

RECLAMATION

Managing Water in the West

2006 Yellow-billed Cuckoo Study Results

San Marcial, New Mexico



U.S. Department of the Interior
Bureau of Reclamation
Fisheries and Wildlife Resources Group
Denver, Colorado

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Mission Statements

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

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

2006 Yellow-billed Cuckoo Study Results

San Marcial, New Mexico

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Executive Summary

During the summer of 2006, the Bureau of Reclamation conducted presence/absence surveys for the Western Yellow-billed Cuckoo (*Coccyzus americanus occidentalis*) (YBCU) along the Middle Rio Grande between the southern boundary of the Bosque del Apache National Wildlife Refuge and Elephant Butte Reservoir. Three surveys were completed between June 15 and August 15 in each of 66 sites to gather baseline population data on the YBCU along the Middle Rio Grande. As time permitted, nest searches also were conducted by experienced biologists when territories were located. In total, 44 YBCU territories were detected and no nests were found.

Introduction

The Western Yellow-billed Cuckoo (*Coccyzus americanus occidentalis*) (YBCU) is a Neotropical migrant that feeds primarily on large insects. In the Southwestern United States, YBCUs nest in large, dense patches of riparian vegetation, particularly with a cottonwood (*Populus deltoides*)/Goodding's willow (*Salix gooddingii*) overstory (Ehrlich et al. 1988). Territory sizes are quite large, ranging from 4 to 40 hectares and are usually in close proximity to water (Halterman 2001). Nest heights range from 1.3 to 13 meters and the breeding cycle at each nest is very rapid, from egg laying to fledging takes 17 days (Halterman 2001). The YBCU typically arrives to its breeding grounds by late-May and initiates migration to wintering grounds in Central and South America by mid-August (Halterman et al. 2000).

During the past 80 years, the population of YBCUs has declined dramatically due to habitat loss and modification as well as a reduction of food resources due to pesticides (Gaines and Laymon 1984) (Figure 1). The Rio Grande is considered one of the important strongholds for the YBCU, and historically cuckoos were “fairly common” along sections of the river (Howe 1986).

It has been debated whether the Western YBCU (*C. a. occidentalis*) is a true subspecies of the YBCU. In 2001, the U.S. Fish and Wildlife Service (USFWS) determined that the western population is a Distinct Population Segment (DPS) from the eastern population (*C. a. americanus*) 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 2004). It also concluded that the listing of the Western YBCU as endangered was “warranted, but precluded by higher priority listing actions” (USFWS 2001). In 2005, the USFWS revised the listing priority of the Western DPS YBCU from 6 to a higher priority of 3 to better reflect the fact that threats are imminent to this DPS (USFWS 2005). Currently, the YBCU is considered a candidate for listing under the federal Endangered Species Act and is listed as either threatened, endangered, or sensitive by the states of California, Arizona, New Mexico, Colorado, and Utah.

During the summer of 2006, the Bureau of Reclamation (Reclamation) conducted formal presence/absence surveys to determine the distribution and abundance of the YBCU in selected sites along a 35 mile reach of the Middle Rio Grande from the South boundary of the Bosque del Apache National Wildlife Refuge (NWR) to Elephant Butte Reservoir (Figure 2). Three formal surveys were conducted between June 15th and August 15th. Reclamation performed these surveys in conjunction with Southwestern Willow Flycatcher (*Empidonax traillii extimus*) (SWFL) surveys that have been ongoing since 1995. In SWFL survey sites north of the YBCU survey area (Moore 2006), surveyors were instructed to document YBCUs that were casually detected. Nest searches were conducted in conjunction with survey efforts by biologists permitted to monitor Southwestern Willow Flycatcher nests.



Figure 1. Historic and current breeding range of the Western YBCU (adapted from Laymon 1987).



Figure 2. General locations of 2006 Western YBCU survey sites.

Methods

Study Area

The 2006 survey area encompassed selected sites along the Rio Grande between the Bosque del Apache NWR and Elephant Butte Reservoir. This stretch is considered the San Marcial reach (Figure 2). There are a total of 66 survey sites within the San Marcial reach, however, three survey sites were not surveyed. Site LF-26 was not surveyed due to a recent fire that left no suitable habitat within the site, and pre-season reconnaissance in sites EB-16 and EB-17 determined the habitat was unsuitable for breeding YBCUs.

Presence/Absence Surveys

All sites were surveyed using methodology developed in cooperation with the Arizona Game and Fish Department and the U. S. Geological Survey which incorporates the repeated tape-playback method. All surveyors were required to attend protocol training prior to conducting formal surveys. Surveyors moved through the habitat in their designated survey site, playing the recorded “*kwolp*” call every 100m. At each playback location, the call was played for 20 to 30 seconds followed by a pause of one minute for detection of a response by YBCUs. If no response was heard, surveyors repeated the call/pause sequence again 100m away. If a response was heard the observer stopped playback, recorded their observations, and repeated the procedure again at 300m. Surveys in individual sites were conducted a minimum of 10 days apart, generally between 0530 and 1200 hours (depending on weather conditions). Survey forms were completed daily for each site. Survey dates are summarized in Table 1.

Table 1. YBCU survey schedule for the 2006 field season

Survey number	Survey period
1	June 15 – July 4
2	July 5 – July 24
3	July 25 – August 15

All three surveys occur within the YBCU resident period. Three surveys were conducted to (1) confirm the establishment of territories and/or nesting, (2) detect late settling males, and (3) determine which sites remained occupied throughout the breeding season. At the conclusion of a survey, survey data recorded on field forms were transferred to hard copy survey forms. Examples of documentation when a YBCU was detected include:

- Detection Time
- Detection Type (aural, visual, and/or both)
- Call Type (*'kwolp'*, *'one note'*, *'knocker'*, or *'coo'*)
- Sex (male, female, or juvenile)
- Paired or Unpaired
- UTM Coordinates (in UTM Nad83 Zone 13N) and estimated bearing and distance to YBCU if detected from a distance
- Comments

Surveyors based breeding status and sex on observations made upon the detection of the YBCU. Aural responses to the playback tape were assumed to vary by breeding status, typically *"kwolp"* calls indicate a paired male, *"coo"* calls indicate an unpaired male, paired females have an abbreviated *"kwolp"* call, and a *"knocker"* call is considered an alarm call by paired males or females (Wiggins 2005). [However, there is considerable and justifiable disagreement that vocalizations are a reliable determination of sex.] Upon detecting a YBCU, surveyors also notified the onsite senior biologist. If pairing was confirmed or suspected and time allowed, the senior biologist initiated a nest search.

