BUREAU OF RECLAMATION

Technical Report No. ENV-2024-020

Middle Rio Grande Yellow-billed Cuckoo Study Results – 2023

Isleta Pueblo to Elephant Butte Reservoir, New Mexico
Upper Colorado Basin Region

U.S. Department of the Interior

August 2024

Mission Statements

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

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

Cover Image – Cuckoo habitat along the Rio Grande in the Narrows. (M. White, 2023/Bureau of Reclamation)

Technical Report No. ENV-2023-021

Middle Rio Grande Yellow-billed Cuckoo Study Results – 2023

Isleta Pueblo to Elephant Butte Reservoir, New Mexico
Upper Colorado Basin Region

Prepared by:

Bureau of Reclamation
Technical Service Center
Denver, Colorado

U.S. Department of the Interior **August 2024**

Technical Report No. ENV-2023-021

Middle Rio Grande Yellow-billed Cuckoo Study Results – 2023

Isleta Pueblo to Elephant Butte Reservoir, New Mexico
Upper Colorado Basin Region

REBECCA SIEGLE

Digitally signed by REBECCA SIEGLE
Date: 2024.09.04 08:35:10 -06'00'

Prepared by: Rebecca Siegle
Natural Resources Specialist, Fisheries and Wildlife Resources Group, 86-68290

STANTON MOORE

Digitally signed by STANTON MOORE
Date: 2024.09.04 09:13:35 -06'00'

Prepared by: Dave Moore
Supervisory Biologist, Fisheries and Wildlife Resources Group, 86-68290

ETHAN REIBSOME

Digitally signed by ETHAN REIBSOME
Date: 2024.09.04 08:45:21 -06'00'

Peer reviewed by: Ethan Reibsome
Biologist, Fisheries and Wildlife Resources Group, 86-68290

Acronyms and Abbreviations

EBR	Elephant Butte Reservoir
ESA	Endangered Species Act
ft	foot/feet
ha	hectare
km	kilometer
LFCC	low flow conveyance channel
m	meter
mi	mile
MRG	Middle Rio Grande
NWR	National Wildlife Refuge
Reclamation	Bureau of Reclamation
RM	river mile
USFWS	U.S. Fish and Wildlife Service
YBCU	Yellow-billed Cuckoo

Symbols

>	greater than
<	less than
%	percent
±	plus or minus

Contents

Tables

Figures

Appendices

Executive Summary

During the summer of 2023, Bureau of Reclamation personnel conducted presence/absence surveys for the federally threatened Yellow-billed Cuckoo (*Coccyzus americanus occidentalis*; YBCU) within the Middle Rio Grande (MRG) riparian corridor between the Isleta Pueblo and Elephant Butte Reservoir, New Mexico. In accordance with established protocols, surveys were conducted during the YBCU breeding season (June 15 to August 15) to determine the distribution and abundance of YBCUs throughout this stretch of the MRG.

During the 2023 breeding season, 452 YBCU detections were recorded within the MRG study area. From these detections, 114 territories were delineated; two were confirmed by locating nests, 60 were possible breeding pairs, and 52 were probable breeding pairs, as defined in Halterman et al. (2016). As in previous years, the San Marcial Reach contained the largest breeding population of YBCUs within the MRG study area, with 322 detections and an estimated 78 breeding territories. Forty-six of these territories were in the exposed pool of Elephant Butte Reservoir. The Bosque del Apache Reach produced the second highest number of territories — 28 from 98 detections — 52 more detections than 2022. The Belen Reach produced 1 territory from 10 detections and the Tiffany Reach included 1 territory from 8 detections. Other river reaches were either not surveyed or surveys were reduced in 2023 due to lack of personnel. The San Acacia and Sevilleta reaches were not surveyed in 2023. Only two sites were surveyed in the Escondida Reach in 2023, just north of the Bosque del Apache. Within these 2 sites, 14 detections were recorded which comprised 6 territories.

Survey Results by Reach*

Belen* – 10 detections, 1 territory

Escondida* – 14 detections, 6 territories

Bosque del Apache (active floodplain)* – 98 detections, 28 territories

Tiffany – 8 detections, 1 territory

San Marcial – 322 detections, 78 territories

* Only selected sites were surveyed

Introduction

The federally threatened Yellow-billed Cuckoo (*Coccyzus americanus occidentalis*), hereafter referred to as YBCU or cuckoo, is a Neotropical migratory bird found in the southwestern United States, including along the Middle Rio Grande (MRG) in New Mexico. Cuckoos typically arrive on breeding grounds in the Southwest by late May and initiate migration to wintering grounds in Central and South America by mid-August (Halterman et al. 2000). During the breeding season, YBCUs establish large territories; radio telemetry studies identified core use areas between 2 and 36 hectares (ha) and home ranges as large as 216 ha in the MRG (Dillon and Moore 2020). Average YBCU nest heights range from 1.3 to 14.5 meters (m; McNeil et al. 2015, Halterman 2001) which correlates with nests found in the Middle and Lower Rio Grande study areas. The nesting pair shares incubation responsibilities, occasionally accompanied by a helper male. The young will fledge approximately 17 days after initial egg laying (Halterman 2001, Hughes 2020). The cuckoo diet primarily consists of larger insects including green caterpillars, katydids, cicadas and other small prey (Laymon 1998, Hughes 2022).

The YBCUs generally nest in large, dense patches of riparian vegetation, particularly with a cottonwood (Populus deltoides) or Goodding's willow (*Salix gooddingii*) overstory (Ehrlich et al. 1988, USFWS 2014, Hughes 2020, Stanek et al. 2021). The YBCU territories often include a dense understory component comprised of native vegetation (e.g. Salix species) or exotics including saltcedar (*Tamarix* spp.) and Russian olive (*Elaeagnus angustifolia*; Sechrist et al. 2009). Early successional restoration areas may readily attract YBCUs, but occupancy and population growth appear to be short term (Wohner 2021). While Eastern Yellow-billed Cuckoos (C. *americanus americanus*) extensively use saltcedar along the Pecos River (Sechrist and Best 2014), habitat models suggest increasing saltcedar coverage, and/or the limited presence of native habitat, discourage YBCU occupancy (Johnson et al. 2017). Loss or modification of habitat, changes in hydrology and use of pesticides have all been attributed to population and range declines, while climate change and other unknown factors appear to be hindering range wide recovery (Gaines and Laymon 1984, USFWS 2014, Mayor et al. 2017).

Western Yellow-billed Cuckoos are protected under the Endangered Species Act (ESA). Once common across riparian habitats of the western United States to British Columbia, Canada, its current range is confined to small populations within the Southwest, including the Rio Grande floodplain. In 2001, the U.S. Fish and Wildlife Service (USFWS) determined that the Western Distinct Population Segment was distinct from the Eastern population, with the division being the continental divide from Montana to central Colorado; the eastern boundary of the Rio Grande drainage from central Colorado to Texas; and the mountain ranges that form a southeastern extension of the Rocky Mountains to the Big Bend area in West Texas (USFWS 2009; figure 1). After being proposed for listing in 2013, on November 3, 2014, the YBCU's threatened listing became effective under the ESA (USFWS 2014). The YBCU is also listed as threatened, endangered, or sensitive by the states of California, Arizona, New Mexico, Colorado, and Utah.

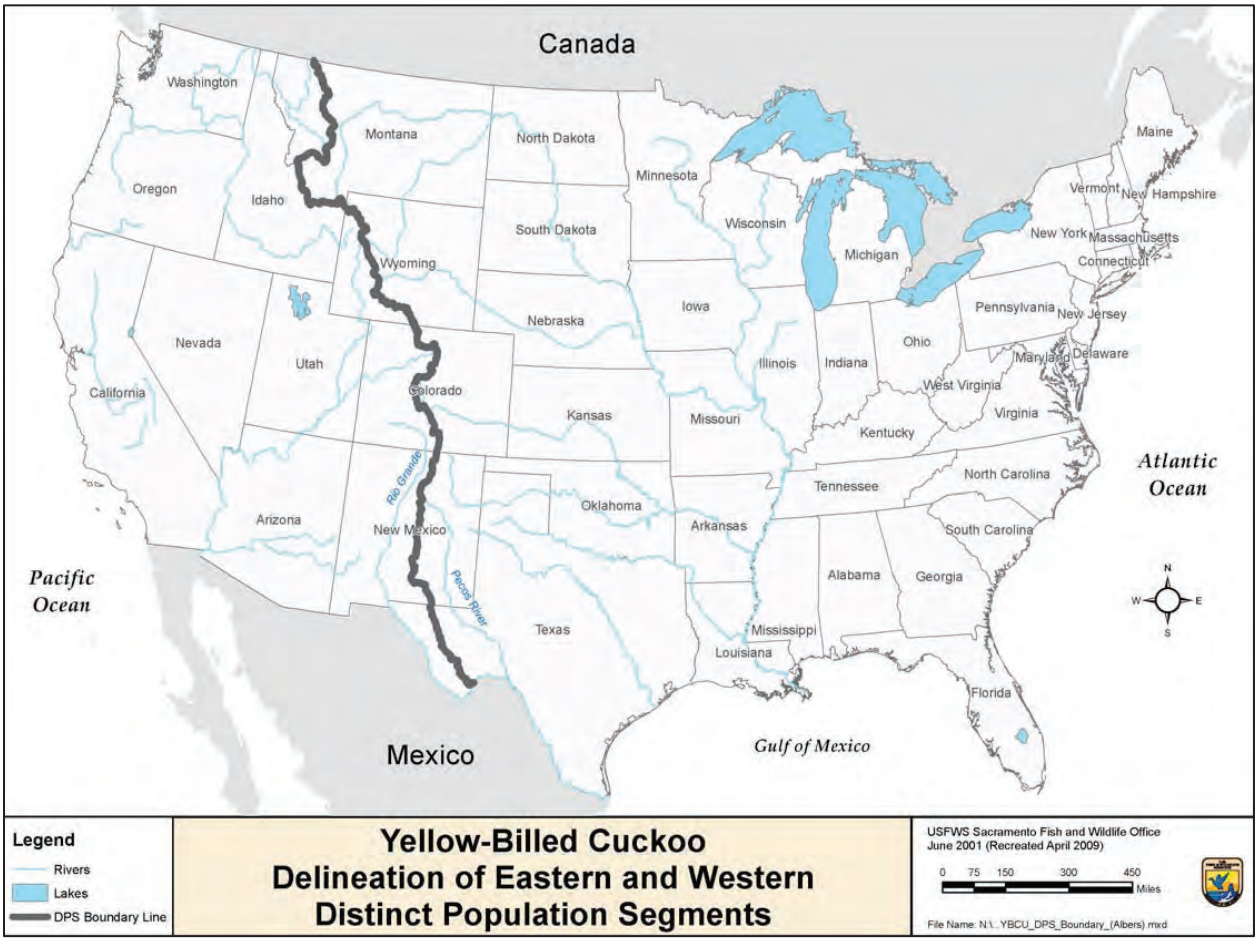

Figure 1.—Delineation of distinct population segments of Yellow-billed Cuckoos (USFWS 2009).

Designated Critical Habitat for the Western Distinct Population was published in 2021 and includes Rio Grande floodplain habitat from Los Lunas, New Mexico to approximately River Mile (RM) 54 within the Elephant Butte Reservoir (EBR) pool, New Mexico (USFWS 2021; figure 2). Although a large percentage of the detections and territories in the MRG study area have been found within the exposed pool of EBR, most of the reservoir delta was excluded from Critical Habitat. Given Bureau of Reclamation's (Reclamation) Western Yellow-billed Cuckoo Management Plan, current management practices and ongoing commitments, USFWS determined that the benefits of exclusion outweigh the benefits of inclusion.

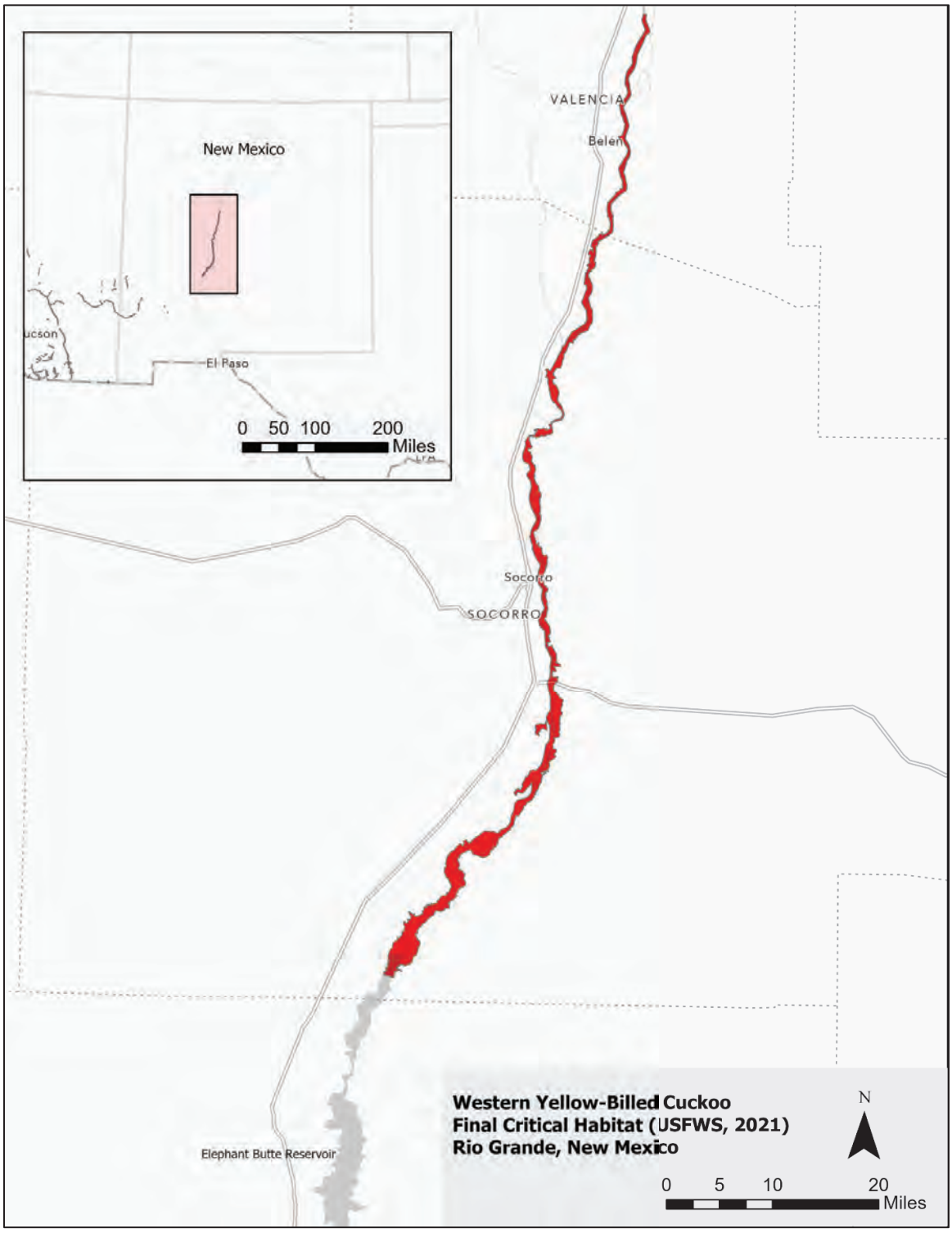

Figure 2.—Delineation of Final Critical Habitat established by USFWS in 2021 along the Middle Rio Grande within New Mexico (Source: USFWS IPAC; https://ipac.ecosphere.fws.gov/).

Cuckoos were observed in the MRG between 1998 and 2005 during Southwestern Willow Flycatcher (*Empidonax traillii extimus*) surveys. To determine the distribution and abundance of YBCUs in the MRG, Reclamation initiated formal presence/absence surveys in 2006 within the exposed pool of EBR, when three surveys were conducted per season. By 2014, the survey area had expanded to encompass its current extent from EBR to the southern boundary of the Isleta Pueblo. The current survey protocol, which includes four surveys per season, was adopted in 2009. This report covers all current year results and reach summaries for prior years.

Methods

Study Area

Reclamation's MRG study area encompasses approximately 129 RMs and covers the riparian corridor between the southern boundary of the Isleta Pueblo and EBR. It is divided into 7 river reaches that include 154 survey sites (figure 3). In 2023, 95 sites within 5 reaches were surveyed. The following is a reach-by-reach description of the study area.

Belen Reach

The Belen Reach is the northernmost reach, extending 39.5 RMs downstream from the south boundary of the Isleta Pueblo (RM 166) to the confluence of the Rio Grande and Rio Puerco (RM 126.5) and covering 7,138 acres (ac; 2,889 hectares [ha]). Native-dominated overstory covers approximately 63 percent of the total survey area, mostly open cottonwood galleries with sparse saltcedar, Russian olive (*Eleagnus angustifolia*) and/or coyote willow (*Salix exigua*) understory. Much of the reach lacks annual overbank flooding and remains dry throughout the breeding season, bounded by the Rio Grande on one side and an extensive levee system on the other. However, several stands of coyote willow have developed on sand bars and islands in recent years.

This reach provided 967 ac (391 ha) of suitable YBCU breeding habitat, 14 percent of the total area, in 2021 (Siegle et.al. 2022). Eleven of the 36 sites within the Belen Reach were surveyed in 2023.

Sevilleta/La Joya Reach

The Sevilleta Reach extends 10.5 RMs from the confluence of the Rio Grande and Rio Puerco (RM 126.5) to San Acacia Diversion Dam (RM 116) and encompasses 3,580 ac (1,449 ha). Lands within this reach are managed by the New Mexico Department of Game and Fish (La Joya Wildlife Management Area) and U.S. Fish and Wildlife Service (Sevilleta National Wildlife Refuge [NWR]). Monotypic stands of saltcedar or Russian olive are common with occasional

cottonwood stands, coyote willow, and Russian olive along the banks of the river. On lower terraces and river bars, moderate overbank flooding occurs during high flow events. The San Acacia Diversion Dam within the downstream portion of this reach backs up water, allowing the portion immediately upstream of the dam to aggrade.

This reach provided 278 ac (113 ha) of suitable YBCU breeding habitat, 8 percent of the total area, in 2021 (Siegle et.al. 2022). None of the 11 sites within the Sevilleta Reach were surveyed in 2023 due to personnel shortages and stakeholder priorities.

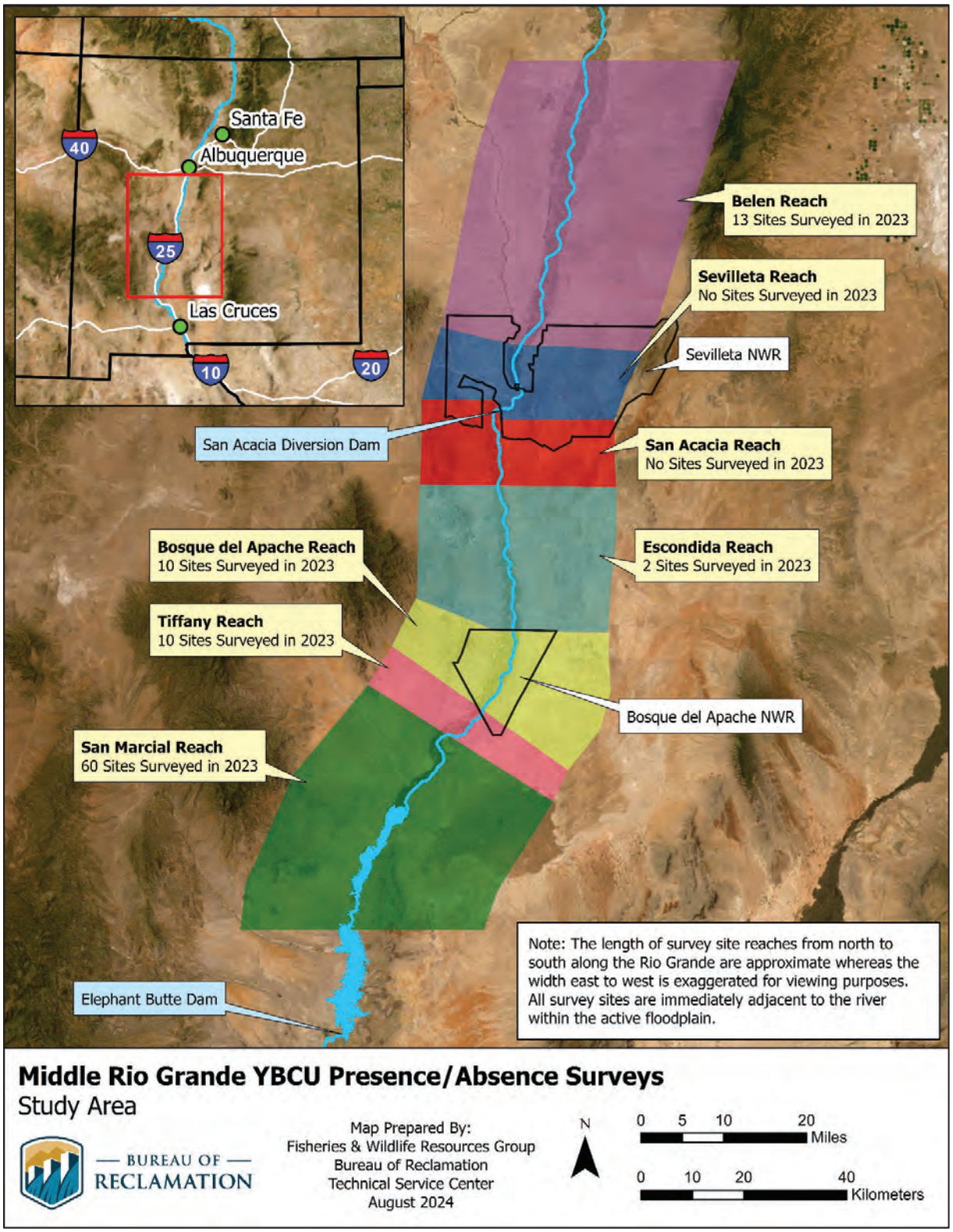

Figure 3.—Middle Rio Grande survey reaches.

