%)	111	147 (47%)	375	2.5

Unknowns not included in nest variable calculation.

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

** Some nests were parasitized, depredated, and/or abandoned. N/S = not surveyed