Any YBCU detection during these surveys was considered a resident, however, due to the fact that territory sizes were large and overlapped, GIS software was used to avoid double-counting detections and to delineate probable territory¹ locations. This process was accomplished by first measuring the distance between detection points (regardless of vocalization type) within the 3 survey periods. If the distance was $\leq 500\text{m}$ (radius), then the two (or more) detections were considered one territory (unless otherwise described as two distinct territories in the survey notes) (Figure 3). Habitat characteristics were also taken into consideration when delineating territory locations. This process was performed for 300 and 750m radii as well in order to determine the most accurate representation of the YBCU territories. Outliers within 50m of each interval were included in the designated territory to account for surveyor error when estimating distance and bearing of detection.

Nest Searches/Monitoring

Nest searches were conducted, time permitting, upon discovery of a breeding or suspected breeding YBCU pair by an experienced biologist. Nest searches were conducted with minimal disturbance. Nest areas were searched by observing diagnostic YBCU breeding behavior and listening for calls (i.e. *"knocker"* call) within the habitat patch. Vocalizations were not played during the first 15 minutes of the search. If a nest was not found in 40 minutes the search was aborted and not conducted again for a minimum of 3 days.

¹Territory – for the purposes of this report – include any clumping of detections representing a pair, suspected pair, or single unpaired male YBCU.

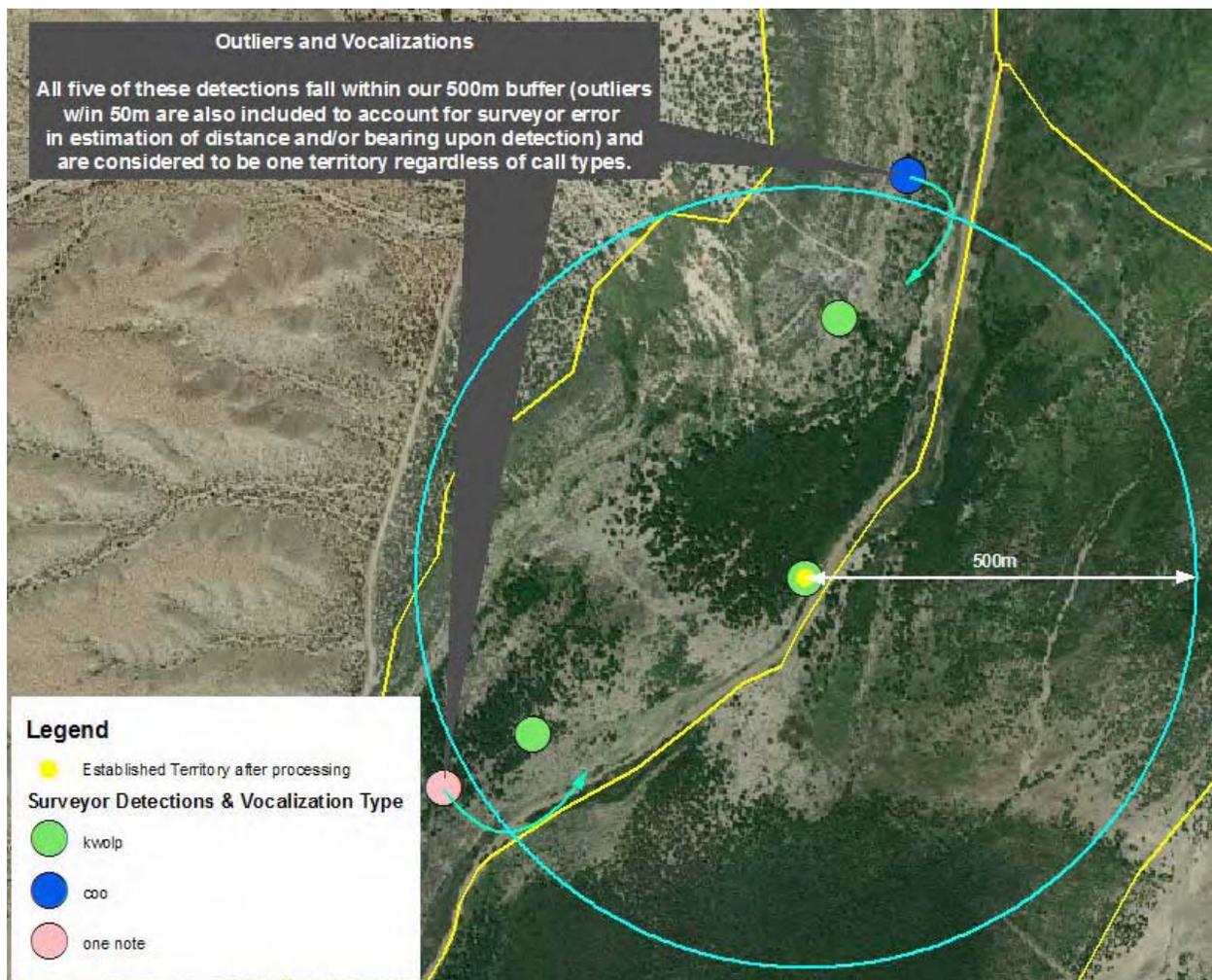


Figure 3. Example of delineation of YBCU territories using GIS and a 500m radius.

Results

Presence/Absence Surveys

During presence/absence surveys conducted from June 15 through August 15, surveyors documented a total of 105 YBCU detections, of which many were repeat counts. After processing the data with GIS software, a total of 61 territories were delineated with the 300m radius, 44 territories with the 500m radius, and 37 territories with the 750m radius. Based on detection clumping patterns, habitat characteristics, and comments documented on survey forms, the 500m distance is believed to be the most accurate determination of probable territories.