San Acacia Reach

The San Acacia Reach extends downstream approximately 12 RMs from San Acacia Diversion Dam (RM 116) to Escondida Bridge (RM 104) comprising 2,767 ac (1,120 ha). The active floodplain within the San Acacia reach is relatively narrow and constrained by uplands to the east and levees along the Low Flow Conveyance Channel (LFCC) to the west. River dynamics in the reach are limited by the San Acacia Diversion Dam, with infrequent flooding only on lower terraces. Habitat within this reach is varied and consists of a mixture of gallery cottonwood, saltcedar of various ages and structures, and patchy coyote willow and Russian olive along the river. The highly degraded river channel in this reach has reduced overbank flooding and limited understory growth in many areas.

This reach holds the smallest amount of suitable habitat of any study reach providing 56 ac (23 ha) of suitable YBCU breeding habitat, 2 percent of the total area, in 2021 (Siegle et.al. 2022). Due to personnel shortages and stakeholder priorities, none of the six sites within the San Acacia Reach were surveyed in 2023.

Escondida Reach

The Escondida Reach extends 20 RMs downstream from Escondida Bridge (RM 104) to the north boundary of the Bosque del Apache NWR (RM 84) and encompasses 5,944 ac (2,405 ha). Similar to the San Acacia Reach, river dynamics in the reach are limited by the San Acacia Diversion Dam. The river in this reach is incised and does not experience regular overbank flooding except during high flow events. Persistent drought and frequent river drying have stressed the native habitat and decreased habitat suitability. Vegetation includes sparse, shrubby saltcedar and seep willow (*Baccharis salicifolia*) with intermittent cottonwood overstory in the drier areas and smaller patches of native willows along the river. This reach has only been partially surveyed since 2019.

This reach provided 113 ac (46 ha) of suitable YBCU breeding habitat, 2 percent of the total area, in 2021 (Siegle et.al. 2022). Two sites between Highway 380 and the Bosque del Apache NWR of the 14 included within the Escondida Reach were surveyed in 2023.

Bosque del Apache Reach

The Bosque del Apache Reach comprises 3,984 ac (1,612 ha) within the active floodplain of the Bosque del Apache NWR (RMs 84 to 74). Habitat within this reach varies widely from decadent, dense saltcedar to large, mature cottonwood and Goodding’s willow stands to dense patches of coyote willow and Russian olive. Extensive overbank flooding occurs in this reach during high river flows, which recently occurred during the 2017, 2019, and 2023 breeding seasons. In 2020, due to the risk posed to refuge infrastructure and water delivery by a sediment plug, the river was

realigned to the east to bypass the plug. Habitat adjacent to the former alignment and sediment plug has become dry and decadent. Ideally, this habitat will be replaced by developing habitat adjacent to the new river alignment. However, the river regularly dries during low-flow periods in the summer.

This reach provided 965 ac (390 ha) of suitable YBCU breeding habitat, 24 percent of the total area, in 2021 (Siegle et.al. 2022). Ten of the 16 sites within the Bosque del Apache Reach were surveyed in 2023.

Tiffany Reach

The Tiffany Reach extends from the southern boundary of the Bosque del Apache NWR to the San Marcial railroad trestle (RMs 74 to 69). The 2017 Tiffany Fire severely burned most of the vegetation within this reach. However, some native canopy patches have partially or fully recovered. Of the 3,772 ac (1,527 ha) within this reach, 24 percent is still open and considered non-habitat due to fire and 56 percent of the area is young saltcedar. A sediment plug has historically formed in this reach, however, in its absence very little overbank flooding occurs without high river flows.

This reach provided 147 ac (59 ha) of suitable YBCU breeding habitat, 24 percent of the total area, in 2021 (Siegle et.al. 2022). All of the 10 sites within the Tiffany Reach were surveyed in 2023.

San Marcial Reach

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

As the EBR receded, several hundred hectares of Goodding’s and coyote willow habitat developed within the exposed pool south of RM 60, some of which continues to provide avian habitat. Monotypic saltcedar stands developed where hydrology became unsuitable for native vegetation. Habitat along the LFCC West, a channel south and west of RM 60, was more frequently flooded or wetted by flows and supports native and occupied habitat. Prolonged drought has impacted high quality habitat within the EBR pool and, over time, saltcedar has expanded in this stretch. Much of the native habitat within the upper pool has begun to show

signs of stress, resulting in a reduction in foliage density and subsequently a decline in habitat suitability. This reach has been surveyed annually since 2006, with subtle increases in the extent of the survey area downstream as the reservoir receded over the past several years.

This reach contains the most suitable habitat of any study reach providing 4,804 ac (1,944 ha) of suitable YBCU breeding habitat, 22 percent of the total area, in 2021 (Siegle et.al. 2022). Sixty of the 61 sites within the San Marcial Reach were surveyed in 2023.

Presence/Absence Surveys

Cuckoo surveys were conducted using methodology outlined in the 2016 Cuckoo Natural History Summary and Survey Protocol (Halterman et al. 2016).

For each survey, surveyors used the repeated call-playback method throughout all suitable habitat in their designated survey site. The prerecorded “kowlp” call was broadcast using a wireless speaker for 20 to 30 seconds, followed by a one-minute pause to allow for a YBCU response. This procedure was repeated five times, or until a YBCU response was detected. If no response was detected, surveyors walk 100 m (328 feet [ft]) and repeat the call/pause sequence. If a response was heard, the observer stopped playback, recorded their observations, and walked 300 m (984 ft) before repeating the procedure, in order to reduce the potential for duplicate counting of individuals.

Four surveys were conducted at least 12 days apart within three survey periods between 5:30 am and 11:00 am (table 1). Multiple surveys were conducted to increase the likelihood of detections, the probability of positively identifying occupied locations during the breeding season, and to aid in the determination of breeding status.

Table 1.—YBCU survey periods based on Halterman et al. (2016)

Survey number	Survey period
1	June 15 to June 30
2 and 3*	July 1 to July 31
4	August 1 to August 15

* Mid-season start and end dates can be +/- three days.

All four surveys were conducted at least 12 days apart within the YBCU resident period and, therefore all detections were assumed to be those of resident paired or unpaired cuckoos and not of migrants. A single individual may have multiple detections over the season. Survey data were recorded on field forms which were subsequently transferred to electronic survey forms, a digital

spreadsheet, and a geospatial database. The actual location of the detected cuckoo was derived from the surveyor's location, the compass bearing to the detected YBCU, and an estimated distance.

Data recorded when a YBCU was detected included the following:

- Detection time
- Detection type (aural, visual, or both)
- Call type ('kowl', 'coo', or other – including 'knocker')
- Playback number at time of detection
- Universal Transvers Mercator (UTM) North American Datum of 1983 (NAD83) coordinates of the surveyor, and estimated bearing and distance to YBCU
- Relevant comments (e.g., observed breeding behavior, vegetation types, etc.)

Territory Estimation

Defining the number and location of cuckoo territories is complicated by several factors. The YBCUs have large, undefended territories that can overlap with other pairs. Individuals can travel more than 500 m (1,640 ft) per day and more than 3 kilometers (km; 1.9 miles [mi]) during the breeding season based on telemetry data (Sechrist et al. 2009). Determining which birds belong to a single territory is further complicated by being unable to differentiate males and females by call as they both make 'coo', 'kowlp', and 'knocker' calls, and the possibility of a third adult (helper male) being present (Halterman, personal communication 2008). Surveys conducted later in the breeding season (i.e., Surveys 3 and 4) could also detect hatch year fledglings that have dispersed from the nest site into surrounding areas, resulting in an overestimation of breeding pairs based on detections. Projected YBCU locations are calculated from surveyor UTM coordinates, distance, and compass bearing, all of which have inherent estimation errors, particularly with aural detections.

The following rules, adapted from Ahlers and Moore (2012) and Halterman et al. (2016), are used to estimate breeding YBCU territories based on survey detections:

1. A YBCU territory must have a minimum of two detections less than 500 m (1,640 ft) apart during at least two surveys of the four total surveys (figure 4, example 1). If these conditions are not met, the detections are not considered to be part of a breeding territory, but rather to be floater detections.

2. No more than three detections within 300 m (984 ft) during the same survey period can be included within a single YBCU territory. More than two YBCU detections during the same survey period in an area less than 300 m (984 ft) apart suggests multiple breeding territories (figure 4, example 2).

3. The YBCU clumping patterns should be evaluated based on the number and proximity of detections during individual survey periods. Ideally, multiple discrete detections within 300 m of each other over multiple surveys are needed to confirm a breeding territory (figure 4, example 3).

4. Although YBCU territories can overlap, "natural breaks" between detection clumps, regardless of distance, should be considered when delineating territories (figure 4, example 4).

5. "Best biological judgment" should prevail when delineating and estimating YBCU territories. Habitat suitability and abundance, as well as the distribution of YBCU detections over the entire breeding season should be considered when delineating breeding territories.

Territories are categorized as possible (PO), probable (PR) or confirmed (CO) breeding territories. Possible breeding territories consist of two or more distinct YBCU detections over two survey periods. Probable breeding territories consist of three or more detections over three survey periods. Confirmed breeding territories are based on finding a nest or observing nest building, copulation, or fledglings (Halterman et al. 2016). A center point for each territory was assigned for mapping purposes.

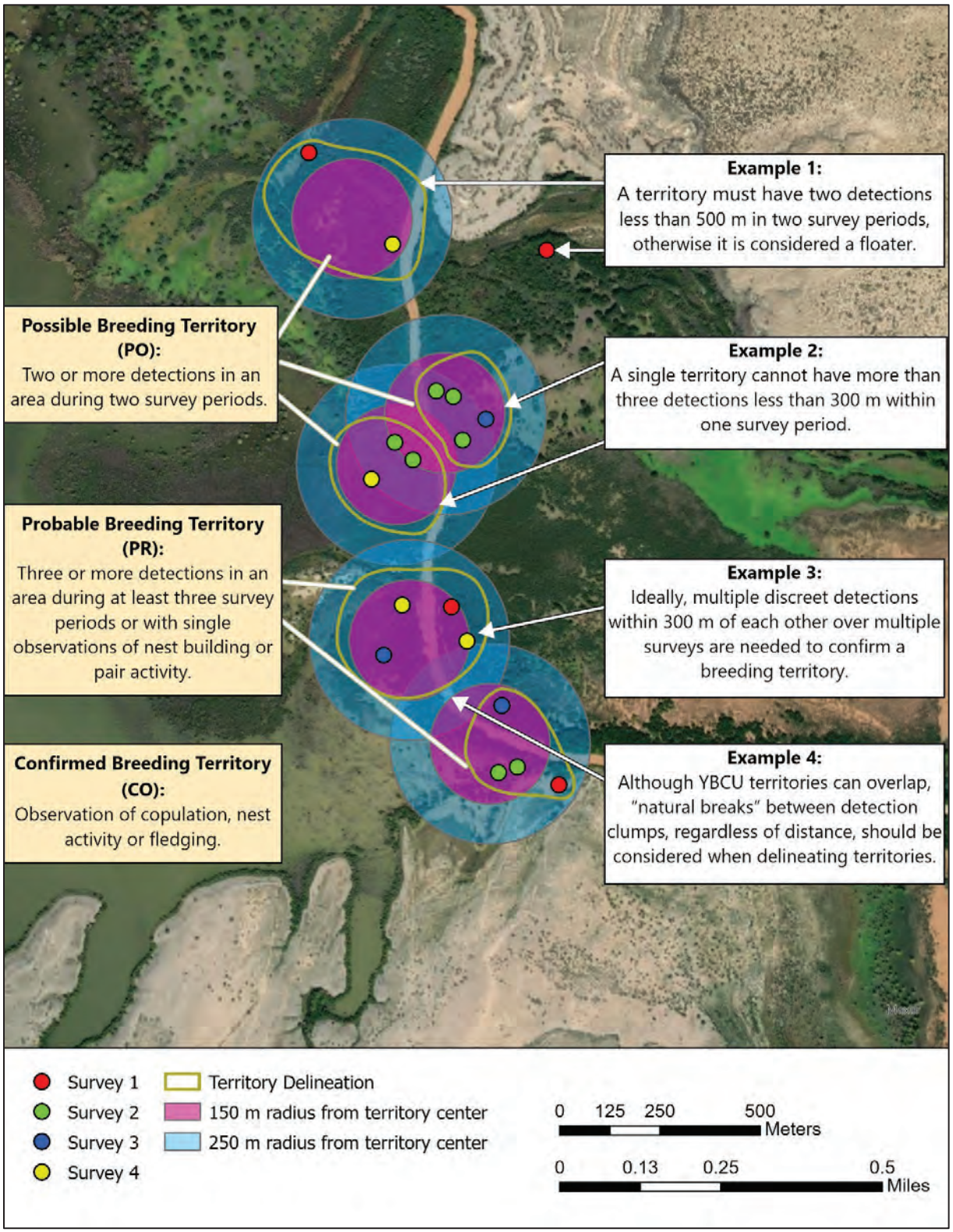

Figure 4.—Examples of Yellow-billed Cuckoo territory estimations.

Results

Presence/Absence Surveys

During the 2023 breeding season, 452 YBCU detections were recorded within the Middle Rio Grande study area. These detections were delineated into 114 estimated breeding territories, including 72 possible breeding territories, 50 probable breeding territories, and 2 confirmed territories where nests were found (table 2). As in previous years, most detections (71 percent) and territories (68 percent) were located within the San Marcial Reach, mostly within the Elephant Butte Reservoir sites south of RM 60 (41 percent of total detections, table 2). The Bosque del Apache Reach supported the highest number of territories outside of the San Marcial Reach. Habitat suitability analysis has determined that these two sites have the greatest percentage of suitable habitat within the Middle Rio Grande for YBCUs (table 2, Siegle and Moore 2022). A small number of territories were delineated in the other reaches surveyed within sites determined to have less available suitable habitat (table 2).

Table 2.—Totals and percentages of suitable habitat, detections and territories by river reach in 2023 within the Middle Rio Grande study area. Habitat suitability from Siegle and Moore (2023)

River reach	Habitat suitability		YBCU detections		YBCU territories	
	Total reach habitat (ha)[1]	Suitable habitat [ha (%)]	Total number of detections	Percentage of total detections	Total number of territories	Percentage of total territories
Belen*	2,380	391 (14%)	10	2%	1	1%
Sevilleta/ La Joya	1,172	113 (8%)	Not surveyed	--	-	--
San Acacia	951	23 (2%)	Not surveyed	--	-	--
Escondida*	1,769	46 (2%)	14	3%	6	5%
Bosque del Apache*	1,227	390 (24%)	98	22%	28	25%
Tiffany	1,126	60 (4%)	8	2%	1	1%
San Marcial*	6,198	1,944 (22%)	322	71%	78	68%
MRG Study Area	19,855	2,966 (22%)	452	100%	114	100%

*Only select sites surveyed in reach

[1] Total habitat = Suitable + Unsuitable + Non-habitat

Spatial distribution and abundance of the 2023 YBCU detections and territories throughout the study area is presented in appendix A. Sections of the study area where no sites were surveyed in 2023 were not mapped in the figures.

Discussion

Presence/Absence Surveys

Since 2009, surveys documented a persistent YBCU population (figure 5), particularly within the San Marcial Reach (table 3). Following the expansion of the Belen and San Marcial Reaches in 2014, survey effort remained relatively consistent until budget shortfalls (2019), limitations imposed by the COVID-19 pandemic (2020 and 2021) and staff shortages (2022 and 2023) reduced the number of sites surveyed. Therefore, the number of detections and territories vary both annually and by site. Trends in population and range should be interpreted carefully (table 3).

After a fire in 2017, most of the Tiffany Reach and the northernmost sites of the San Marcial Reach were burned and, for the most part, excluded from surveys. When surveys were conducted in 2023, most of the burned habitat in both the San Marcial and Tiffany Reaches had recovered, except one site in San Marcial.

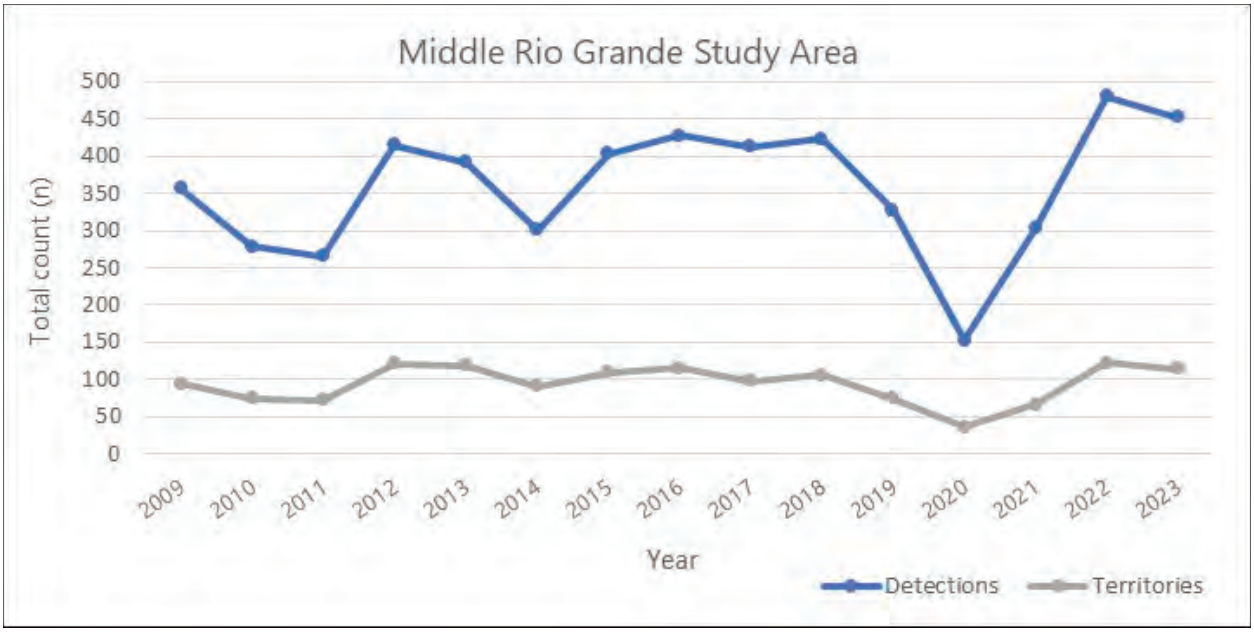

Figure 5.—Total number of both Yellow-billed Cuckoo detections and territories within the Middle Rio Grande study area of New Mexico from 2009–2023.

Table 3.— Yellow-billed Cuckoo territories and detections by river reach from 2009 to 2023 within the Middle Rio Grande Study Area

Year	Number of territories (detections)							
	Belen	Sevilleta	San Acacia	Escondida	Bosque del Apache	Tiffany	San Marcial	Total
2009	0 (1)	2 (4)	1 (8)	9 (29)	11 (47)	3 (10)	69 (257)	**95 (356)**
2010	0 (3)	0 (1)	0 (3)	2 (6)	3 (14)	0 (2)	70 (249)	**75 (278)**
2011	4 (16)	2 (6)	1 (6)	3 (15)	4 (17)	1 (4)	58 (202)	**73 (266)**
2012	15 (44)	12 (36)	4 (19)	21 (68)	10 (36)	2 (10)	57 (202)	**121 (415)**
2013	6 (20)	6 (19)	5 (20)	23 (80)	8 (29)	1 (4)	70 (219)	**119 (391)**
2014	5 (24)*	2 (9)	4 (15)	7 (27)	12 (34)	0 (2)	61 (190)*	**91 (277)**
2015	10 (39)	5 (18)	8 (27)	16 (62)	12 (40)	0 (2)	59 (215)	**110 (403)**
2016	12 (54)	10 (32)	8 (23)	16 (58)	11 (32)	0 (9)	59 (220)	**116 (428)**
2017	4 (34)	4 (12)	13 (50)	11 (44)	10 (43)	0 (2)	56 (227)	**98 (410)**
2018	10 (51)	10 (31)	14 (47)	10 (55)	13 (46)	0 (0)	49 (193)	**106 (423)**
2019	NS	NS	8 (29)	11 (50)	14 (59)	0 (0)	42 (190)	**75 (328)**
2020	3 (16)	NS	NS	5 (16)	11 (52)	NS	17 (69)	**36 (153)**
2021	5 (22)	NS	NS	2 (13)	15 (70)	NS	45 (198)	**67 (303)**
2022	11 (40)	11 (50)	6 (24)	1 (3)	14 (46)	NS	79 (317)	**122 (480)**
2023	1 (10)	NS	NS	6 (14)	28 (98)	1 (8)	78 (322)	**114 (452)**

* Added 35.5 river miles of survey area to Belen Reach and 4 river miles to San Marcial Reach in 2014

Shaded = Reach only partially surveyed

NS = Not Surveyed

Fewer detections after 2019 in Belen and Escondida are likely due to reduced survey efforts in theses longer reaches (table 3). Detections and territories rebounded in Belen when the entire reach was surveyed in 2022. This effect did not appear in the Bosque del Apache, where detections and territories were highest in 2023 when only half the reach was surveyed. In 2023, the San Marcial Reach also produced the highest number of detections recorded to date following an increase in survey effort (table 3).

Total territory numbers within the MRG have fluctuated since 2009, but importantly territories have been identified in all surveyed reaches through 2023 (table 3). In 2023, 78 territories were delineated in the San Marcial Reach, the second highest total on record for any reach, closely following the 2022 record. Despite limited survey efforts in the San Acacia reach, detections and territories remain relatively consistent. However, continued surveys will be necessary in future years for accurate population estimates.

The following section discusses historical trends by reach. Maps of all YBCU territories from 2009 to 2023 are presented in appendix B.

The Belen Reach (figure 6) was partially surveyed (south of Highway 60 at RM 130.5) from 2009 to 2013 and in 2023 and surveyed in its entirety from 2014 to 2018, as well as in 2022. The reach was excluded from surveys in 2019 and only a small number of priority sites were surveyed in 2020 and 2021. Since 2011, the reach has supported between 4 and 15 cuckoo territories annually, predominately in the southern portion of the reach around Highway 60, although YBCUs have been detected throughout the reach. Fires in 2021 and 2022 burned portions of the middle of this reach near Belen, New Mexico and removed some native canopy. Fewer detections after 2019 in Belen and Escondida are likely due to reduced survey efforts in theses longer reaches (table 3).

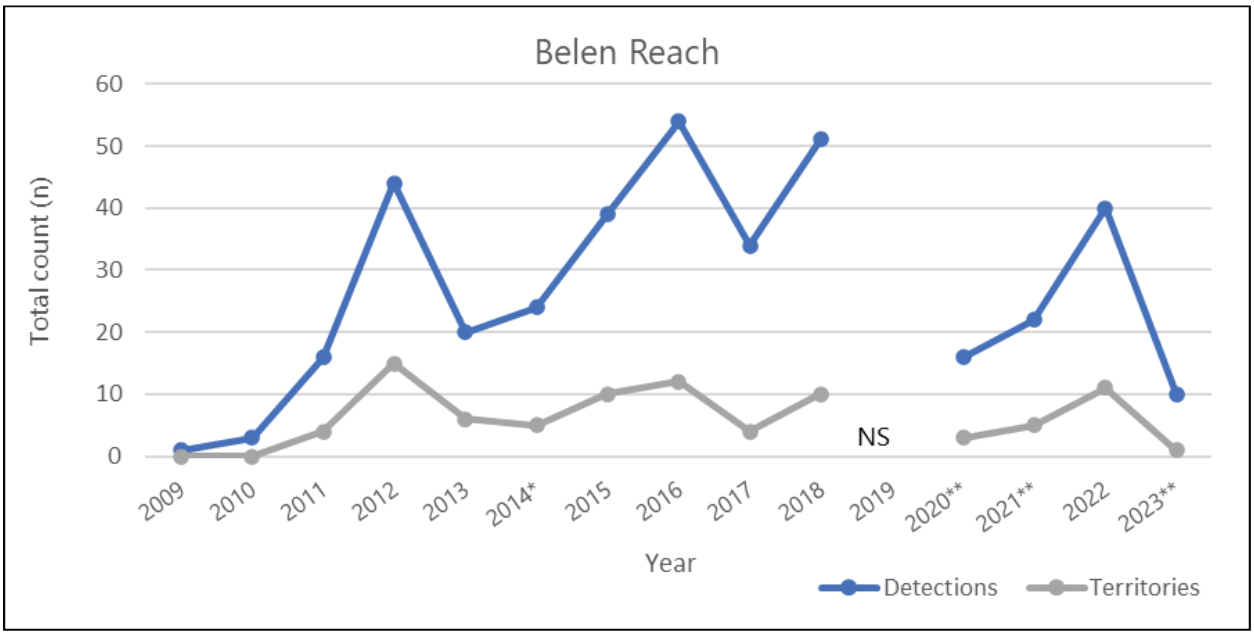

Figure 6.—The number of Yellow-billed Cuckoo detections and territories in the Belen Reach from 2009 to 2023.
* Survey area expanded 35.5 RMs
**Reduced number of sites surveyed
NS = Not surveyed.

The Sevilleta/La Joya Reach (figure 7) was not surveyed from 2019 to 2021, nor in 2023, but surveyed completely in all other years. The number of territories and detections ranged from 2 to 12 over the survey period. Most were found north of RM 121, abutting the population in the Belen Reach. While the number of territories were similar in 2018 and 2022, more detections were found in 2022 and were distributed across more survey sites. Since surveys were not conducted in this reach in 2023, more data collection will be needed to understand the trends in this population.

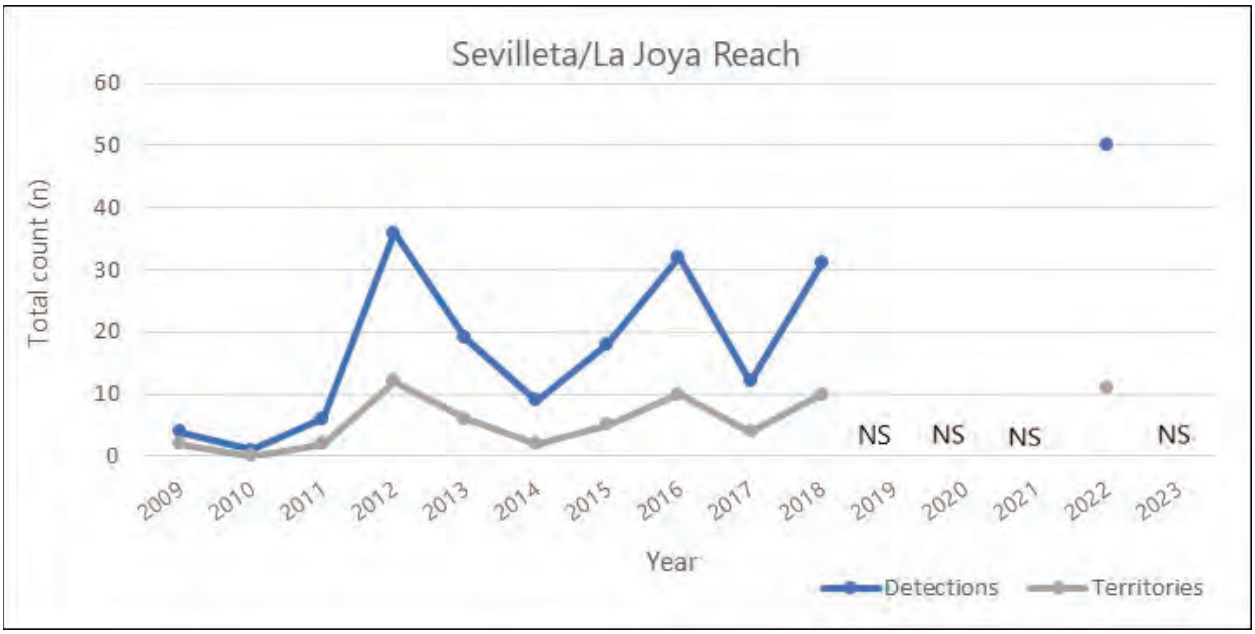

Figure 7.—The number of Yellow-billed Cuckoo detections (black line) and territories (grey line) in the Sevilleta/La Joya Reach from 2009 to 2023.
NS = Not surveyed.

The San Acacia Reach (figure 8) was surveyed in its entirety from 2009 to 2019 and not surveyed in 2020, 2021, and 2023. In 2022, only half of the sites were surveyed. The number of cuckoo territories per season gradually increased through 2018, peaking at 14 territories. A single nest, which successfully fledged young, was found in 2019. This gradual increase appeared to continue into 2022 with 24 detections and 6 territories in the two sites surveyed., These same sites had 16 detections and 4 territories in 2019. However, because this reach was not surveyed in 2020, 2021, or 2023, recent trends in the San Acacia population are unknown.

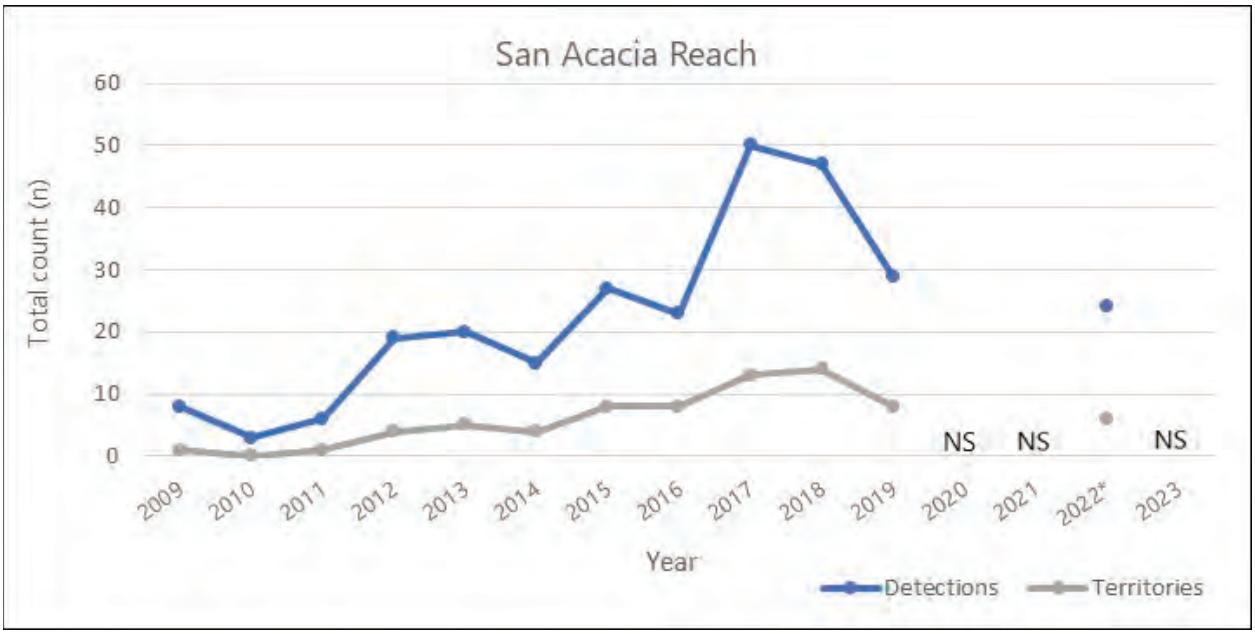

Figure 8.—The number of Yellow-billed Cuckoo detections (black line) and territories (grey line) in the San Acacia from 2009 to 2023.
*Reduced number of sites surveyed.
NS = Not surveyed

The Escondida Reach (figure 9) was surveyed completely between 2009 and 2019. Three sites were surveyed in 2020 and two sites in 2021, 2022, and 2023. Several territories were delineated annually since 2012, with a high of 23 territories in 2013. In 2019, the last year the entire reach was surveyed, 11 cuckoo territories were delineated from 50 detections, and 2 nests were located (1 fledged). The 2016 Escondida Fire burned approximately 212 ha in the northern end of this reach. No cuckoo territories were previously documented in this area, suggesting that it had minimal impact on the cuckoo population. The area surveyed between 2021 and 2023 represents a small section of the Escondida reach that supported zero to six territories annually. Additional surveys across the entire reach are needed to assess population trends within this reach.

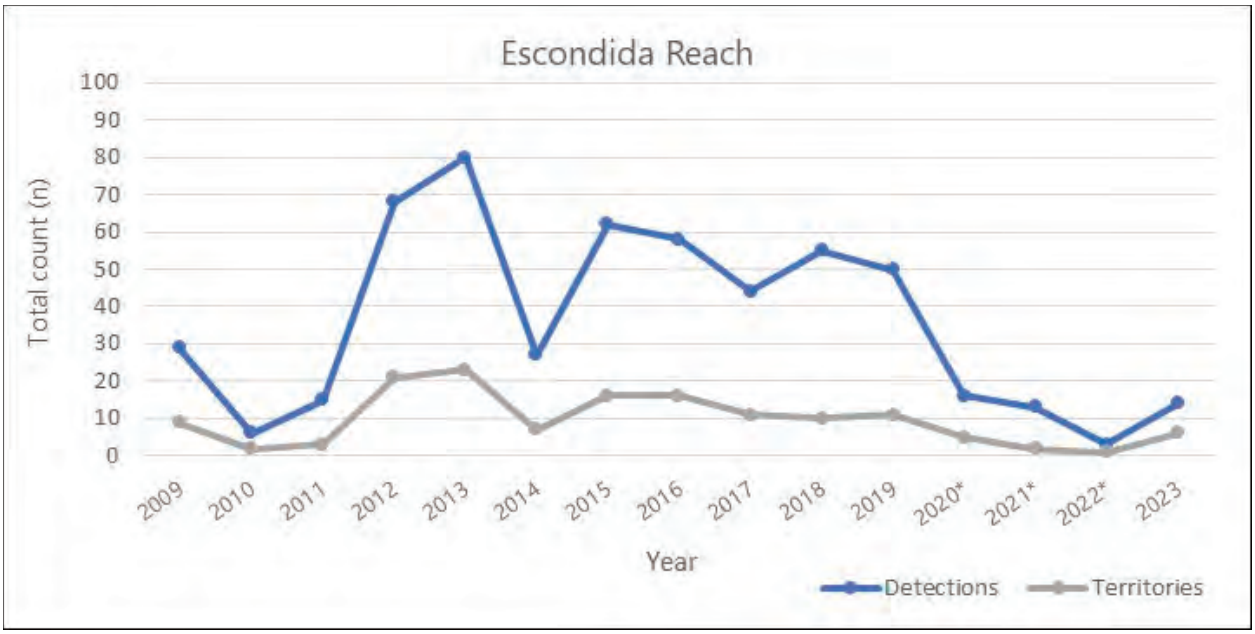

Figure 9.—The number of Yellow-billed Cuckoo detections and territories in the Escondida Reach from 2009 to 2023.
*Reduced number of sites surveyed

The Bosque del Apache Reach (figure 10) was also surveyed in its entirety from 2009 to 2019, and again in 2022. Only the northern half of the reach was surveyed in 2020, 2021, and 2023. The Bosque del Apache Reach competes with the Escondida Reach in supporting the second highest number of territories after the San Marcial Reach. Ten or more territories have been delineated annually since 2014, regardless of how many sites were surveyed. Despite excluding more than a third of sites from surveys in 2020 and 2021, 11 and 15 territories were delineated from 52 and 70 detections, respectively. Territories in 2022 dispersed throughout the entire reach and it is unclear what caused the high number of detections concentrated in the north sites in 2021. In 2023, there were 98 detections recorded which comprised 28 territories, the maximum number since surveys began in 2009, even though surveys only covered about 60 percent of the reach.

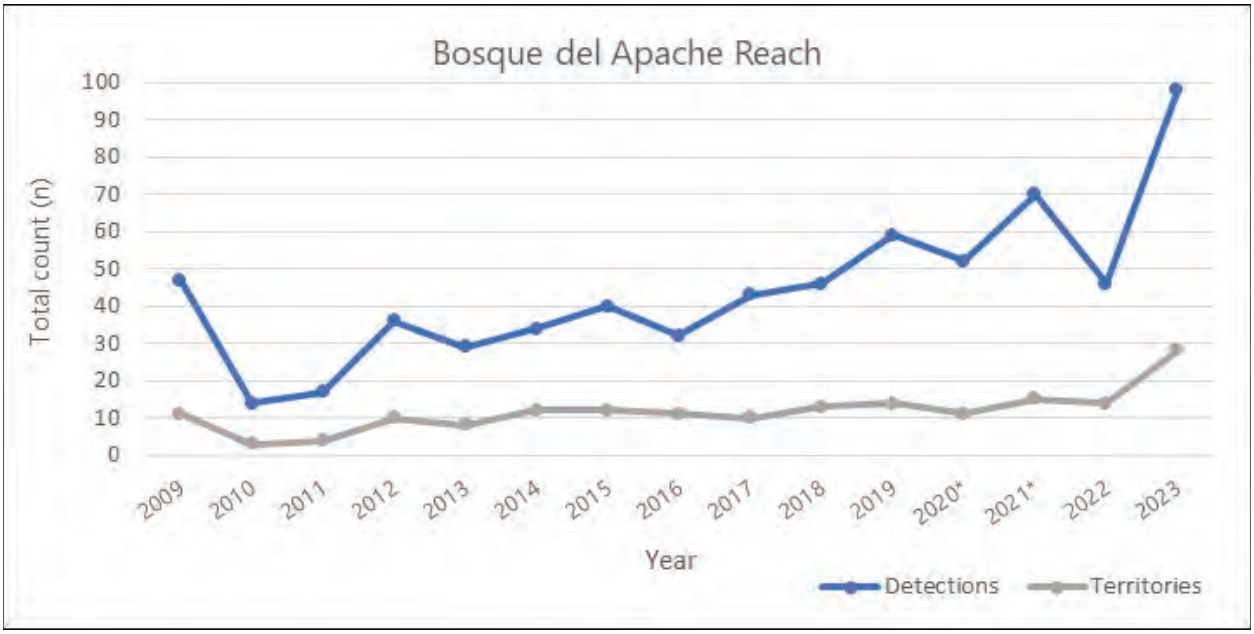

Figure 10.—The number of Yellow-billed Cuckoo detections and territories in the Bosque del Apache Reach from 2009 to 2023.
*Reduced number of sites surveyed

The Tiffany Reach (figure 11) was surveyed entirely from 2006 to 2017 but only one possible YBCU territory was delineated in the reach from 2013 to 2017. Most of the reach was severely burned in the 2017 Tiffany Fire, and only one site (LF-26) was surveyed in 2018 and 2019. No surveys were conducted from 2020 to 2022. In 2023, 100 percent of this reach was surveyed (10 sites), and there were 8 detections and one possible breeding YBCU territory in the very southern end of the reach.

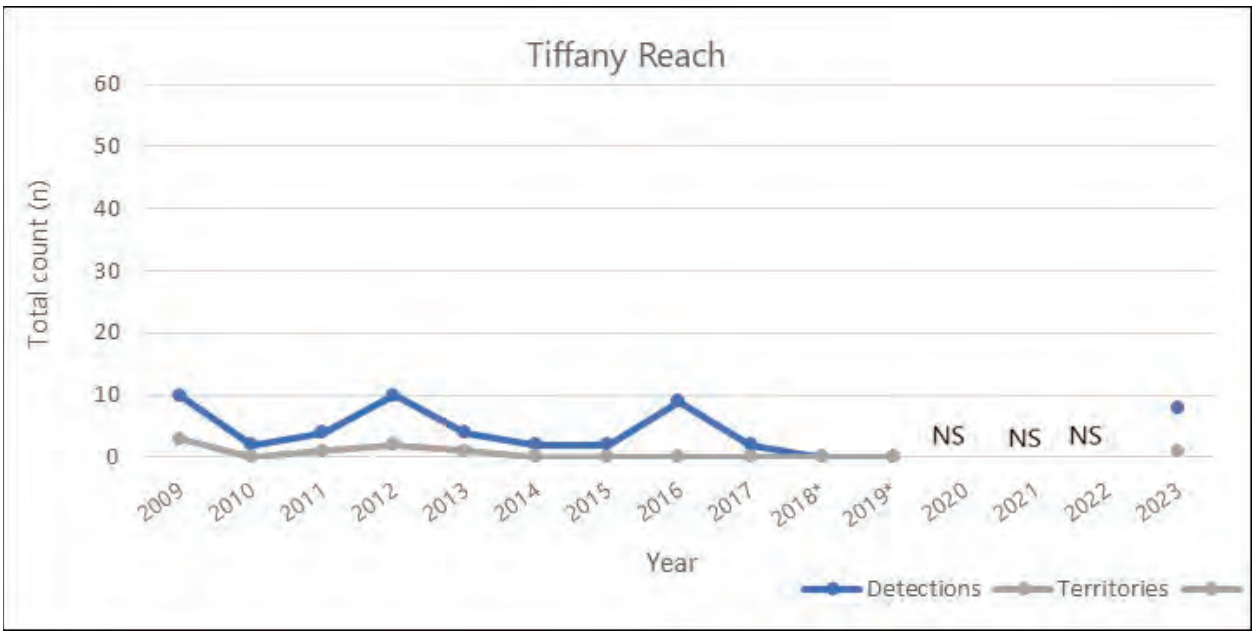

Figure 11.—The number of Yellow-billed Cuckoo detections and territories in the Tiffany Reach from 2009 to 2023.
*Only one site surveyed in 2018 and 2019 following fire
NS = Not surveyed

The San Marcial Reach (figure 12) supported the largest number of cuckoos in the study area, averaging 61 percent of all territories and detections observed annually. The record low number of territories (n = 17) in 2020 was a result of a large reduction in survey effort across the reach (approximately 12 percent of sites were surveyed). In 2022, there were 79 territories delineated from 317 detections - the highest recorded in the study's history - and in 2023 the number of YBCU detections was similar with 78 territories delineated from 322 detections. The entire reach was surveyed until 2017 when the Tiffany Fire burned many sites in the upstream portion of the reach. In 2018 and 2019 all sites with potential habitat that hadn't burned were surveyed. There were reduced survey efforts from 2020 to 2023, however the number of sites surveyed varied. For example, less than half of the sites were surveyed in 2021 while almost all sites were surveyed in 2023. Therefore, the effect of these reductions on the number of detections was considerably different by year. Fewer surveys were due to COVID travel/hiring restrictions (2020 and 2021) and additional hiring difficulties (2022 and 2023). Since the protocol surveys began in this reach, nine nests have been found with an average success rate of 50 percent.