Because of the large territory sizes of YBCUs and their secretive nature, it is difficult to determine visually how many birds are present once a territory is located. Most of the time, surveyors relied on vocalizations to determine the breeding status of birds within the territory. However, this is an inexact science considering there is still debate regarding the reliability of gender and breeding status determination based on vocalizations. For these reasons, it is unknown exactly how many birds (males, females, helper males, paired territories, and unpaired territories) occurred within the 44 total territories documented during 2006. Figures 4 and 5 illustrate probable territory locations.

Nest searching

A total of seven 40 minute nest searches were conducted in 3 survey sites resulting in no nests found. While searching, visual and aural observances of YBCUs were noted, and only on one search did the YBCU respond to our searching with a “*knocker*” call.

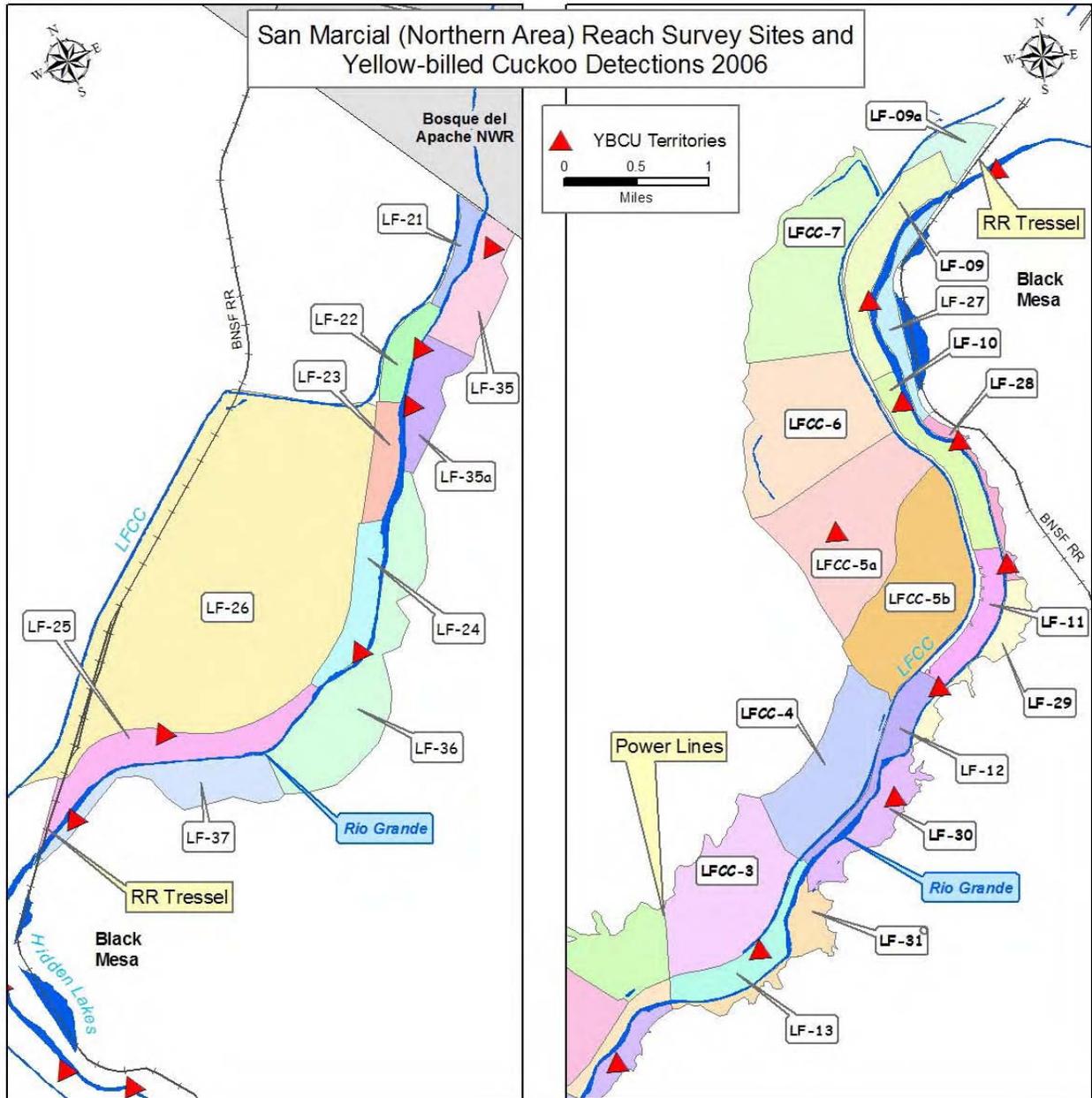


Figure 4. Overview of the survey sites and YBCU detections within the northern portion of the San Marcial reach.

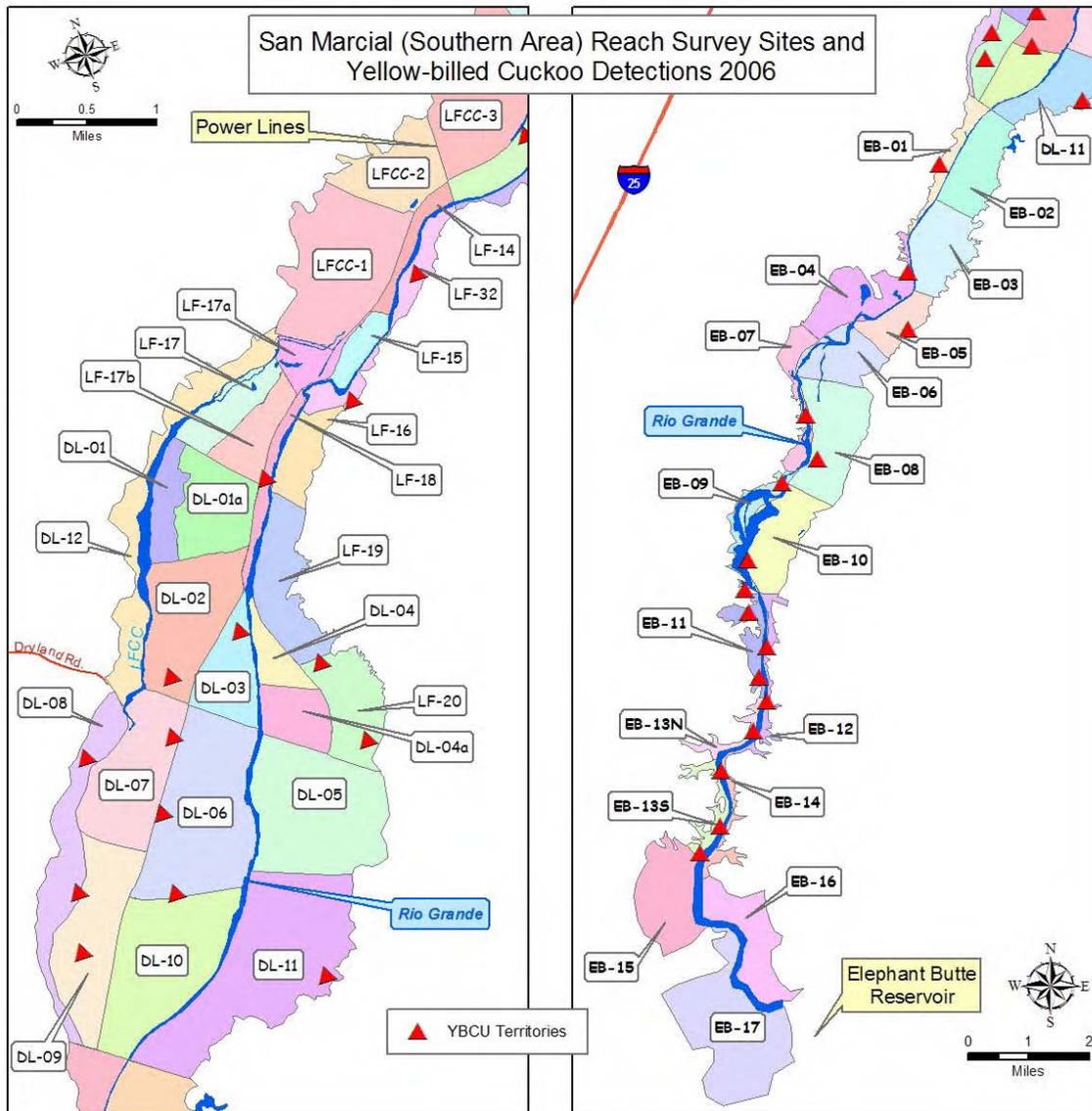


Figure 5. Overview of survey sites and YBCU detections within the southern portion of the San Marcial Reach

Site descriptions

The following section contains an overview of the 35 sites where resident YBCUs were detected during the 2006 season.

Site LF-22 (Figure 4) is approximately 1.2 km south of the southern boundary of the Bosque del Apache NWR on the west side of the Rio Grande (UTM NAD 83 Zone 13 south – 3732177 N 321944 E to 3731409 N 321097 E). Habitat is a mixture of native and exotic vegetation with the Goodding's willow/cottonwood community and mature saltcedar (*Tamarix* sp.) being codominant. Further from the river, decadent saltcedar becomes dominant. This site was very dry during this season and does not receive much overbank flooding except in years of abnormally high flows. The territory was located at the eastern edge of the site in Goodding's willow habitat adjacent to the river.

Site LF-24 (Figure 4) is approximately 4.5 km south of the southern boundary of the Bosque del Apache NWR on the west side of the river (UTM NAD 83 Zone 13 south – 3732177 N 321944 E to 3728915 N 318915 E). Habitat within the site is composed mainly of exotic vegetation; Russian olive (*Eleagnus angustifolia*) along the river, and saltcedar in the interior and western edge of the site. Very little overbank flooding occurs in this site due to the height of the banks along the river; however, there is occasional standing water due to heavy rains and groundwater close to the surface.

Site LF-25 (Figure 4) is southwest of site LF-24 on the north-west side of the river (UTM NAD 83 Zone 13 south - 372891 N 318915 E to 3728665 N 315388 E). Habitat within this site consists of very mature Goodding's willow patches at the southern end and mainly saltcedar with some Russian olive at the north end. Portions of this site hold water in the form of groundwater or floodwater. In 2005, overbank flooding inundated this site for the majority of the summer, however this site was dry during the 2006 survey season.

The northern boundary of **Site LF-35** (Figure 4) is the southern boundary of the Bosque del Apache NWR. It is located on the east side of the river and stretches approximately 1.5km to its southern boundary (UTM NAD 83 Zone 13 south - 3732924 N 322831 E to 3731979 N 321672 E). Habitat within this site varies highly from dense saltcedar in the interior and eastern portion of the site to dense Russian olive and canopy cottonwoods on the western edge, adjacent to the river. There is a large earthen berm running through the middle of the site that acts as a barrier to floodwaters and even the western side of the site does not appear to receive much overbank flooding.

Site LF-35a (Figure 4) is located just across the river from LF-22 and 1.5 km south of the Bosque del Apache NWR (UTM NAD 83 Zone 13 south - 3731979 N 321672 E to 3730728 N 320792 E). Vegetation in this site consists mainly of cottonwood and Goodding's willow canopy and saltcedar understory. Some patches of monotypic saltcedar exist at the northern and eastern ends of the site. This site does not receive much overbank flooding unless river flows are unusually high. The YBCU territory was located in the central region of the site within 25 meters of the river.

Site LF-37 (Figure 4) is located across the river from LF-25 and immediately upstream of the railroad trestle (UTM NAD 83 Zone 13 south – 3728521 N 318082 E to 3728585 N 315353 E). The habitat within this site is dominated by dense, decadent saltcedar. In several locations there is a significant native component in the form of mature, overstory Goodding's willow and cottonwood. It is in one of these areas approximately 650m northeast of the railroad trestle that the YBCU territory was located. This site receives overbank flooding during high riverflows and the northern end contains a great deal of debris from flooding in 2005. A nest search was conducted in this area and a 'knocker' call was documented.