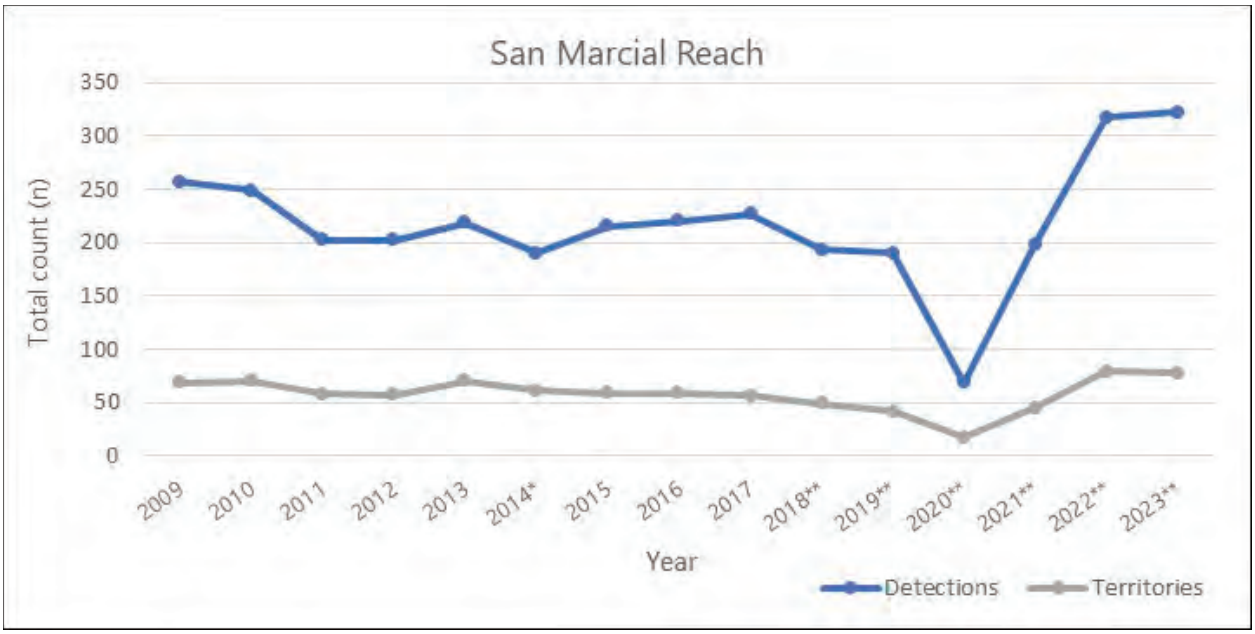

Figure 12.—The number of Yellow-billed Cuckoo detections and territories in the San Marcial Reach from 2009 to 2023.
* Survey area expanded 4 RMs
**Reduced number of sites surveyed

YBCU Distribution within Elephant Butte Reservoir

Large stands of native Goodding's willow-dominated habitat developed within exposed portions of upper reservoir pool as Elephant Butte Reservoir receded between 1995 and 2004 (figure 13). The LFCC West flows and overbank flooding of the river channel maintained this habitat.

However, much of the habitat in the upper portion of the exposed reservoir pool has declined in quality over the past 20 years due to natural succession, senescence of understory, drought, a deepening water table and infrequent flooding caused by degradation of the Rio Grande channel, and a lack of recruitment of young willows. Habitat adjacent to the LFCC West and in the downstream portion of the exposed reservoir pool continues to develop due to a shallower water table and more frequent flooding, although expansion of habitat is limited by river regulation, drought, ongoing succession, and a lack of disturbance which would return areas to the earlier seral stages preferred by cuckoos.

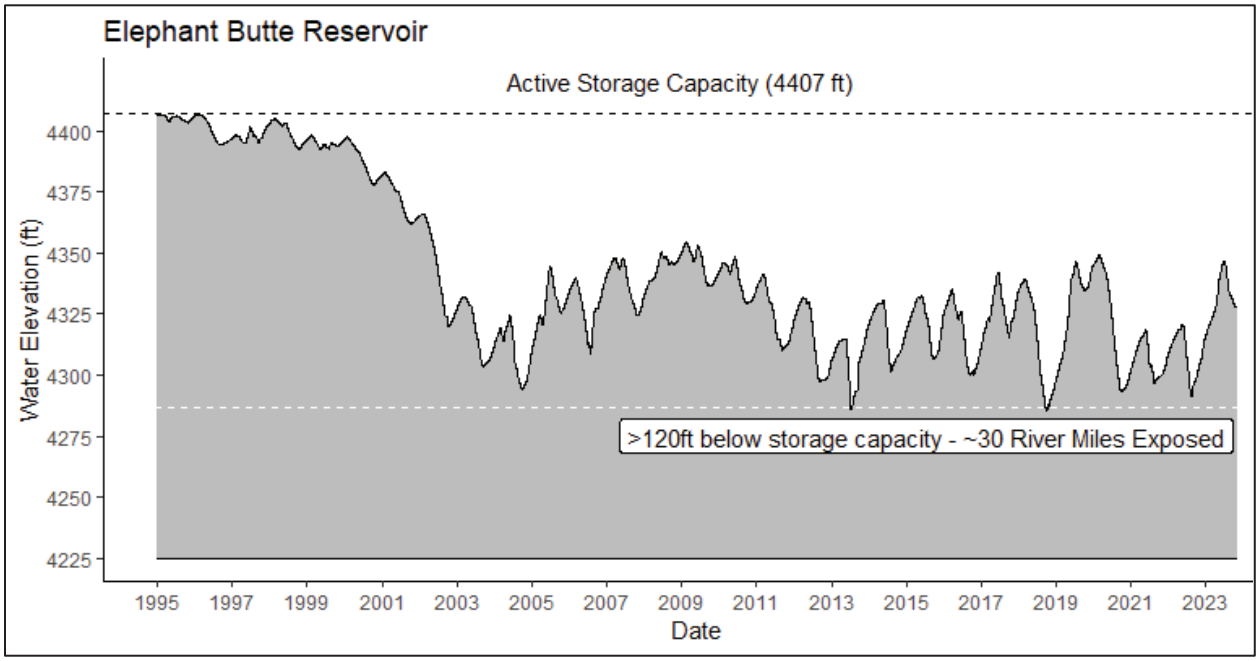

Figure 13.—Surface elevation of Elephant Butte Reservoir 1995 to 2023.

During the summer of 2013, and again in September 2018, Elephant Butte Reservoir dropped to 4,286 ft (1,306 m), its lowest elevation since 1972. The reservoir was approximately 120 vertical ft below the spillway and nearly 1.9 million acre-ft from full capacity on these occasions. Since the early 2000's, monsoonal rain events and high winter and spring flows periodically raised reservoir levels and flooded newly established habitat in the southern end of the exposed reservoir (figure 13).

Soon after surveys began in 2006, many YBCU detections in the exposed pool of Elephant Butte Reservoir were located within the elevational range of 4,355 to 4,360 ft (1327 to 1329 m). The YBCUs began colonizing lower elevations soon after habitat was considered suitable enough to be surveyed. Detections were first recorded at less than 4,340 ft (1,323 m) in 2014 and comprised over 15 percent of annual detections between 2016 and 2020 (figure 14).

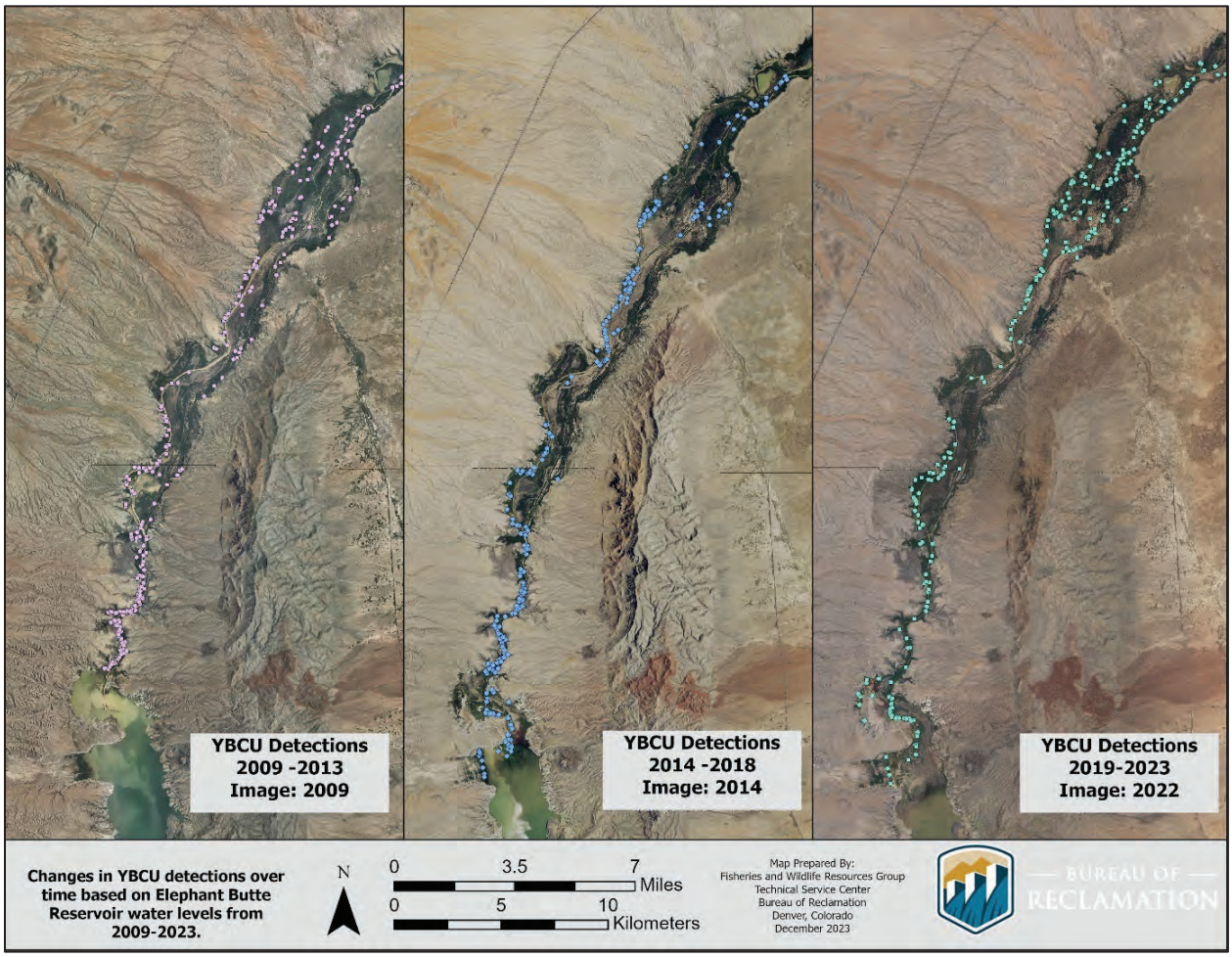

Figure 14.—Three satellite images of Elephant Butte Reservoir (NAIP 2009, 2014, and 2022) showing the changes in water levels, available habitat, and detections of Yellow-billed Cuckoos, represented by circles from 2009–2013 (pink), 2014–2018 (blue), and 2019–2023 (green) in Sierra and Socorro Counties, New Mexico.

Conclusion

A persistent cuckoo population has been documented in the MRG since 2009. Inconsistent survey effort between 2019 and 2023 skewed comparisons of overall population size within those years, but surveys conducted in 2023 documented a sizeable population within the Rio Grande floodplain from Isleta Pueblo to EBR. Although reach-specific population trends can be extrapolated from years when an entire reach was surveyed, overall population trends cannot be determined in the absence of a complete survey effort. Fifty-three percent of all cuckoo territories and detections in the MRG from 2009 to 2023 have been located within the exposed pool of EBR within the San Marcial Reach. Although this population fluctuated annually, it appears to be well established and likely serves as a source population for sites both upstream

and downstream. Survey data across the entire MRG survey area suggest that certain areas were continually occupied by YBCUs, while occupations in other stretches were erratic. Habitat in San Marcial supported more territories than in other reaches, but several of the reaches upstream consistently retained smaller populations. Complete surveys in future years would be a valuable monitoring tool for the MRG cuckoo population as a whole and would help determine if these habitat patches and populations expand or change their distribution.

Recommendations

1. Continue annual surveys within all areas where active projects are being conducted to meet Biological Opinion mandates.

2. Monitor any documented cuckoo nests to gain insight into nesting variables. The YBCU nests are rarely found without the use of radiotelemetry so there is currently minimal information about cuckoo productivity, nest success and site fidelity on the Rio Grande.

3. Update the Geographic Information System database with annual YBCU territory locations to monitor population trends based on detection and territory abundance.

4. Update vegetation maps at 4- to 5-year intervals to document changes in habitat quality and identify potential restoration opportunities when needed.

Literature Cited

Dillon, K, and S.D. Moore. 2020. Yellow-billed cuckoo breeding habitat use: A radio telemetry study on the Middle Rio Grande. Denver, Colorado: Bureau of Reclamation, Technical Service Center.

Ehrlich, P. R., D.S. Dobkin, and D. Wheye. 1988. The Birder's Handbook: a field guide to the natural history of North American birds. New York, New York: Simon and Schuster.

Gaines, D., and S.A. Laymon. 1984. "Decline, Status and Preservation of the Yellow-Billed Cuckoo in California." *Western Birds* 15 (2):49–80.

Halterman, M.D. 2001. Population Status of the Yellow-billed Cuckoo at the Bill Williams River NWR and Alamo Dam, Arizona, and Southern Nevada: Summer 2000. Weldon, CA: Southern Sierra Research Station.

Halterman, M.D. 2008. "Personal communication." Weldon, California: Southern Sierra Research Station.

Halterman, M.D., D.S. Gilmer, S.A. Laymon, and G. A. Falxa. 2000. Yellow-Billed Cuckoo Study Methodology in California 1999–2000. Weldon, California: Southern Sierra Research Station.

Halterman, M.D., M.J. Johnson, J.A. Holmes, and S.A. Laymon. 2016. A Natural History Summary and Survey protocol for the Western Distinct Population Segment of the Yellow-billed Cuckoo. Draft May 2016. 45 p.: U.S. Fish and Wildlife Techniques and Methods.

Howe, W.H. 1986. Status of the Yellow-billed Cuckoo (*Coccyzus americanus*) in New Mexico. Final Report to NMDGF. Contract No. 20181-86-00731. Phoenix, Arizona: U.S. Fish and Wildlife Service.

Hughes, J.M. 2020. Yellow-billed Cuckoo (*Coccyzus americanus*), version 1.0. In Birds of the World (P. G. Rodewald, Editor). Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bow.yebcuc.01

Laymon, S.A., and M.D. Halterman. 1987. Can the Western Subspecies of the Yellow-Billed Cuckoo be Saved from Extinction? *Western Birds* 18: 19–25.

Mayor, S.J., R.P. Guralnick, M. W. Tingley, J. Otegui, J.C. Withey, S.C. Elmendorf, M.E. Andrew, S. Leyk, I.S. Pearse, and D.C. Schneider. 2017. Increasing phenological asynchrony between spring green-up and arrival of migratory birds. *Scientific Reports* 7: 1902. doi:https://doi.org/10.1038/s41598-017-02045-z.

Sechrist, J., and E. Best. 2012. Yellow-billed Cuckoo Migration Study Results - Pecos River . Denver, Colorado: Bureau of Reclamation, Technical Service Center.

Sechrist, J.,V. Johanson, and D.D. Ahlers. 2009. Western Yellow-billed Cuckoo Radio Telemetry Study Results – Middle Rio Grande New Mexico – 2007–2008. Denver, Colorado: Bureau of Reclamation, Technical Service Center.

Siegle, R., and S.D. Moore. 2022. Western Yellow-billed Cuckoo Habitat Suitability: Middle Rio Grande, New Mexico. Denver, Colorado: Bureau of Reclamation, Technical Service Center.

Stanek, J.E., S.E. Mcneil, D. Tracy, J.R. Stanek, J.A. Manning, and M.D. Halterman. 2021. Western Yellow-Billed Cuckoo Nest-Site Selection and Success in Restored and Natural Riparian Forests. Journal of Wildlife Management, 85(4): 782–793.

U.S. Fish and Wildlife Service (USFWS). 2009. U.S. Fish and Wildlife Service Species Assessment and Listing Priority Assignment Form, by the Sacramento Fish and Wildlife Office.

U.S. Fish and Wildlife Service. 2014. "Determination of threatened status for the Western Distinct Population Segment of the Yellow-billed Cuckoo (*Coccyzus americanus*); proposed rule." *Federal Register* 79 (158): 48548–48652.

U.S. Fish and Wildlife Service. 2021. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Western Distinct Population Segment of the Yellow-billed Cuckoo. *Federal Register* 86 (75): 20798–21005.

Appendix A

Yellow-billed Cuckoo Detections and Territories by Reach

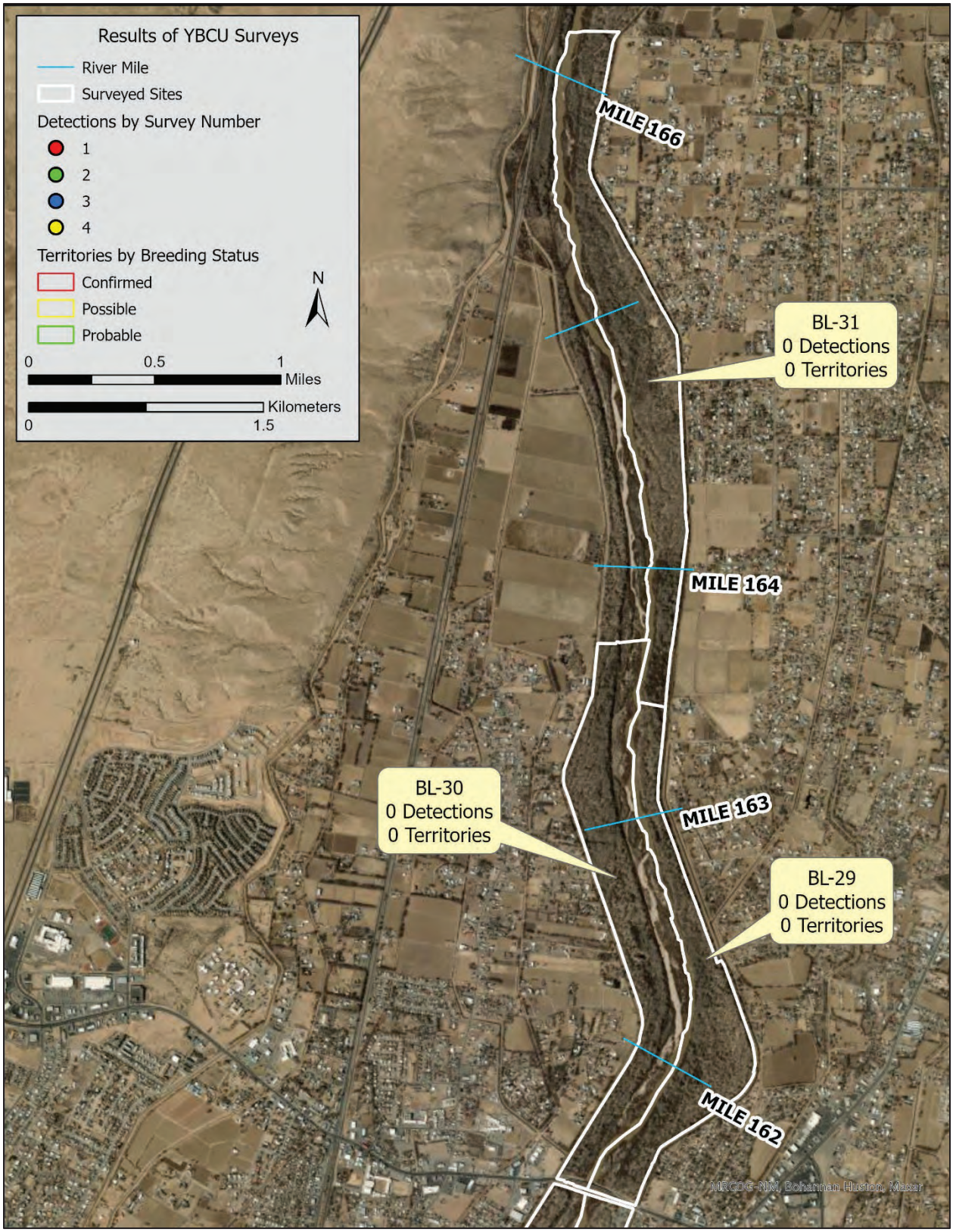

Figure A-1.—2023 Yellow-billed Cuckoo detections and territories in the Belen Reach (1 of 3).

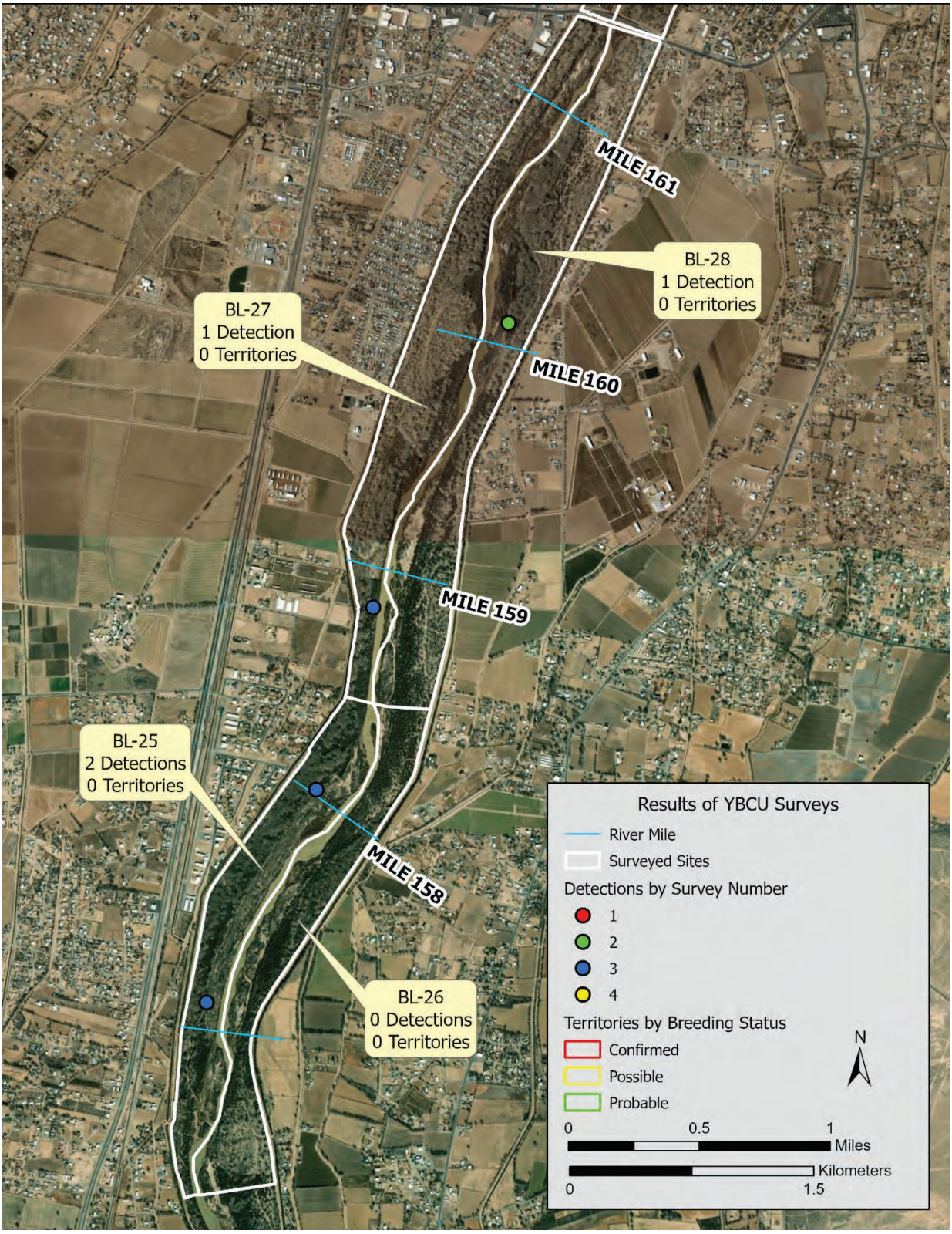

Figure A-2.—2023 Yellow-billed Cuckoo detections and territories in the Belen Reach (2 of 3).

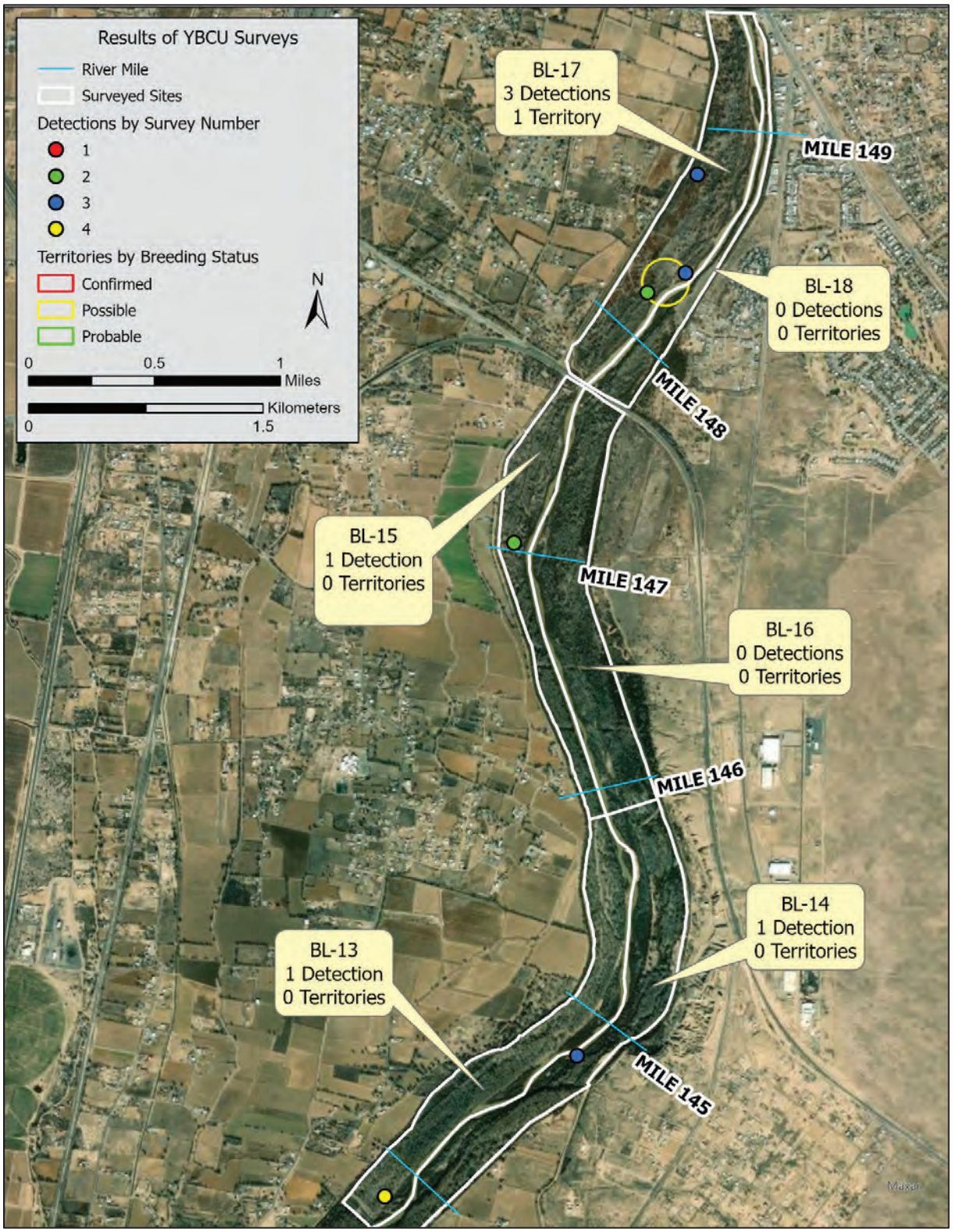

Figure A-3.—2023 Yellow-billed Cuckoo detections and territories in the Belen Reach (3 of 3).

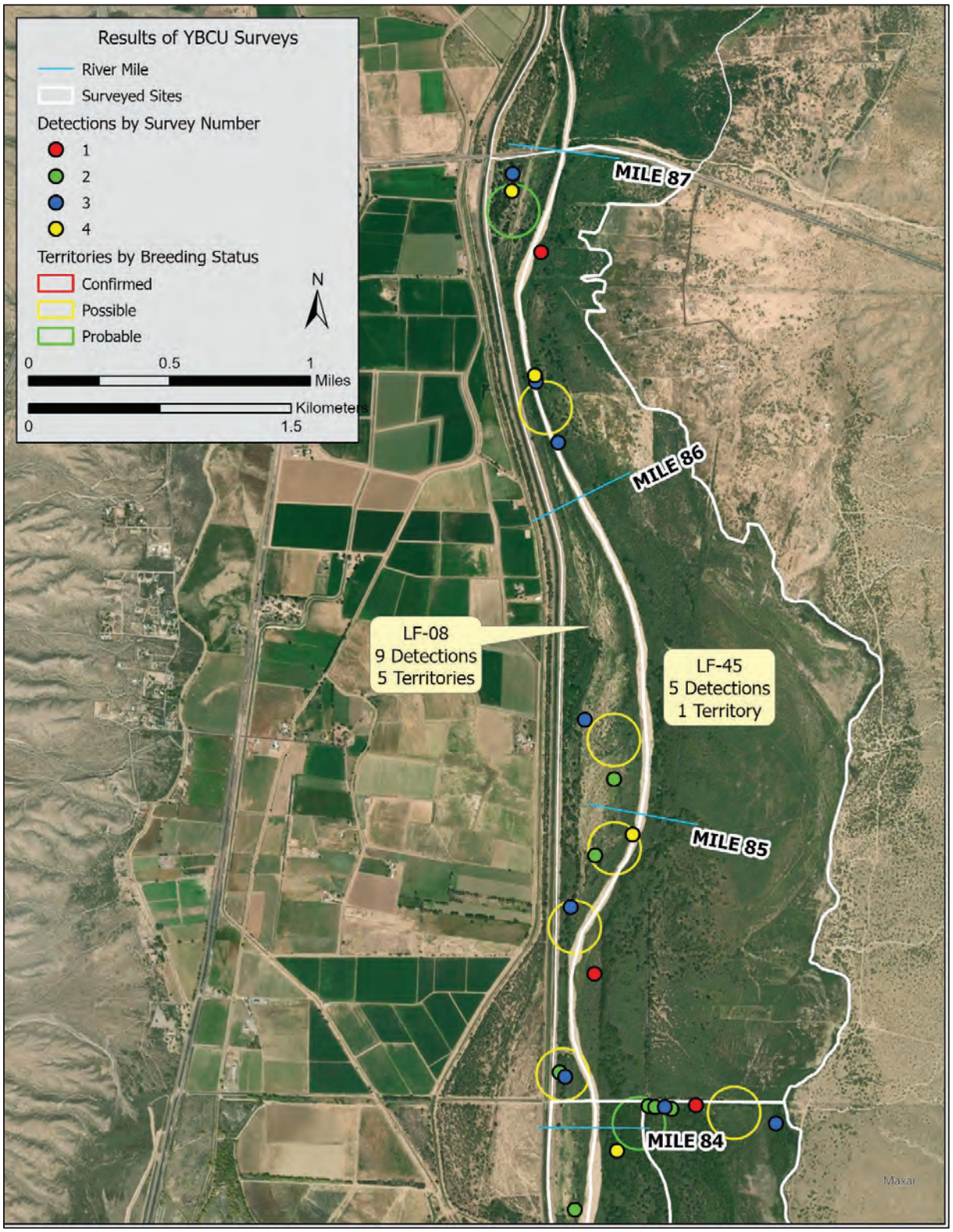

Figure A-4.—2023 Yellow-billed Cuckoo detections and territories in the Escondida Reach (1 of 1).

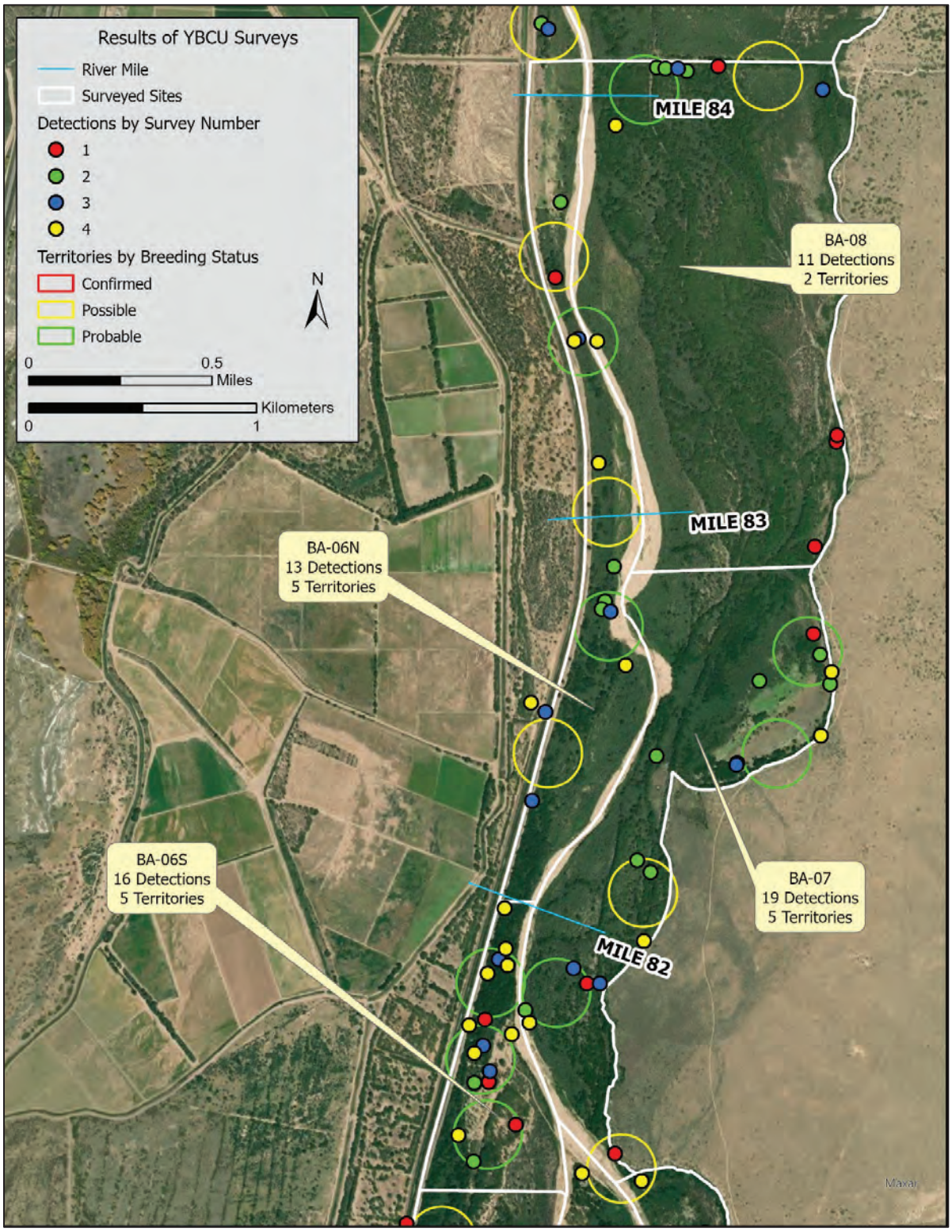

Figure A-5.—2023 Yellow-billed Cuckoo detections and territories in the Bosque del Apache Reach (1 of 2).

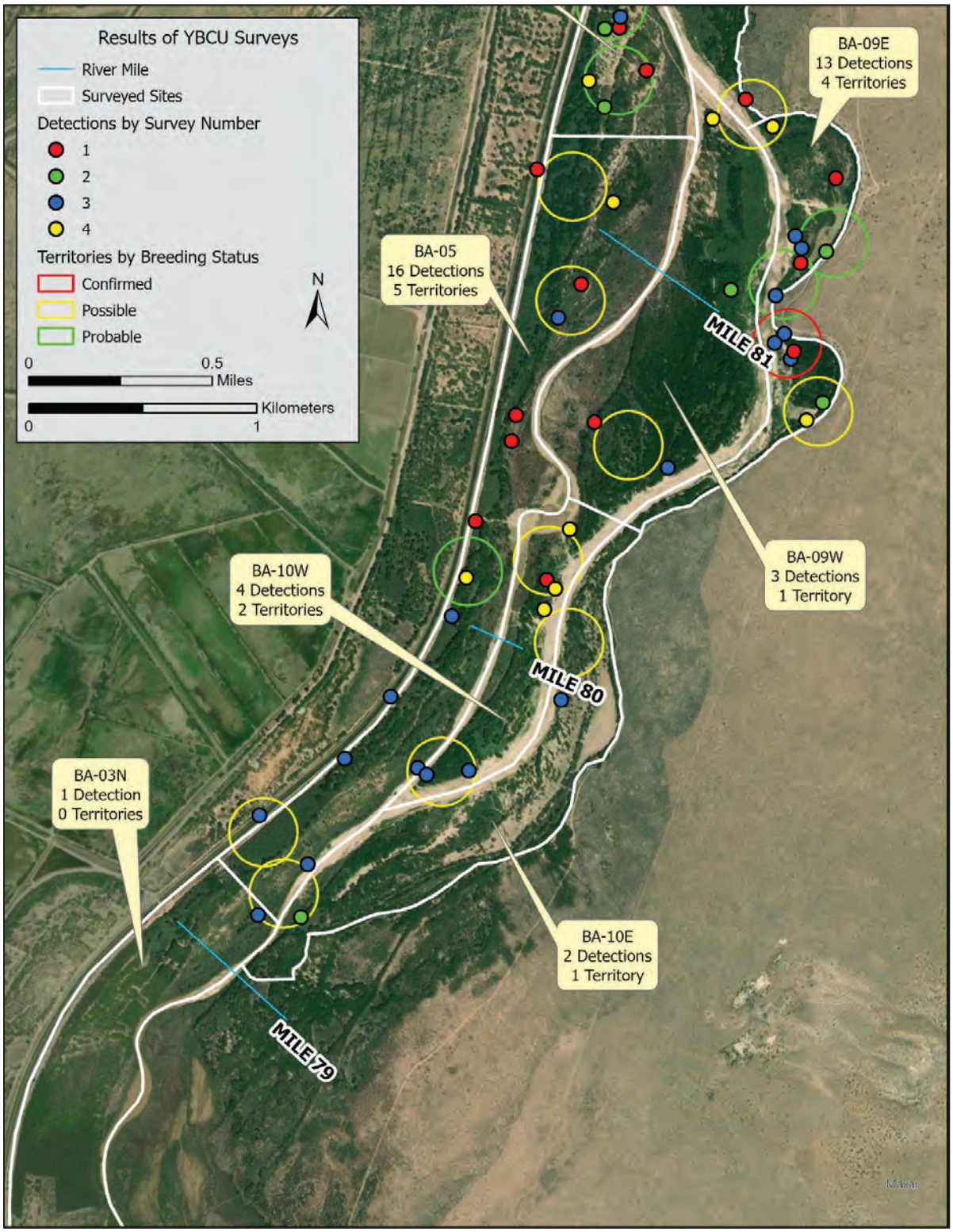

Figure A-6.—2023 Yellow-billed Cuckoo detections and territories in the Bosque del Apache Reach (2 of 2).

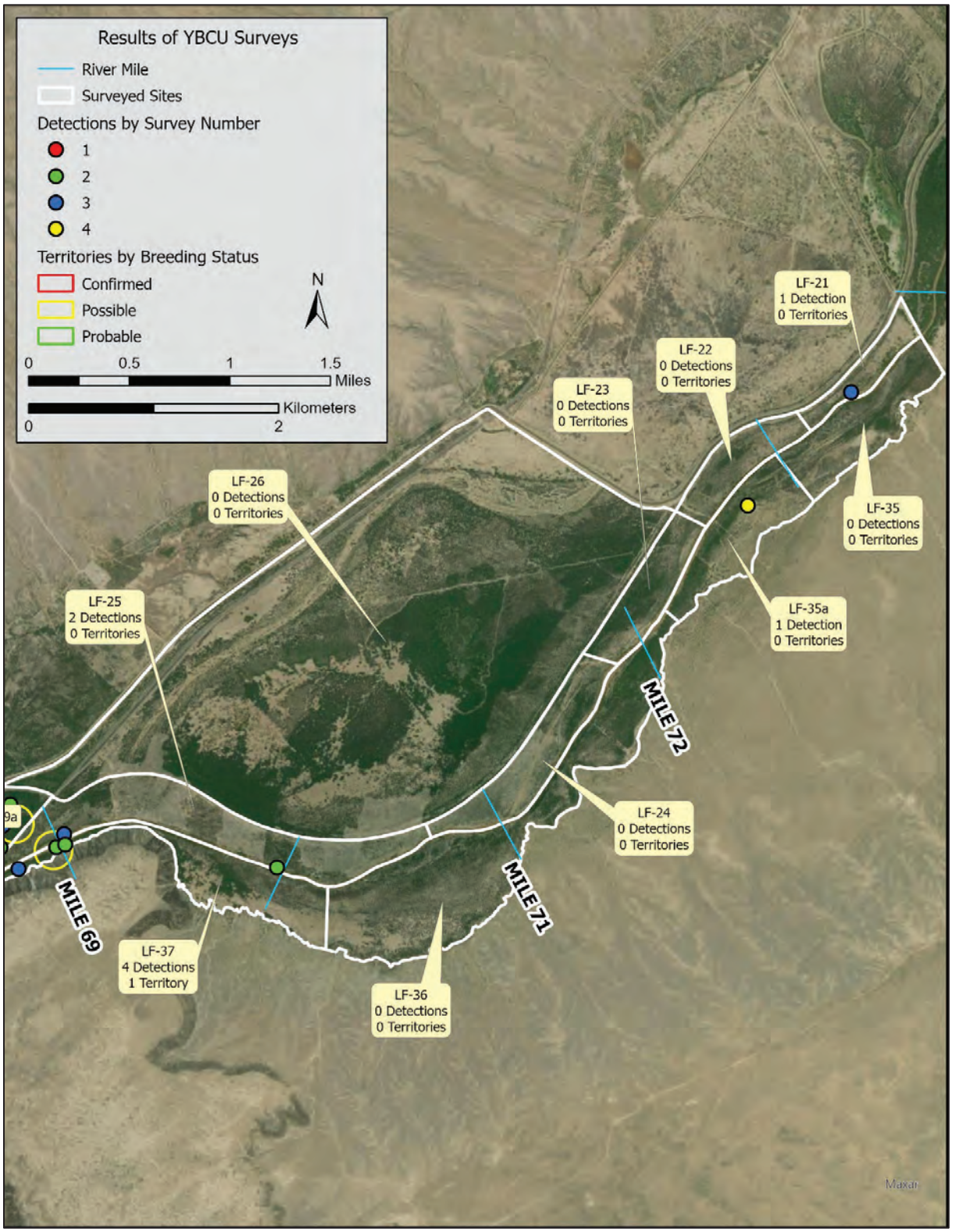

Figure A-7.—2023 Yellow-billed Cuckoo detections and territories in the Tiffany Reach (1 of 1).