Site LF-09/09a's (Figure 4) northern boundary is the San Marcial railroad trestle. At the southern end of the site it shares a boundary with site LF-10 (UTM NAD 83 Zone 13 south – 3729237 N 315868 E to 3726632 N 314493 E). Vegetation is mainly Goodding's willow, saltcedar, and cottonwood. The site is typically dry and does not receive overbank flooding with the exception of times with abnormally high flows (in 2005 this site was flooded due to a levee breach during high flows). The YBCU territory was located in a patch of cottonwood with saltcedar and coyote willow (*Salix exigua*) understory within 10 meters of the Rio Grande.

Site LF-10 (Figure 4) is located approximately 2 km south of the railroad trestle on the west side of the river (UTM NAD 83 Zone 13 south – 3726632 N 314493 E to 3724572 N 315493 E). The site is situated between the western bank of the Rio Grande and the Low Flow Conveyance Channel (LFCC) levee. Some fairly suitable YBCU habitat in the form of mature Goodding's willow exists, however, much of it has dried out during the recent drought and is dying. The rest of the site is composed of saltcedar and some large cottonwoods. The YBCU territory was located at the northern end of the site in a cottonwood patch with minimal understory within 20 meters of the river.

Site LF-12 (Figure 4) is south of Fort Craig on the west side of the Rio Grande (UTM NAD 83 Zone 13 south – 3723102 N 314765 E to 3721226 N 313069 E). It contained a single YBCU territory on the north-eastern edge adjacent to the river. A mix of saltcedar, willow, and cottonwood dominates the habitat. This site is periodically subject to overbank flooding during periods of high riverflows. Some highly suitable habitat exists in this site in the form of dense, multi-story Goodding's willow along the eastern edge adjacent to the river.

Site LF-13 (Figure 4) is just south of site LF-12 on the west side of the river between the LFCC and the Rio Grande (UTM NAD 83 Zone 13 south – 3721226 N 313069 E to 3719842 N 311418 E). Habitat is very similar to other sites in the area. Vegetation consists of dense patches of saltcedar interspersed within the overall mosaic of multi-story Goodding's willow and a few overstory cottonwoods. This site receives overbank flooding during periods of high riverflows. The YBCU territory was located at the eastern edge of the site and only detected during the first survey period.

Site LF-18 (Figure 5) is located between the levee road and the Rio Grande on the west side of the river (UTM NAD 83 Zone 13 south – 3718295 N 309101 E to 3716332 N 307751 E). This site contained one YBCU territory. Habitat is composed primarily of mature Goodding's willow with little understory. There is also some mature saltcedar encroaching into the southern end.

Results

This site receives overbank flooding during high riverflows, but native vegetation has begun to die out due to saltcedar encroachment and over-maturity.

Site LF-20 (Figure 5) is approximately 800m east of the Rio Grande and is survey site DL-03's eastern boundary (UTM NAD 83 Zone 13 south – 3715325 N 308071 E to 3714249 N 308065 E). This site has patches of highly suitable Goodding's willow habitat throughout the site, and a large patch in the northeastern area of the site. In portions of the site not occupied by willow, vegetation consists of sparse saltcedar and bare sections. The two YBCU territories were in willow patches, one at the northeastern end and one towards the southern end. At the southernmost territory, two nest searches were conducted resulting in no nests being found.

Site LF-28 (Figure 5) lies 2.5 km south of the railroad trestle on the east side of the Rio Grande (UTM NAD 83 Zone 13 south - 3726052 N 314763 S to 3724199 N 315543 S). This site is characterized by patchy vegetation dominated by a mixture of saltcedar, Goodding's willow and gallery cottonwoods. It receives fairly regular overbank flooding which promotes the dense growth of willows along the river channel. Native vegetation is replaced by exotic species with increasing distance from the river. One YBCU territory was located in a patch consisting of cottonwood and Goodding's willow canopy and saltcedar understory. The other territory was in mature saltcedar with cottonwood overstory. Both territories were within 10 meters of the river.

Site LF-30 (Figure 5) is located on the east side of the river across from site LF-12 (UTM NAD 83 Zone 13 south – 3722449 N 314325 E to 3720941 N 313047 E). Habitat within this site consists of mainly Goodding's willow with saltcedar understory. Patches of monotypic saltcedar exist at the southern end of the site. This site typically has standing water in a backwater channel located in the center of the site running north to south. There was one YBCU territory in this site near a dry backwater channel in a patch of monotypic Goodding's willow. This YBCU was only detected during the second survey period.

Site LF-32 (Figure 5) is south of the powerlines on the east side of the river (UTM NAD 83 Zone 13 south – 3719842 N 311418 E to 3718116 N 309006 E). The majority of this site contains monotypic stands of Goodding's willow with minimal understory although there are patches of saltcedar understory throughout the site as well as patches of coyote willow understory towards the river. There were two YBCU territories in this site, both of them being within 100 meters of the river in vegetation composed of Goodding's willow canopy and a Goodding's willow and saltcedar mixed understory.

Site LFCC-05a (Figure 5) is just east of Fort Craig and to the west of the LFCC (UTM NAD 83 Zone 13 south – 3725982 N 314461 E to 3725558 N 314857 E). The site consists mainly of saltcedar vegetation with small patches of cottonwood. The single YBCU territory was located in the largest cottonwood patch within the site and approximately 800m from any water source.

Site DL-02 (Figure 5) is within the Elephant Butte Reservoir conservation pool (UTM NAD 83 Zone 13 south – 3716809 N 307932 E to 3715299 N 306713 E). The YBCU territory is located in the south-central part of this site. Vegetation in this area is composed of extensive Goodding's willow stands interspersed with occasional saltcedar shrubs. This site also receives

regular flooding caused by the breach in the LFCC. Vegetation at the eastern edge of this site is composed of dense saltcedar.