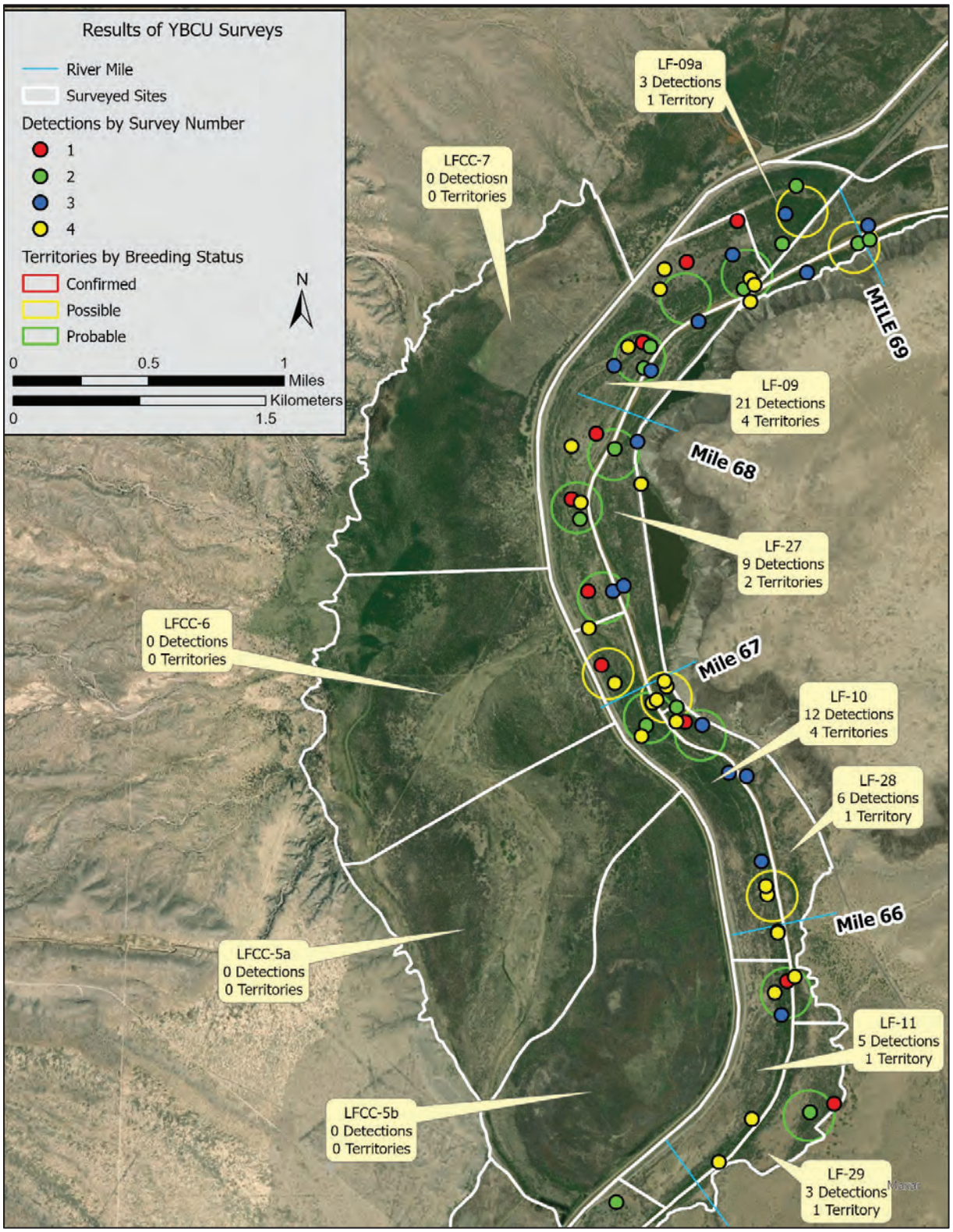

Figure A-8.—2023 Yellow-billed Cuckoo detections and territories in the San Marcial Reach (1 of 6).

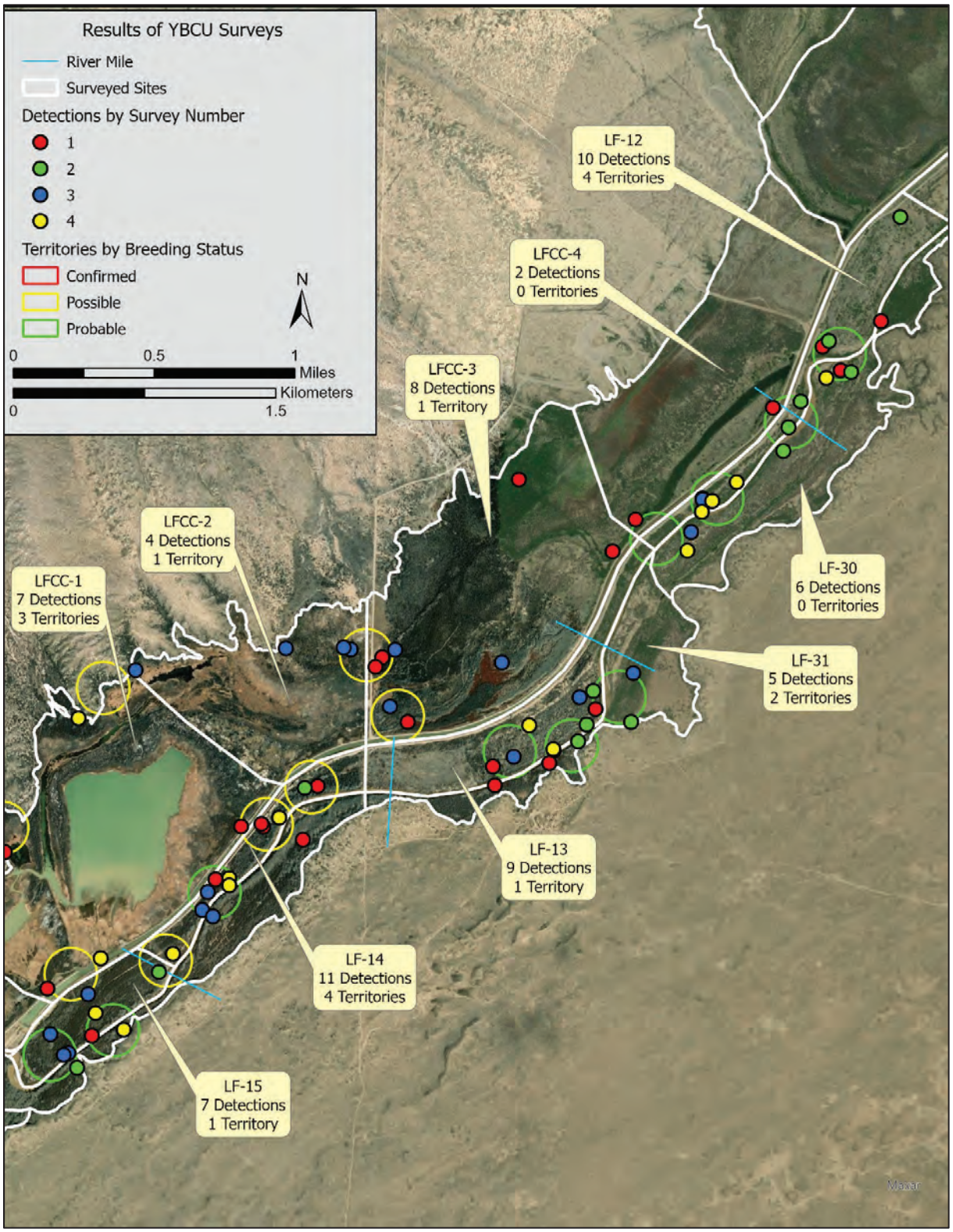

Figure A-9.—2023 Yellow-billed Cuckoo detections and territories in the San Marcial Reach (2 of 6).

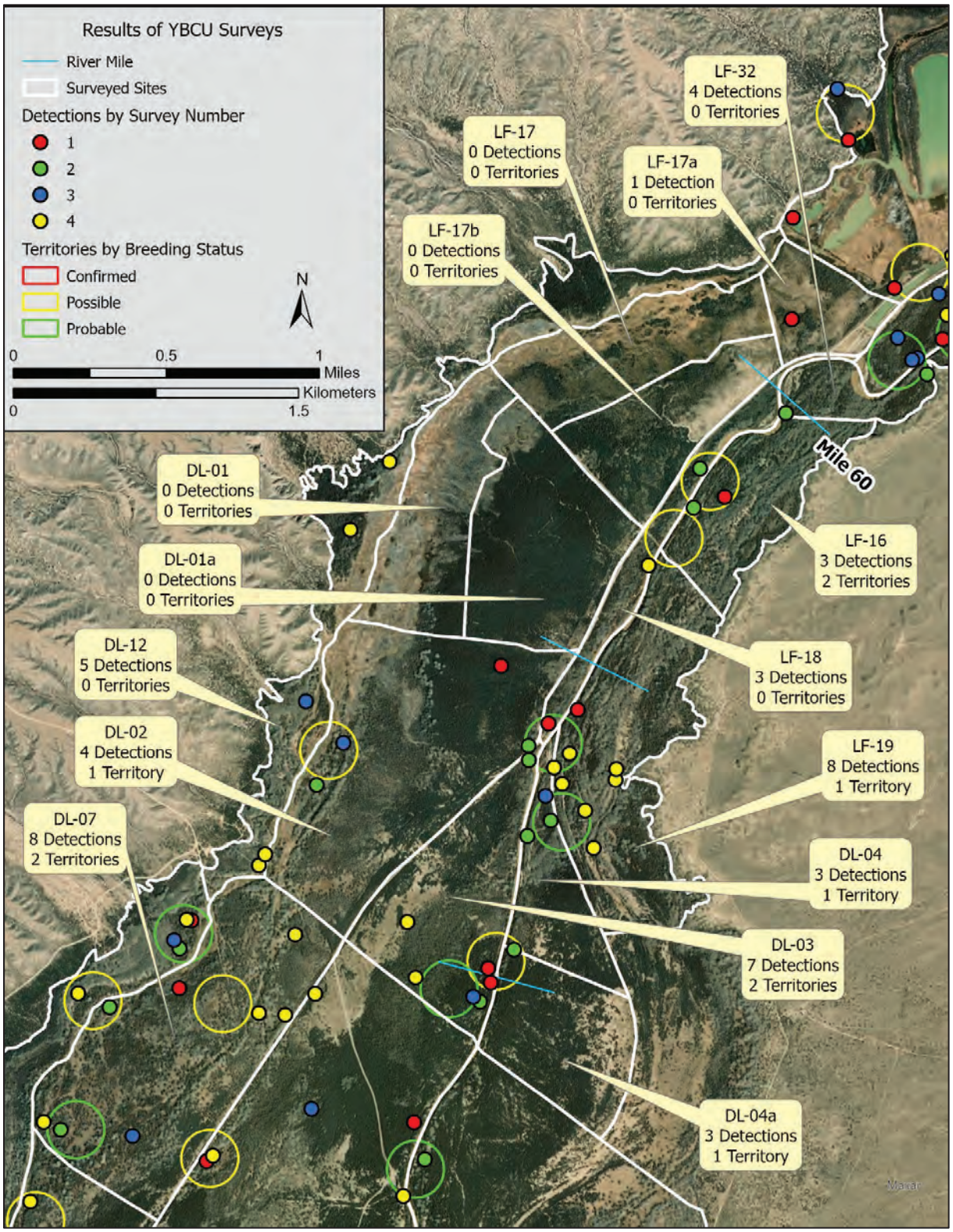

Figure A-10.—2023 Yellow-billed Cuckoo detections and territories in the San Marcial Reach (3 of 6).

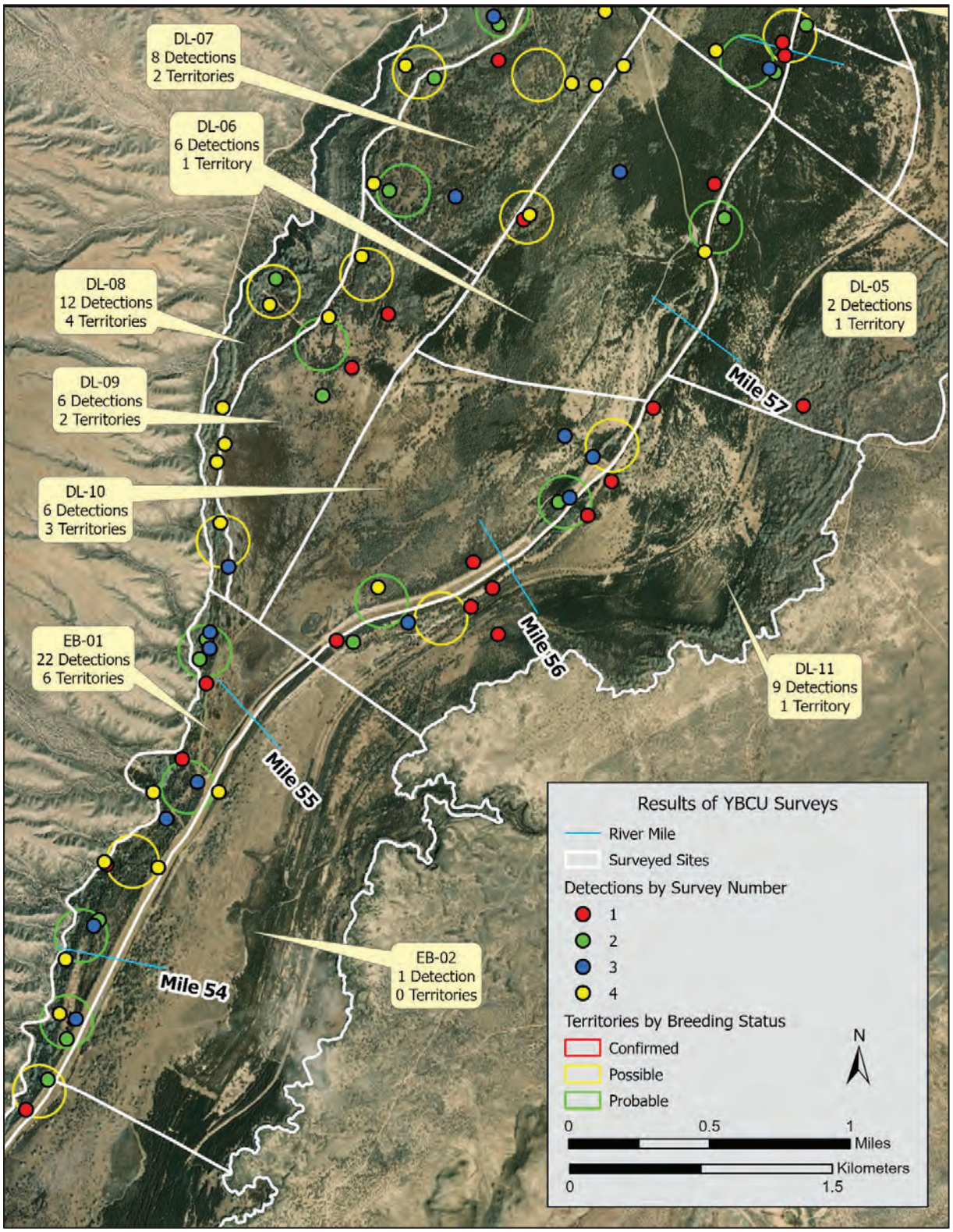

Figure A-11.—2023 Yellow-billed Cuckoo detections and territories in the San Marcial Reach (4 of 6).

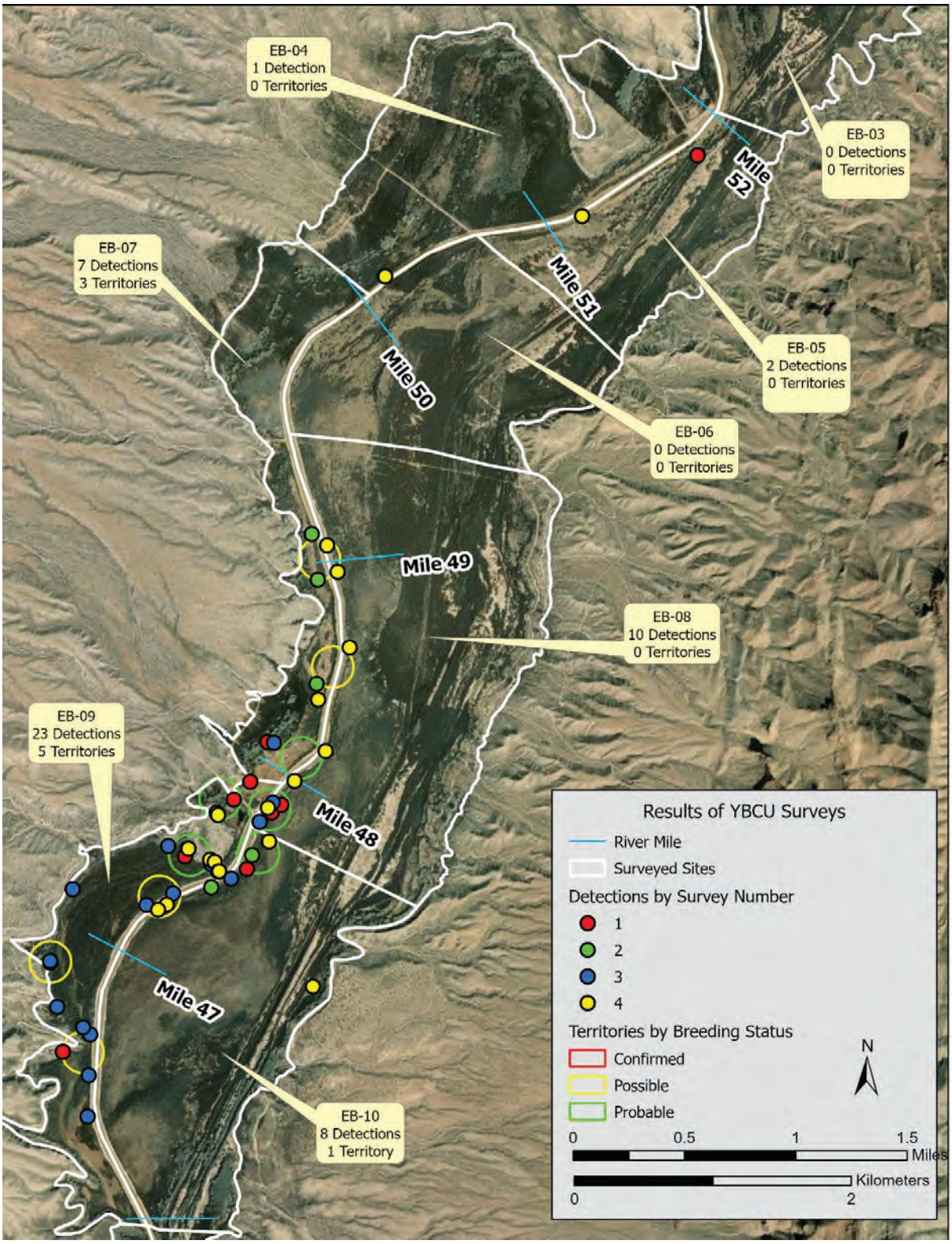

Figure A-12.—2023 Yellow-billed Cuckoo detections and territories in the San Marcial Reach (5 of 6).

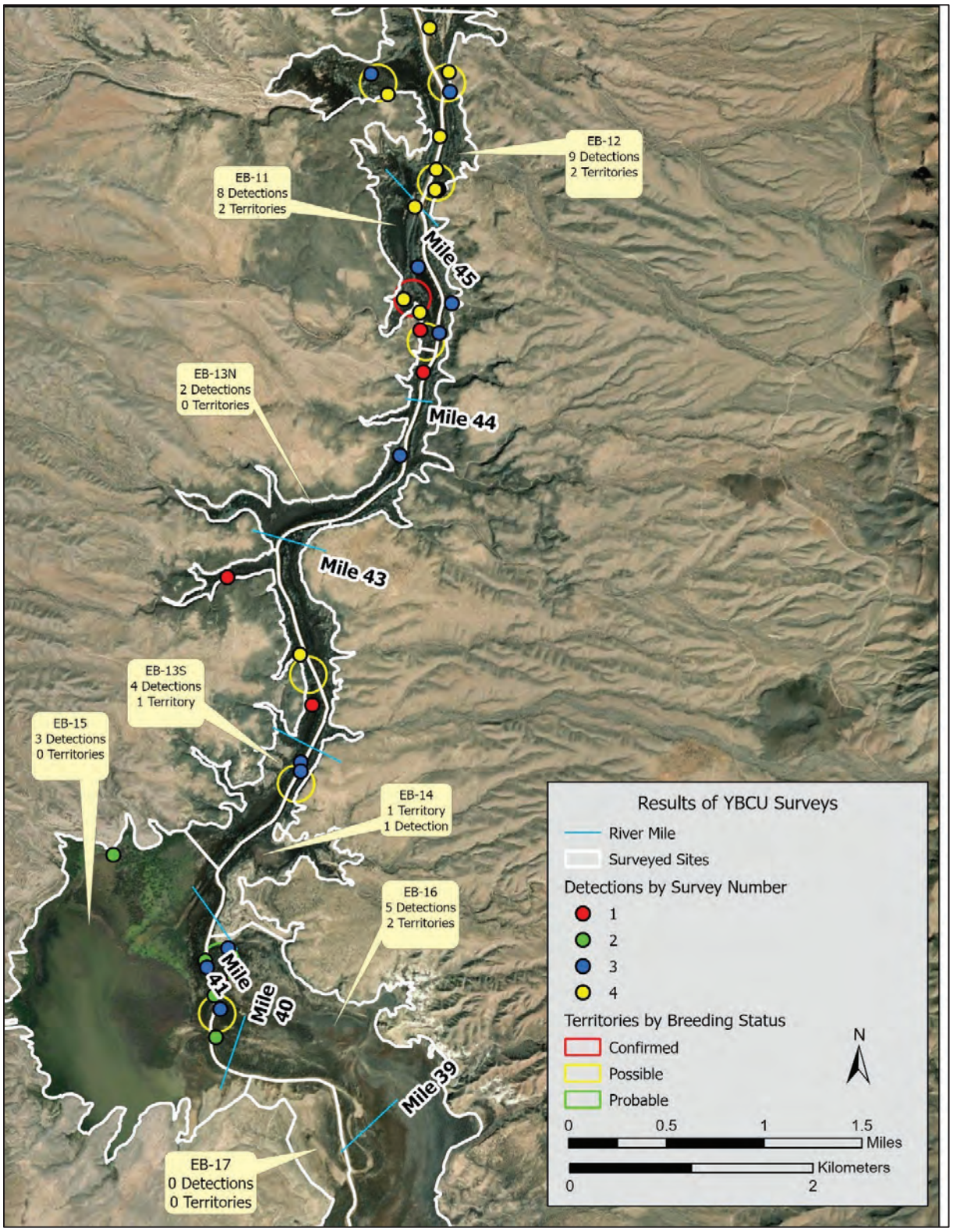

Figure A-13.—2023 Yellow-billed Cuckoo detections and territories in the San Marcial Reach (6 of 6).

Appendix B

Yellow-billed Cuckoo Territories 2009 to 2023 by Reach

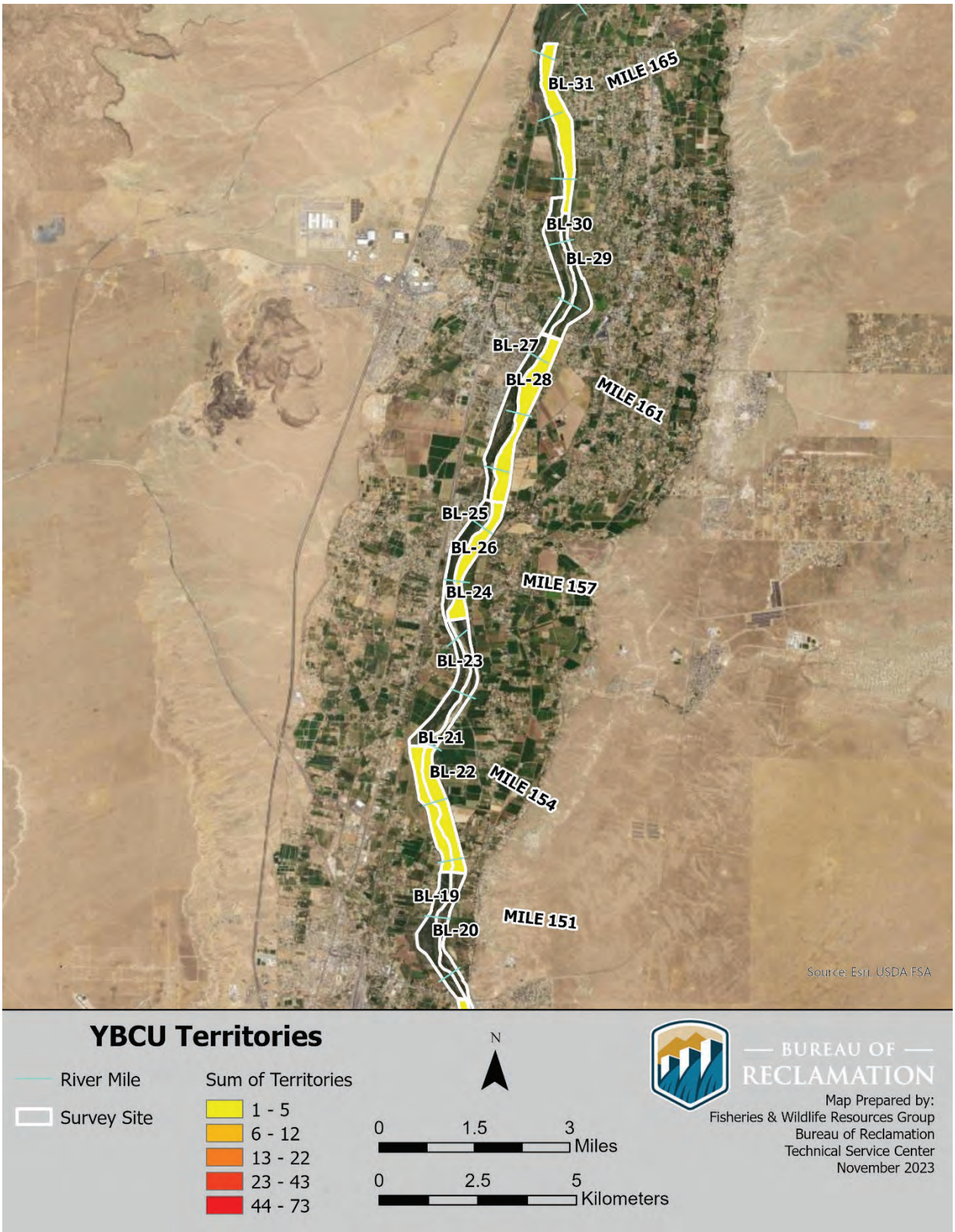

Figure B-1.—Number of Yellow-billed Cuckoo territories recorded in the Belen Reach from 2009 to 2023 (Map 1 of 2).

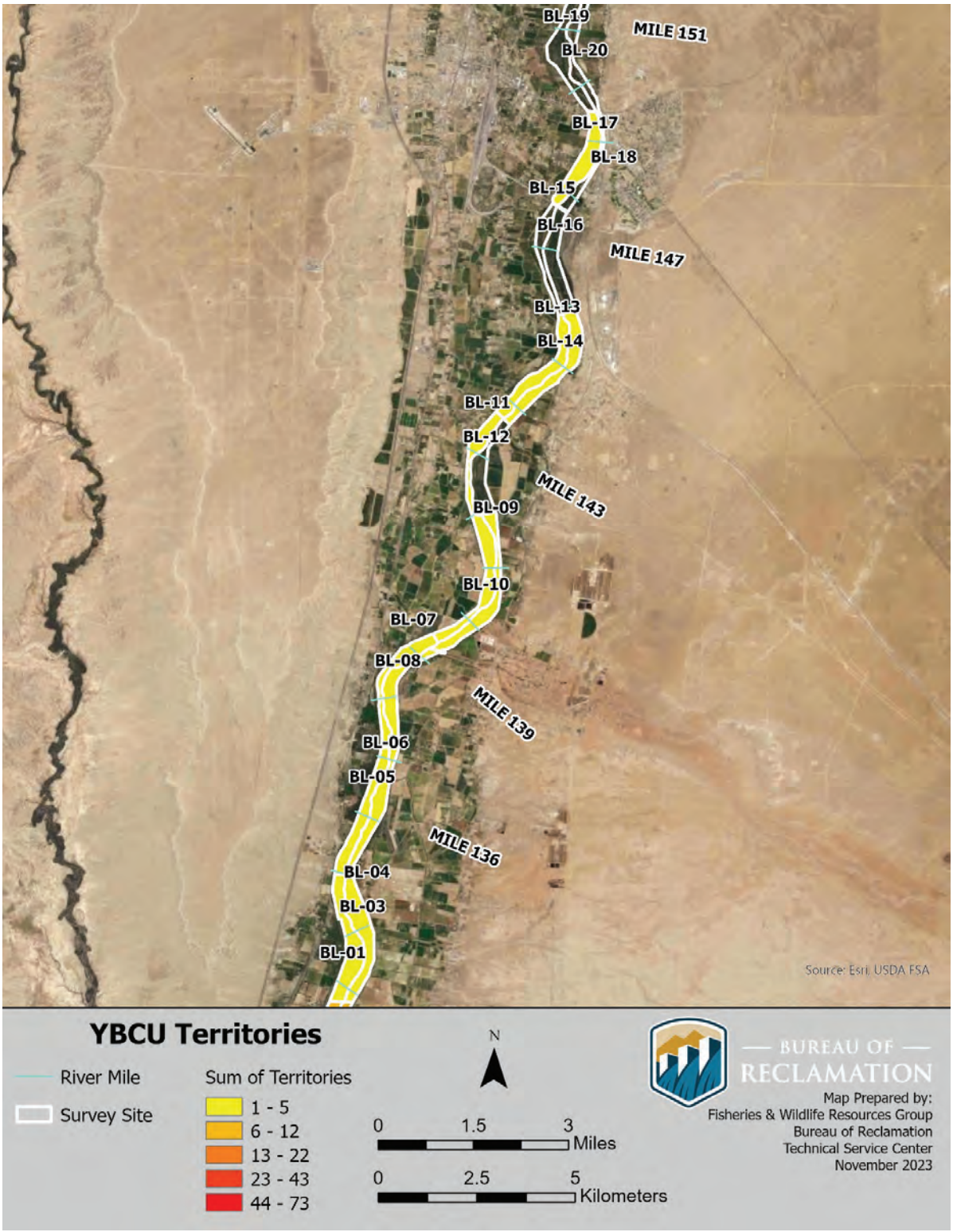

Figure B-2.—Number of Yellow-billed Cuckoo territories recorded in the Belen Reach from 2009 to 2023 (Map 2 of 2).

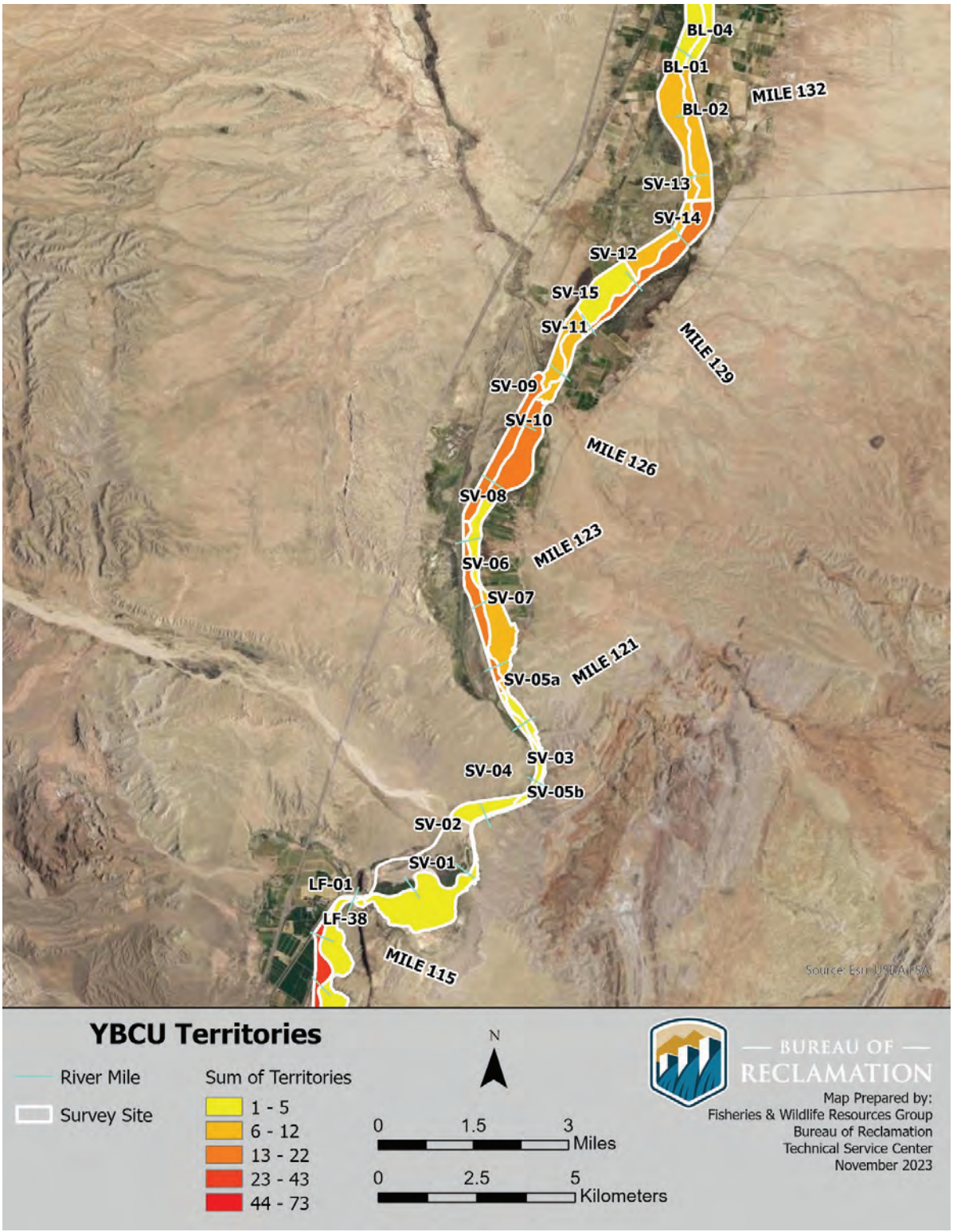

Figure B-3.—Number of Yellow-billed Cuckoo territories recorded in the Sevilleta/La Joya Reach from 2009 to 2023 (Map 1 of 1).

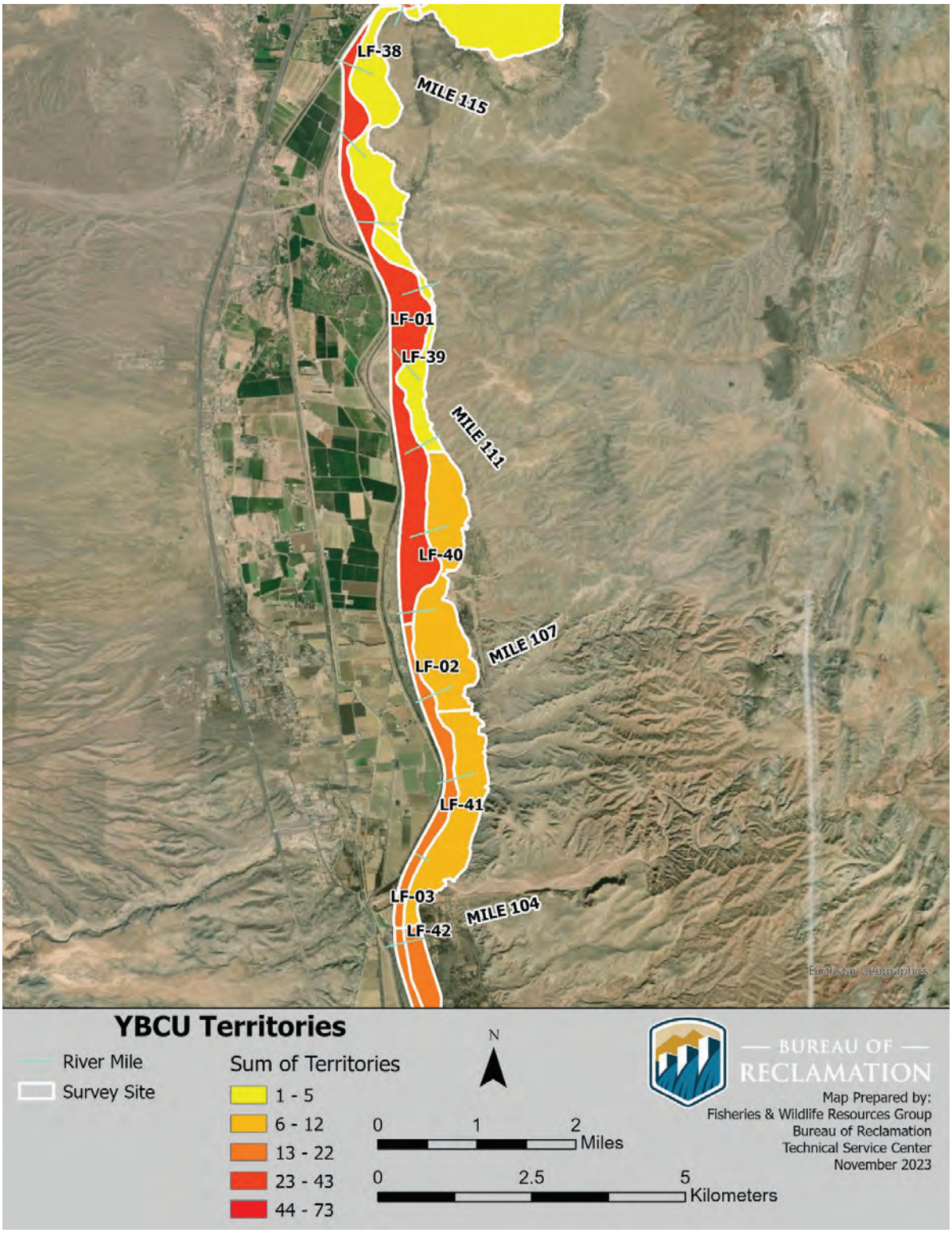

Figure B-4.—Number of Yellow-billed Cuckoo territories recorded in the San Acacia Reach from 2009 to 2023 (Map 1 of 1).

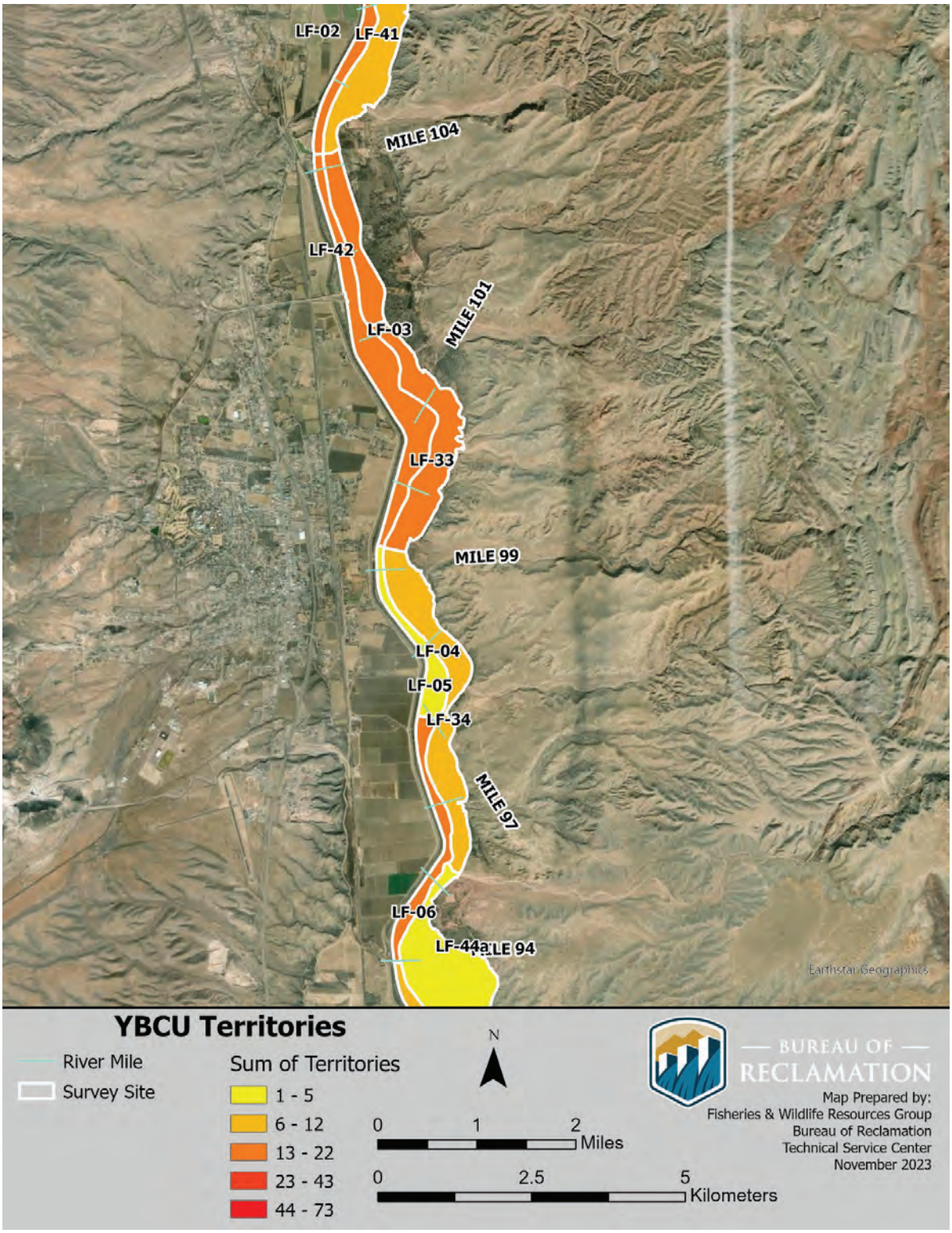

Figure B-5.—Number of Yellow-billed Cuckoo territories recorded in the Escondida Reach from 2009 to 2023 (Map 1 of 2).