Site DL-03 (Figure 5) is immediately southeast of DL-02, adjacent to the Rio Grande (UTM NAD 83 Zone 13 south – 3716385 N 307767 E to 3714748 N 307408 E). Habitat is composed of high quality coyote and Goodding’s willow on the eastern edge adjacent to the river and dense saltcedar throughout the remainder of the site. The native habitat in this site developed when the river was realigned but, due to the embankment paralleling the new pilot channel, it receives no overbank flows. Due to the drying of this site and the lowering of the water table, the high quality willow habitat adjacent to the river seems to be slowly dying out. One YBCU territory was in this site on the eastern edge in the willow habitat.

Site DL-06 (Figure 5) is located immediately south of DL-03 adjacent to the Rio Grande on the west side of the river (UTM NAD 83 Zone 13 south – 3714748 N 307408 E to 3713090 N 306690 E). Vegetation within the site is composed of patches of Goodding’s willow that have recently matured into suitable habitat. Interspersed within the Goodding’s willow habitat is low-growing herbaceous vegetation and dense saltcedar at the northern end. Two YBCU territories existed in this site. Both territories were in patches of Goodding’s willow vegetation. This site did not receive any LFCC overbank flooding until late in the survey season.

Site DL-07 (Figure 5) is located directly south of DL-02 on the east side of the LFCC outfall (UTM NAD 83 Zone 13 south – 3715299 N 306713 E to 3713826 N 305732 E). This site contains several patches of highly suitable YBCU habitat in the form of mature Goodding’s willow with coyote willow understory, particularly in the northwestern and northeastern ends of the site. The rest of the site is a mix of dead or decadent saltcedar and open areas with low-growing herbaceous vegetation such as grasses and emergent aquatics. There is a fair amount of marshy habitat within this site if water from the LFCC is present in sufficient quantity.

Site DL-08 (Figure 5) is located on the west side of the LFCC outfall south of Dryland Road (UTM NAD 83 Zone 13 south – 3715506 N 306009 E to 3711922 N 304339 E). It is a narrow, linear site that is dominated by marshy areas interspersed with young to mid-age saltcedar, Goodding’s willow, and cottonwood. Portions of this site adjacent to the LFCC outfall receive regular overbank flooding. Both territories within this site were immediately adjacent to the LFCC outfall in mid-age stands of native willows or cottonwoods.

Site DL-09 (Figure 5) is located directly south of DL-07 along the LFCC outfall (UTM NAD 83 Zone 13 south – 3713826 N 305732 E to 3711830 N 304474 E) and contains habitat that is very similar to DL-07. Several patches of high quality Goodding’s willow habitat exist within the site; however, the majority of vegetation within the site is mid-age saltcedar or herbaceous “weedy” vegetation. This site was either flooded or saturated throughout the survey season. There was one YBCU territory located in the central area of this site in a Goodding’s willow patch.

Site DL-11 (Figure 5) is approximately 1 km east and across the Rio Grande from DL-09. The Rio Grande is the western boundary and bluffs encompass the eastern boundary of this site (UTM Nad 83 Zone 13 south – 3713246 N 306814 E to 3711593 N 304811 E). Habitat within

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this site is composed primarily of low growing herbaceous vegetation such as cattails (*Typha* sp.), burdock (*Arctium minus*), and other emergent aquatics. However, in several areas along the eastern bluffs, mid-age stands of Goodding's willow exist and provide fairly suitable YBCU habitat. One YBCU territory was detected within this willow area during the first survey period only.

Site EB-01 (Figure 5) is immediately south of site DL-09 (UTM Nad 83 Zone 13 south – 3712009 N 304201 E to 3708220 N 302632 E). The vegetation in this site is sparse with some patches of relatively young to intermediate Goodding's willow and cattail marshes. This site does flood during high water flows coming from arroyos and heavy rainfall. This site supported one YBCU territory located on the western edge in a patch of Goodding's willow. It was only detected on the third survey.

Site EB-04 (Figure 5) is located at the confluence of Nogal Canyon and the Rio Grande on the western side of the river (UTM NAD 83 Zone 13 south – 3708246 N 302566 S to 3705454 N 300234 E). There are very few patches of young and intermediate aged Goodding's willow within this site and the majority of the vegetation consists of sparse coyote willow and/or saltcedar and cattail marshes. This site typically has areas of pooled water and marshes from heavy rainfall and/or groundwater and does not regularly receive overbank flooding due to the levees built up on the eastern edge adjacent to the Rio. This site supported one YBCU territory located in a Goodding's willow patch.

Site EB-05 (Figure 5) is immediately across the river from site EB-04, with the Rio Grande serving as the western boundary (UTM NAD 83 Zone 13 south – 3706786 N 302749 E to 3704927 N 302083 E). This site is mostly open with young saltcedar and Goodding's willow being the predominant species. Hydrology within the site is typically dry, receiving no overbank flooding due to levees along the river and not having any pools of water from heavy rainfall. There was one YBCU territory in this site located at the eastern edge in a Goodding's willow patch approximately 700m from water.

Site EB-07 (Figure 5) is immediately south of site EB-04 on the western side of the river (UTM NAD 83 Zone 13 south – 3705885 N 299727 E to 3701965 N 299342 E). Vegetation in this site is composed primarily of saltcedar and cattail marshes with some Goodding's willow patches and interspersed coyote and seep willow (*Baccharis* sp.). During wet periods, this site typically has pools of water and saturated soil. There was one YBCU territory that was detected during the second survey period at the center of the site between a cattail marsh and the river in Goodding's willow habitat.

Site EB-08 (Figure 5) is located across the river from survey site EB-07 (UTM NAD 83 Zone 13 south – 3704456 N 299646 E to 3701048 N 300575 E). The eastern half of this site is mainly open with some young saltcedar, and the western half consists of mainly intermediate aged Goodding's willow and saltcedar. A patch in the center of the site, where the YBCU was detected with a 'knocker' type vocalization, consists of a marshy area with cattails and Goodding's willow.

The northern boundary of **Site EB-09** (Figure 5) is Pete's Well Road, south of EB-07 (UTM NAD 83 Zone 13 south – 3701931 N 299615 E to 3698740 N 298618 E). Habitat in this site consists mainly of saltcedar with some Goodding's willow and seep willow habitat. Hydrology is typically dry in this site with patches of recently dried cattail habitat. Overbank flooding does not typically occur in this site due to the levees on the eastern edge of the site adjacent to the river. This site had two YBCU territories, both in Goodding's willow habitat with one territory at the north end and the other at the south end.