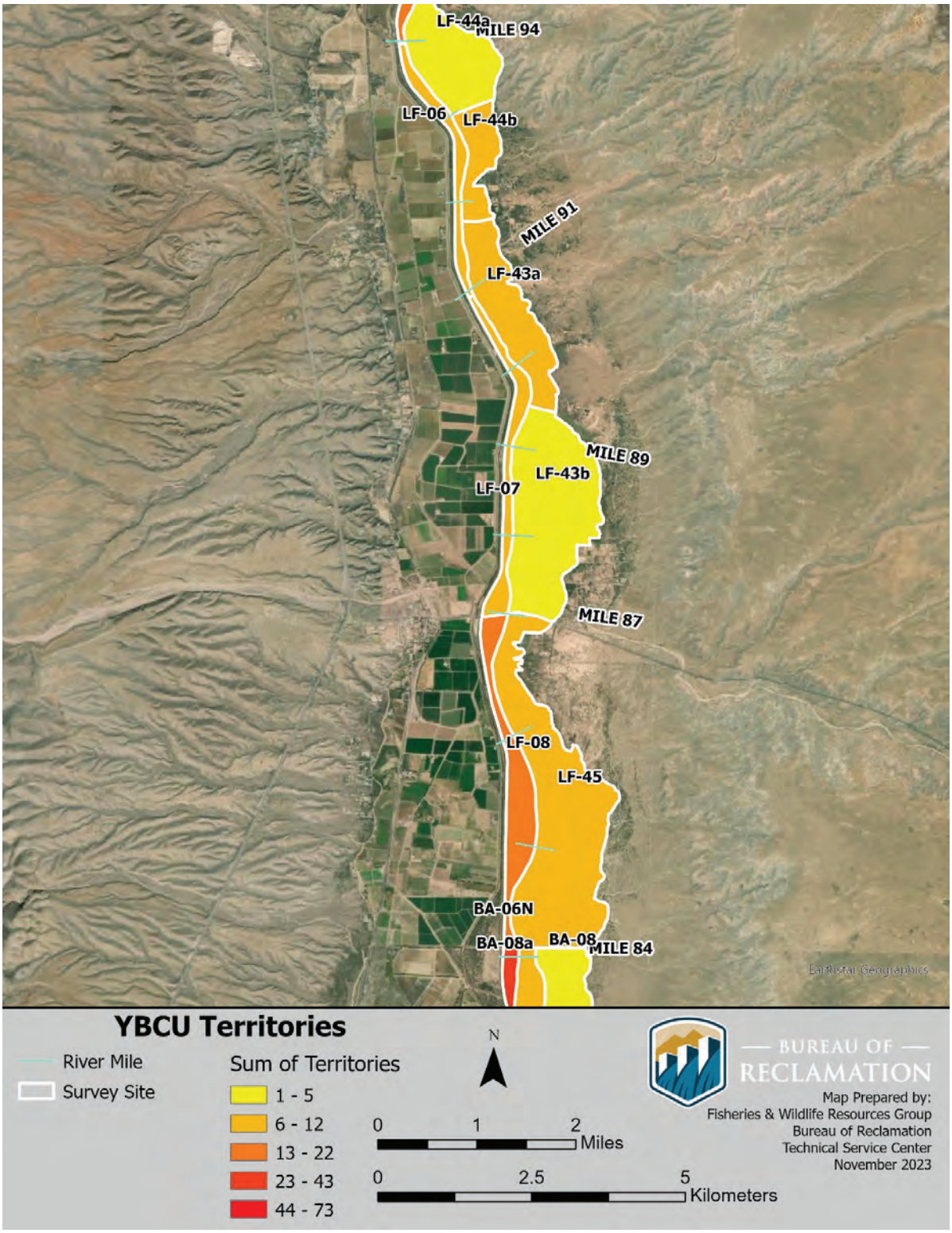

Figure B-6.—Number of Yellow-billed Cuckoo territories recorded in the Escondida Reach from 2009 to 2023 (Map 2 of 2).

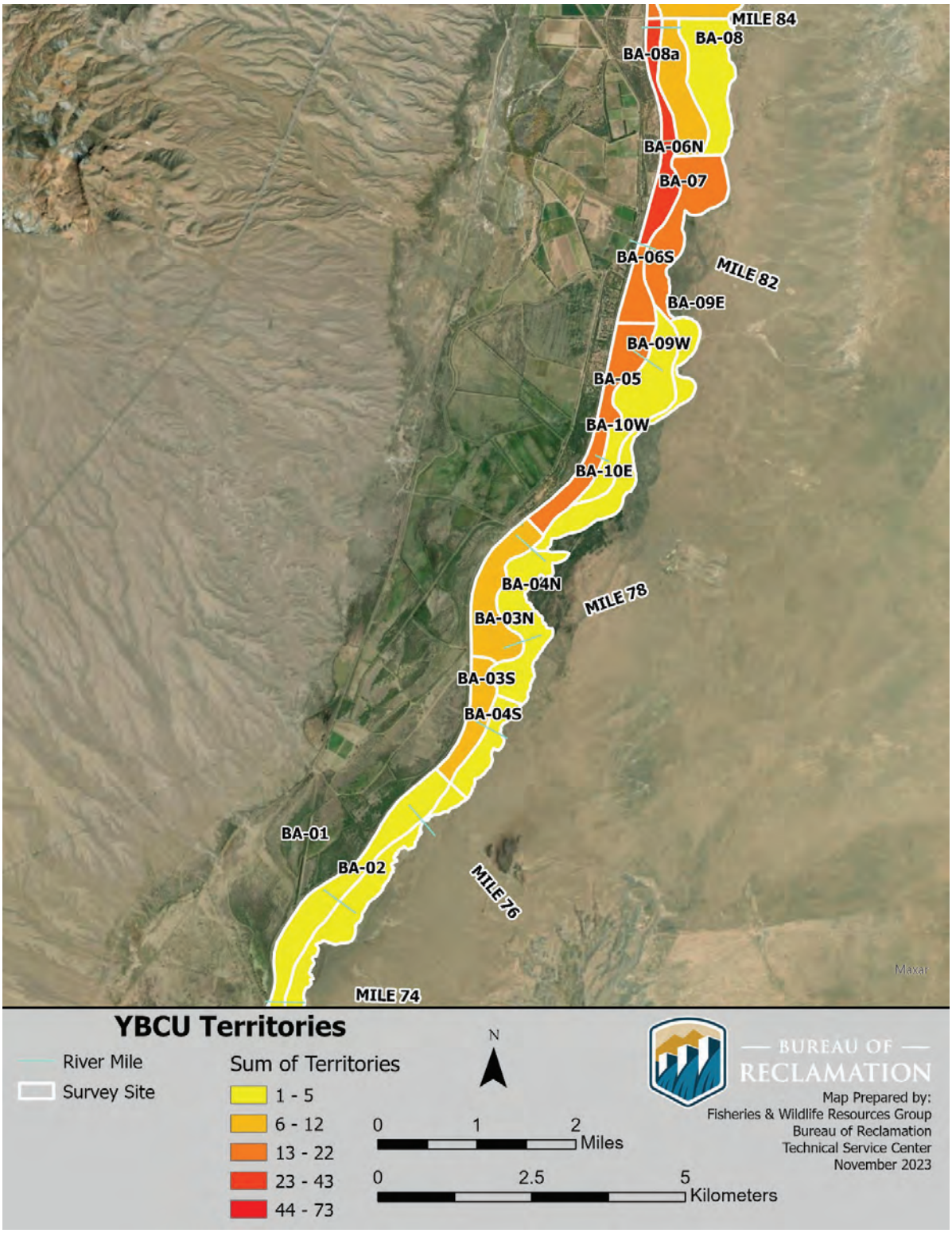

Figure B-7.—Number of Yellow-billed Cuckoo territories recorded in the Bosque del Apache Reach from 2009 to 2023 (Map 1 of 1).

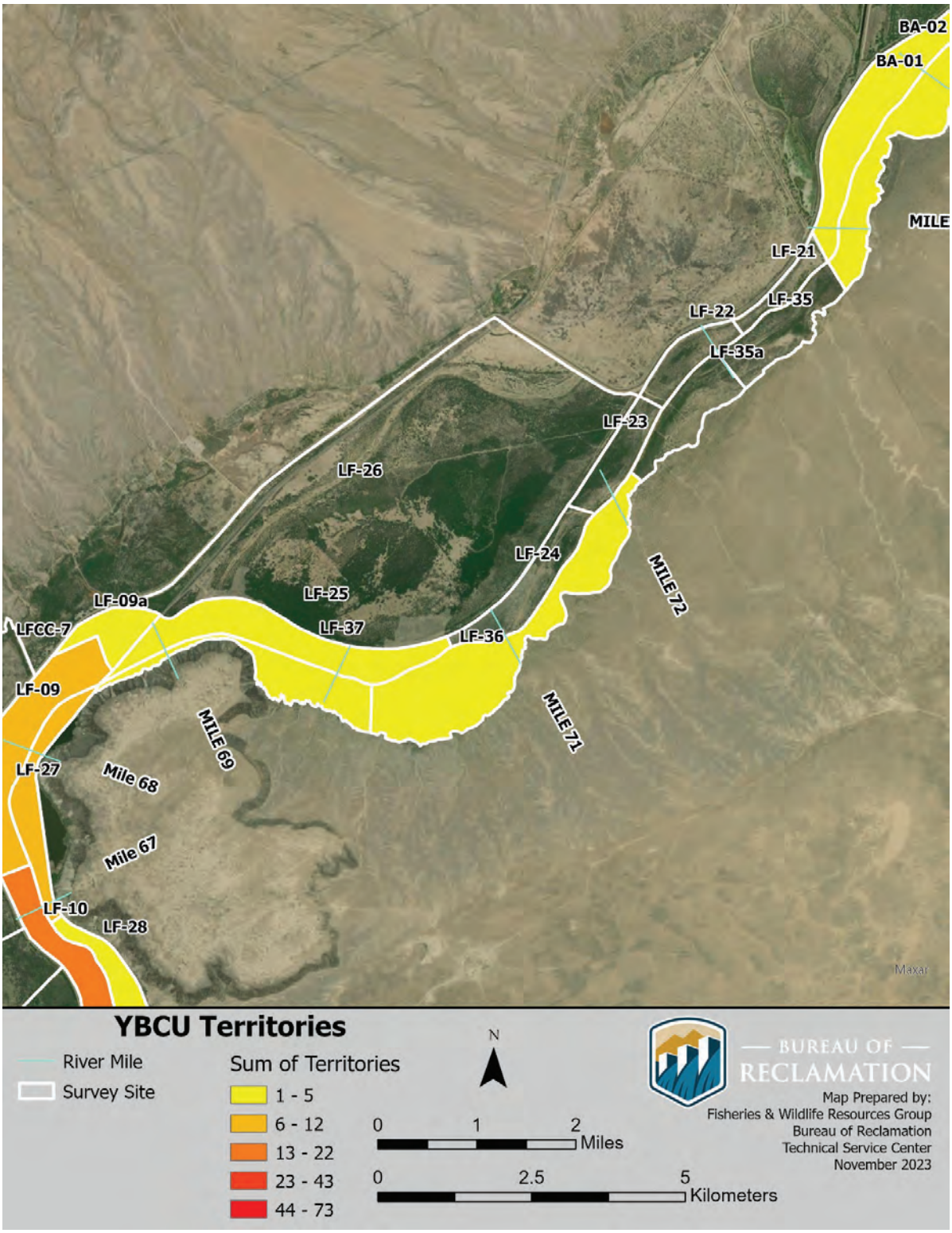

Figure B-8.—Number of Yellow-billed Cuckoo territories recorded in the Tiffany Reach from 2009 to 2023 (Map 1 of 1).

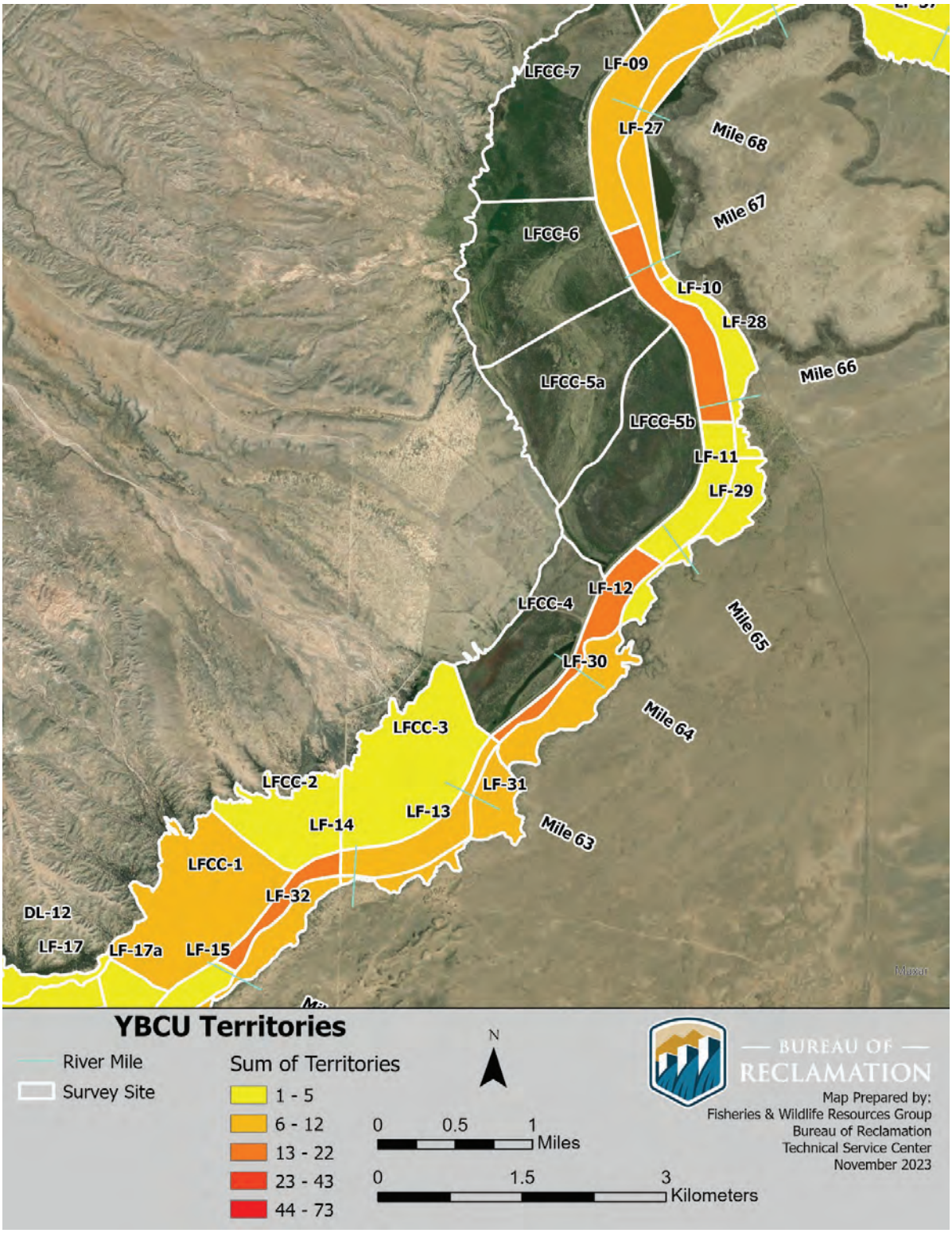

Figure B-9.—Number of Yellow-billed Cuckoo territories recorded in the San Marcial Reach from 2009 to 2023 (Map 1 of 3).

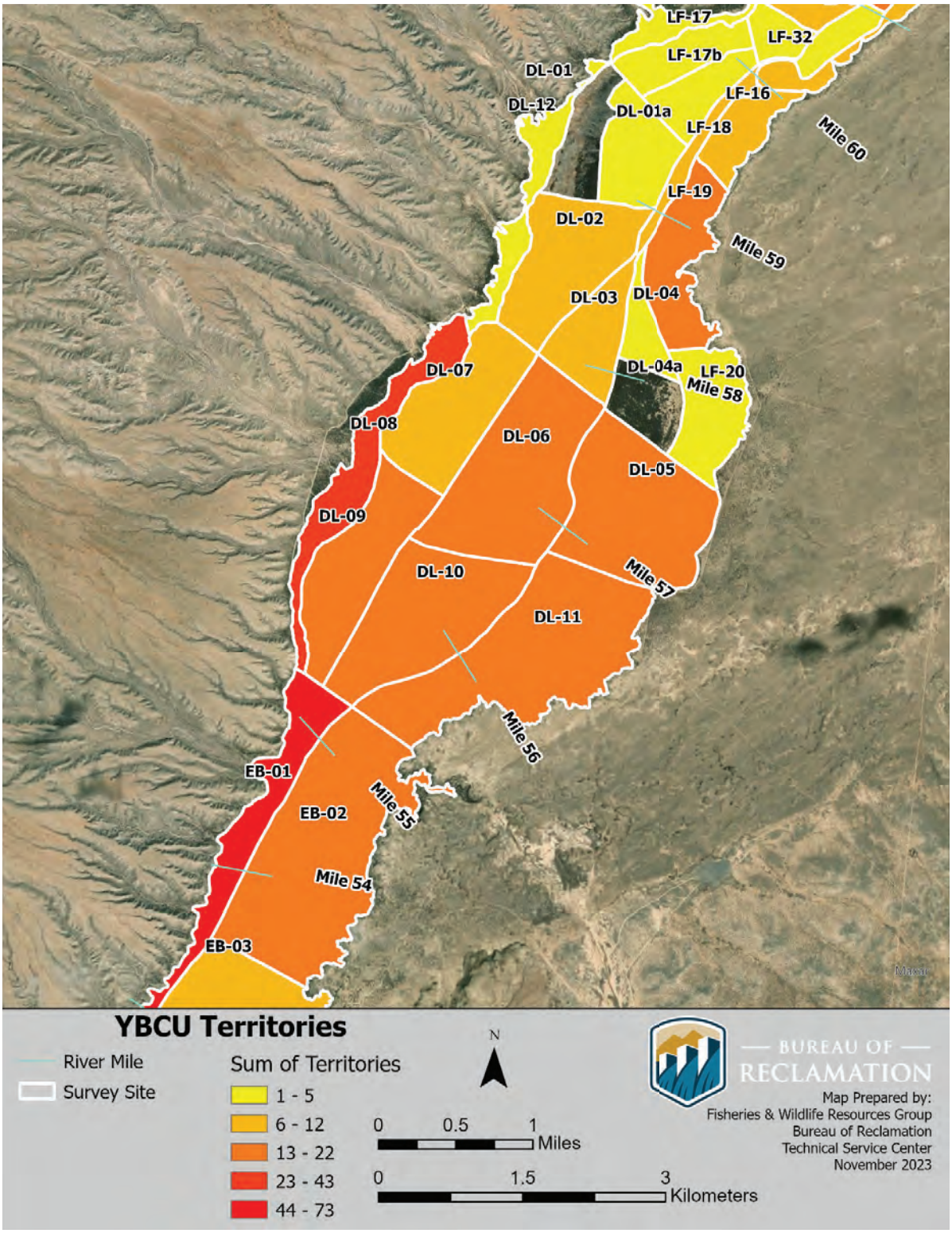

Figure B-10.—Number of Yellow-billed Cuckoo territories recorded in the San Marcial Reach from 2009 to 2023 (Map 2 of 3).

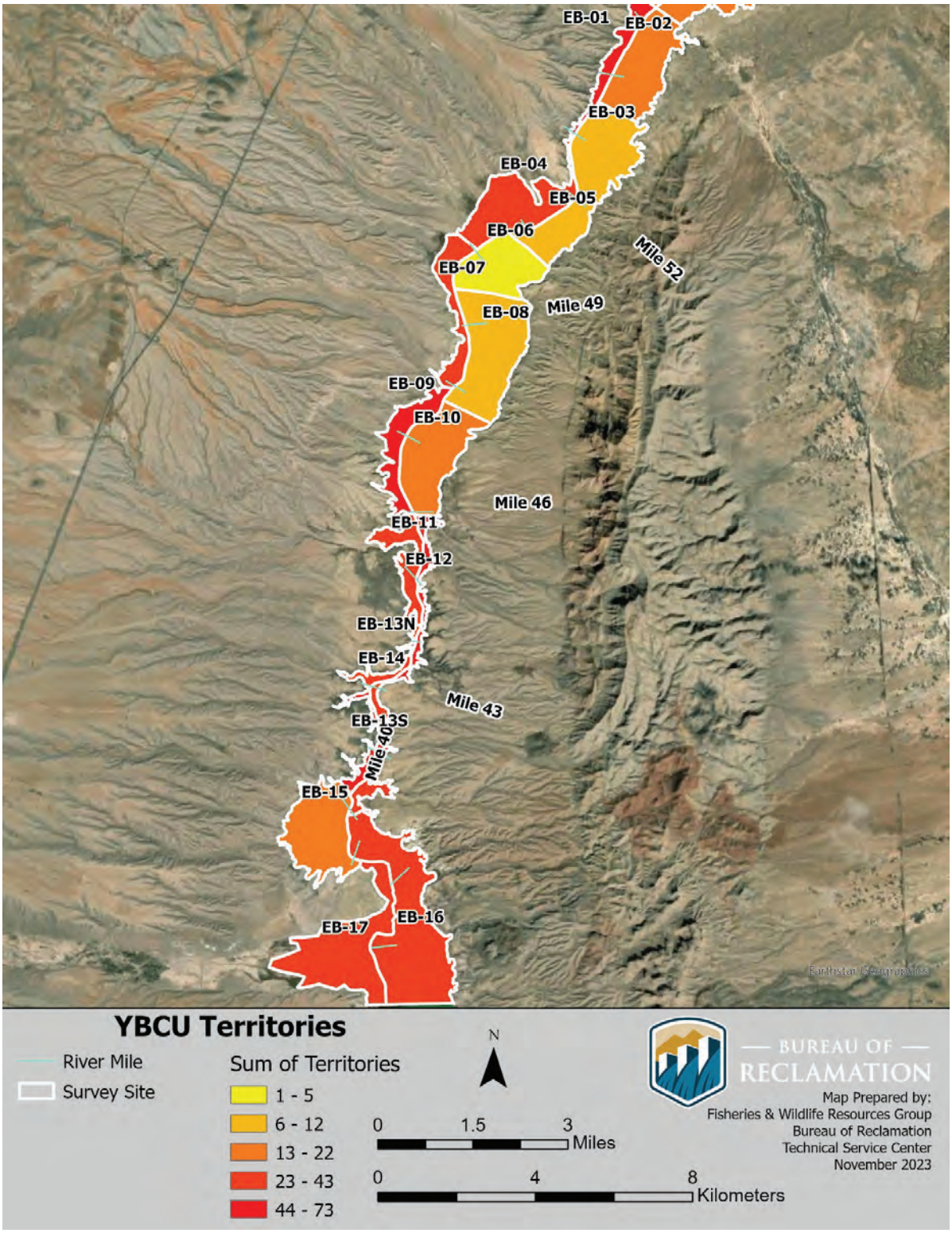

Figure B-11.—Number of Yellow-billed Cuckoo territories recorded in the San Marcial Reach from 2009 to 2023 (Map 3 of 3).