Site EB-10 (Figure 5) is located directly across the river from site EB-09 to the east of the Rio Grande (UTM NAD 83 Zone 13 south – 3701618 N 299386 E to 3698740 N 298618 E). Habitat on the eastern half of this site consists of sparse young saltcedar. On the western half of this site vegetation is composed of young Goodding's willow with patches of mature Goodding's willow and dry cattail marshes. This site remained dry throughout the 2006 summer season, but in 2005 the levee on the western edge adjacent to the river breached and caused deep overbank flooding. The YBCU territory was located towards the southern end of the site within 65m of the Rio in Goodding's willow habitat.

Site EB-11 (Figure 5) is just south of survey site EB-09 on the west side of the river (UTM NAD 83 Zone 13 south – 3698740 N 298618 E to 3695897 N 298813 E). Vegetation in this site is composed mainly of Goodding's willow in various stages of growth, either monotypic or mixed with saltcedar. Some areas in the southern region of the site have more coyote willow and cottonwood. This site is typically dry and does not generally receive any overbank flooding. There were two YBCU territories in this site.

Site EB-12 (Figure 5) is located across the river from site EB-11 (UTM NAD 83 Zone 13 south – 3698707 N 299146 E to 3694438 N 297937 E). This site has many linear narrow strips of vegetation running north to south. Almost all strips contain a Goodding's willow component in different age classes, some are monotypic, with saltcedar or coyote willow understory or with a cottonwood mixed canopy. EB-12 stays dry and does not receive overbank flooding. There were two YBCU territories documented in this site.

Site EB-13N's (Figure 5) northern boundary is off of the Upper Narrows Road near China Canyon and the site is immediately south of site EB-11 (UTM NAD 83 Zone 13 south – 3695927 N 298637 E to 3694261 N 297523 E). Vegetation is mainly Goodding's willow and saltcedar with some dead cattail marsh in the central/western region of the site. There are many inlets on the western edge of the site containing more mature stands of Goodding's willow. There was one YBCU territory in the central area of this site in a Goodding's willow patch with a dead and dry cattail marsh along one border. Hydrology is typically dry, although there are a couple cattail marshes that become saturated during heavy rains.

Site EB-13S (figure 5) is immediately south of EB-13N on the western side of the Rio Grande (UTM NAD 83 Zone 13 south – 3694261 N 297523 E to 3691076 N 296957 E). Hydrology is

identical to that in EB-13N, being very dry with saturation only in a couple cattail marshes in times of heavy rain. Vegetation is primarily Goodding's willow and saltcedar. At the southern end of the site there is a lot more cottonwood and coyote willow interspersed with Goodding's willow and saltcedar.

Site EB-14 (figure 5) is a long narrow site across the river from EB-13S and immediately south of site EB-12 on the eastern side of the Rio Grande (UTM NAD 83 Zone 13 south – 3694502 N 297938 E to 3691076 N 296957 E). This site is very dry and does not receive overbank flooding. The north end of this site is mainly dense saltcedar and habitat is mainly open at the southern end. The area in the center is a mixture of Goodding's willow and saltcedar with some cottonwood, coyote willow, and dead cattails. There was one YBCU territory in the central region of the site.

Discussion

A total of 44 YBCU territories (based on a 500m radius) were found within 35 survey sites during the 2006 survey season. As previously mentioned, the YBCU's secretive nature, territory size, and the debatable reliability of the vocalizations for determining gender, are all factors contributing to approximate results. Nest location is really the only method to determine an exact count of Yellow-billed Cuckoos (Wiggins 2005), and unfortunately we were unable to locate any nests during the survey season. Additional surveys and telemetry studies would improve our understanding of the species and its behavior as well as a more precise estimate of territory numbers, territory sizes, sex ratios, and nests.

Due to the nature of the survey protocol, several detection variables can be explored (Table 3). While surveying, YBCUs typically responded to the first or second playback, based on the sample size of only 17. Unfortunately only 17 surveyors documented the playback vocalization number after which the YBCUs responded and more diligence in recording this information should have been made.

Most "new" territories were detected during the first survey period, and approximately half of YBCU territories were detected in more than one survey period. Conversely, half of the territories were only detected on one survey period. This may be due to different behavioral patterns throughout the breeding period causing the YBCUs to respond more or less during the breeding season. Most detections consisted of a vocal response by the YBCU after call playback, occurring between 0700 and 0900 hrs.

Table 2. Summary of 2006 YBCU detection and call response variables.

Responded After Playback # (n = 17):					# of New Territory Detections per Survey (n = 43)			
1	2	3	4	5	Survey 1	Survey 2	Survey 3	≥ 2 Periods ⁽¹⁾
58%	24%	6%	0%	12%	49%	32%	19%	47%
Detection Type (n = 100)					Time Detected (n = 81)			
Casual	Playback	Visual	Aural	Both	0500 to 0700	0700 to 0900	0900 to 1100	1100 to 1300
29%	71%	5%	85%	10%	22%	44%	31%	3%

⁽¹⁾ Of the new territories (based on a 500m radius) located in surveys 1 through 3, this is the percentage of territories detected on more than one survey.

The following table (Table 4) summarizes the territory locations, approximate distance to water, and the vegetation type within the territories found during the 2006 summer season. As the table illustrates, all territories contained a saltcedar, Goodding's willow, and/or cottonwood vegetation element. The southern-most sites had little to no canopy component above 20 feet, and the average distance to water was approximately 200 meters.

Table 3. Summary of 2006 YBCU territories.

Site Number	Total # of Territories (500m radius)	Approximate Distance to Water (meters)	Vegetation Type (in order from most to least in each category)
LF-22	1	20	Canopy - Goodding's willow, cottonwood; Understory - saltcedar
LF-24	1	60	Canopy - Goodding's willow, cottonwood, Russian olive, saltcedar; Understory - saltcedar, coyote willow
LF-25	1	350	Canopy - saltcedar
LF-35	1	145	Canopy - Goodding's willow, cottonwood; Understory - saltcedar
LF-35a	1	25	Canopy - Goodding's willow, cottonwood; Understory - saltcedar
LF-37	1	10	Canopy - cottonwood, Goodding's willow; Understory - saltcedar, coyote willow
LF-09/LF-09a	1	10	Canopy - cottonwood; Understory - coyote willow, saltcedar
LF-10	1	20	Canopy - cottonwood, Goodding's willow; Understory - saltcedar, coyote willow, cottonwood
LF-12	1	10	Canopy - cottonwood, Goodding's willow; Understory - saltcedar
LF-13	1	75	Canopy - cottonwood, Goodding's willow; Understory - coyote willow, saltcedar
LF-18	1	55	Canopy - Goodding's willow; Understory - coyote willow, Goodding's willow
LF-20	2	Territory 1 - 730 Territory 2 - 1195	Territory 1: Canopy - Goodding's willow; Understory - saltcedar, Goodding's willow Territory 2: Canopy - Goodding's willow; Understory - Goodding's willow, saltcedar

Discussion

Site Number	Total # of Territories (500m radius)	Approximate Distance to Water (meters)	Vegetation Type (in order from most to least in each category)
LF-28	2	Territory 1 & 2 - 10	Territory 1 & 2: Canopy - cottonwood, Goodding's willow; Understory - saltcedar
LF-30	1	170	Canopy - Goodding's willow, cottonwood; Understory - saltcedar
LF-32	2	Territory 1 - 90 Territory 2 - 100	Territory 1: Canopy - Goodding's willow, cottonwood; Understory - saltcedar, Goodding's willow Territory 2: Canopy - Goodding's willow; Understory - Goodding's willow, saltcedar
LFCC-5a	1	780	Canopy - cottonwood; Understory - saltcedar
DL-02	1	140	Canopy - cottonwood, Goodding's willow; Understory- saltcedar, Goodding's willow
DL-03	1	130	Canopy - cottonwood, Goodding's willow; Understory - coyote willow, Goodding's willow
DL-06	2	Territory 1 - 790 Territory 2 - 100	Territory 1 & 2: Canopy - Goodding's willow, cottonwood; Understory - saltcedar, coyote willow, seep willow, Goodding's willow, cottonwood
DL-07	1	0	Canopy - Goodding's willow, cottonwood; Understory - Goodding's willow, cattails
DL-08	2	Territory 1 & 2 - 0	Territory 1: Canopy - cottonwood, saltcedar; Understory - saltcedar Territory 2: Canopy - Goodding's willow; Understory - Goodding's willow, saltcedar
DL-09	1	0	Understory - Goodding's willow, cattails
DL-11	1	1150	Canopy - Goodding's willow; Understory - Goodding's willow
EB-01	1	300	Understory - Goodding's willow
EB-04	1	130	Understory - Goodding's willow, seep willow, Saltcedar
EB-05	1	700	Understory - Goodding's willow, cottonwood, seep willow, saltcedar
EB-07	1	70	Understory - Goodding's willow, cattails
EB-08	1	230	Understory - Goodding's willow, saltcedar, seep willow, cottonwood
EB-09	2	Territory 1 -120 Territory 2 - 155	Territory 1: Understory - Goodding's willow, saltcedar, cattails, seep willow Territory 2: Understory - saltcedar, Goodding's willow, coyote willow, seep willow, cattails
EB-10	1	65	Understory - saltcedar, Goodding's willow
EB-11	2	Territory 1 - 375 Territory 2 - 150	Territory 1: Understory - Goodding's willow, saltcedar, seep willow Territory 2: Understory - Goodding's willow, saltcedar
EB-12	2	Territory 1 - 55 Territory 2 - 30	Territory 1 & 2: Understory - Goodding's willow, saltcedar
EB-13N	1	75	Understory - Goodding's willow, saltcedar

Site Number	Total # of Territories (500m radius)	Approximate Distance to Water (meters)	Vegetation Type (in order from most to least in each category)
EB-13S	2	Territory 1 - 90 Territory 2 - 65	Territory 1: Understory - Goodding's willow, saltcedar, seep willow Territory 2: Understory - saltcedar, Goodding's willow, coyote willow, seep willow
EB-14	1	65	Understory - Goodding's willow, saltcedar

* Vegetation types gathered from surveyor notes and/or GIS vegetation polygons generated using the field techniques based on the work by Hink and Ohmart (1984) from 2002 through 2005.

** Canopy is considered vegetation \geq 20 feet, understory is considered vegetation \leq 20 feet.

For further detail on each detection, the survey forms in the Appendix include all 105 detections noted by surveyors. Of these, several were double and triple counts based on the 500m radius and were combined with a delineated waypoint for the territory. The placement for these 'delineated waypoints' was established by either using the centralized detection point, or the point which had the most suitable vegetation characteristics. These 'delineated waypoints' are marked on the survey forms with an asterisk and within the comments section are details regarding these territories. All detections and delineated waypoints are also illustrated in the survey maps.

Recommendations

1. Continue annual surveying and, to the extent that funding permits, continue nest searching/monitoring within the San Marcial and Tiffany reaches to determine population trends and reproduction rates of YBCUs within this portion of the Middle Rio Grande Basin.
2. Initiate a radiotelemetry study to collect valuable information pertaining to behavioral characteristics, habitat requirements, and territory size associated with the YBCU.
3. Continue updating a GIS database displaying YBCU territories along the Middle Rio Grande.
4. Coordinate with other entities to initiate the development of a rangewide database similar to that for the SWFL.
5. Revise survey forms to include a column for the playback number the YBCU responded to as well as emphasize the importance of collecting these data during the protocol training.
6. Conduct a study on call types to determine whether or not it is a viable source of determining breeding status and sex of YBCUs.

Conclusion

The data collected in 2006 provides a basis for future research in studying, comparing, and analyzing the population of YBCUs within the San Marcial reach of the Middle Rio Grande. Based on the data collected in 2006, this area is believed to be a significant stronghold for one of the few remaining YBCU populations in the southwest.

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