PIMA COUNTY
SUSTAINABILITY & CONSERVATION

Pima County Ecological Monitoring Program

Western Yellow-billed Cuckoo Monitoring Protocol

January 2019

Prepared by Pima County Office of Sustainability and Conservation Staff:
Ian W. Murray
Jeff M. Gicklhorn

Recommended Citation:
Murray, I.W. & J.M. Gicklhorn. 2018. Western Yellow-billed Cuckoo Monitoring Protocol. Ecological Monitoring Program, Pima County Multi-species Conservation Plan. Report to the U.S. Fish and Wildlife Service, Tucson, AZ.

Table of Contents

List of Figures

List of Tables

Abstract

This protocol details the structure and results of Pima County's first round of monitoring for western yellow-billed cuckoo, under its Multi-species Conservation Plan (MSCP) and Section 10 permit from the U.S. Fish and Wildlife Service (USFWS). The County has agreed to monitor for the occupancy of this species every three years at Cienega Creek Natural Preserve and Bingham Cienega Natural Preserve, following the currently approved USFWS play callback survey monitoring protocol that dictates four different surveys be completed during three survey periods. Additionally, Pima County allocated additional survey effort to other Pima County preserve lands where cuckoo distribution was less well understood by species experts. These surveys were single pass, exploratory surveys in potentially suitable riparian habitat in Posta Quemada Canyon (Rincon Mountains), Buehman Canyon and Edgar Canyons (Santa Catalina Mountains), and lower Davidson Canyon (south of Cienega Creek). If and where additional exploratory surveys will be completed in future rounds of monitoring for cuckoos will be decided together with USFWS staff. Across the four survey periods we made 52 cuckoo detections at Cienega Creek Natural Preserve, 26 detections at Bingham Cienega Natural Preserve, five detections in lower Buehman Canyon, and one detection in Edgar Canyon. Cienega Creek hosts what is likely a robust breeding population of this species, and Bingham Cienega also likely harbors breeding cuckoos albeit a more modest number of pairs. Observations suggest that small number of cuckoos may breed in both Edgar and lower Buehman Canyons, but the single survey that we made in each site is insufficient to thoroughly evaluate this.

Acknowledgements

We thank Jennie MacFarland, Jonathan Horst, and a host of volunteers, all from the Tucson Audubon Society, for their efforts in completing fieldwork in sometimes inclement conditions. We also thank Iris Rodden for important assistance in completing this fieldwork. Brian Powell also provided key insights, discussion, support, and assistance with fieldwork. Jennifer Becker and Jess Barry provided important logistical support and access to the Bingham Cienega site. We also thank Susan Sferra and Scott Richardson for key discussions on survey placement and other logistics.

Background

Pima County's Multi-species Conservation Plan (MSCP) is tasked with ensuring that the County remains in compliance with its federal Endangered Species Act Section 10 Incidental Take Permit. Implementation of an ecological monitoring program is a key requirement of the MSCP, and Pima County has agreed to conduct species-level monitoring for 15 of the 44 plant and animal species covered under the MSCP. The threatened western yellow-billed cuckoo (YBCU) is one such species that the County has agreed to monitor on the County preserves Cienega Creek Natural Preserve and Bingham Cienega Natural Preserve.

The yellow-billed cuckoo is a secretive and slender, ~30 cm long neotropical migrant bird species that is relatively widespread in forested habitats across the eastern United States, but is rarer and generally restricted to areas with deciduous riparian trees along riparian corridors through parts of western North America. The taxonomic status of the yellow-billed cuckoo, particularly those birds in the western part of their range (referred to in some works as *Coccyzus americanus occidentalis*) is not universally agreed upon and the U.S. Fish and Wildlife Service (USFWS) considers yellow-billed cuckoos that occur in the western parts of North America to be a distinct population segment of the yellow-billed cuckoo, or the western yellow-billed cuckoo. It is clear that the western yellow-billed cuckoo has experienced significant declines, largely associated with losses of riparian cottonwood-willow habitat in the West, and is considered to be extirpated in Washington, Oregon, and British Columbia. Consequently, the western Distinct Population Segment of the yellow-billed cuckoo was federally listed as threatened in 2014.

The western yellow-billed cuckoo primarily breeds in relatively large tracts of native broadleaf deciduous woodlands, which are generally located along streams and rivers. However, recent research and survey efforts have changed the current understanding of what vegetation types should be considered suitable breeding habitat. For example, YBCU will successfully rear broods in Madrean oak woodland associated with mountain canyons, as well as velvet mesquite bosques.

In southern Arizona, YBCU are late-season breeders with peak breeding occurring in July and August. Among bird species, YBCU have one of the most rapid incubation and nestling period with young being capable of fledging (though not flying) approximately 17 days after egg-laying. This species is relatively reclusive, and spends long periods of time at stationary perches in the tree canopy searching for large-bodied invertebrates such as caterpillars, katydids, and cicadas. The YBCU is well known for being capable of eating large numbers of hairy and often noxious caterpillars, prey that are usually ignored by other bird species.

Objectives

Pima County has committed itself to monitoring for the presence of this species using the USFWS-approved call playback survey protocol outlined in Halterman et al. (2015; https://www.fws.gov/southwest/es/Documents/R2ES/YBCU_SurveyProtocol_FINAL_DRAFT_22Apr2015.pdf). Pima County will monitor for this species in two areas of the County's preserve lands that contain suitable habitat for the species. These areas are Bingham Cienega Natural Preserve and Cienega Creek Natural Preserve where at least one and two transects, respectively, will be established and assessed for occupancy every three years (Pima County 2016).

Methods

In 2017, Pima County used the Halterman et al. (2015) playback survey protocol to assess for the presence of the YBCU on two Pima County preserve properties, Bingham Cienega Natural Preserve and Cienega Creek Natural Preserve (Figure 1). Additionally, County staff completed non-protocol exploratory, one-visit surveys for YBCU in four additional drainages on County preserves upon working with USFWS staff to prioritize areas where survey efforts would be particularly valuable for overall YBCU conservation efforts (Figure 1). For those transects on Bingham Cienega and Cienega Creek, we followed the basic monitoring protocol that prescribes four survey visits completed across the three survey periods (June 15-30, July 1-31, and August 1-15). As indicated by the protocol, two of the survey visits were conducted during survey period two. For the additional, non-protocol surveys we completed one-visit surveys during survey period two.

We used a FoxPro NX4 electronic caller (or similar device) loaded with a recording provided by the USFWS that contained a series of contact ("kowlp") calls beginning at or near sunrise and occurring no later than about 1100 h. We followed a one minute quiet listening period with a series of five contact calls spaced one minute apart. We repeated this every 100 meters as we moved through the habitat to be surveyed. If we detected a cuckoo, we moved at least 300 m further before starting the next survey point. In several cases we moved call points beyond a normally spaced point due to the presence of raptors or raptor nests. We filled out the yellow-billed cuckoo daily datasheet and included the UTM coordinates for each call point. All lead field surveyors had completed the YBCU survey protocol training offered by the USFWS and the Arizona Game and Fish Department. See Halterman et al. (2015) for a complete description of the methodology that we followed.

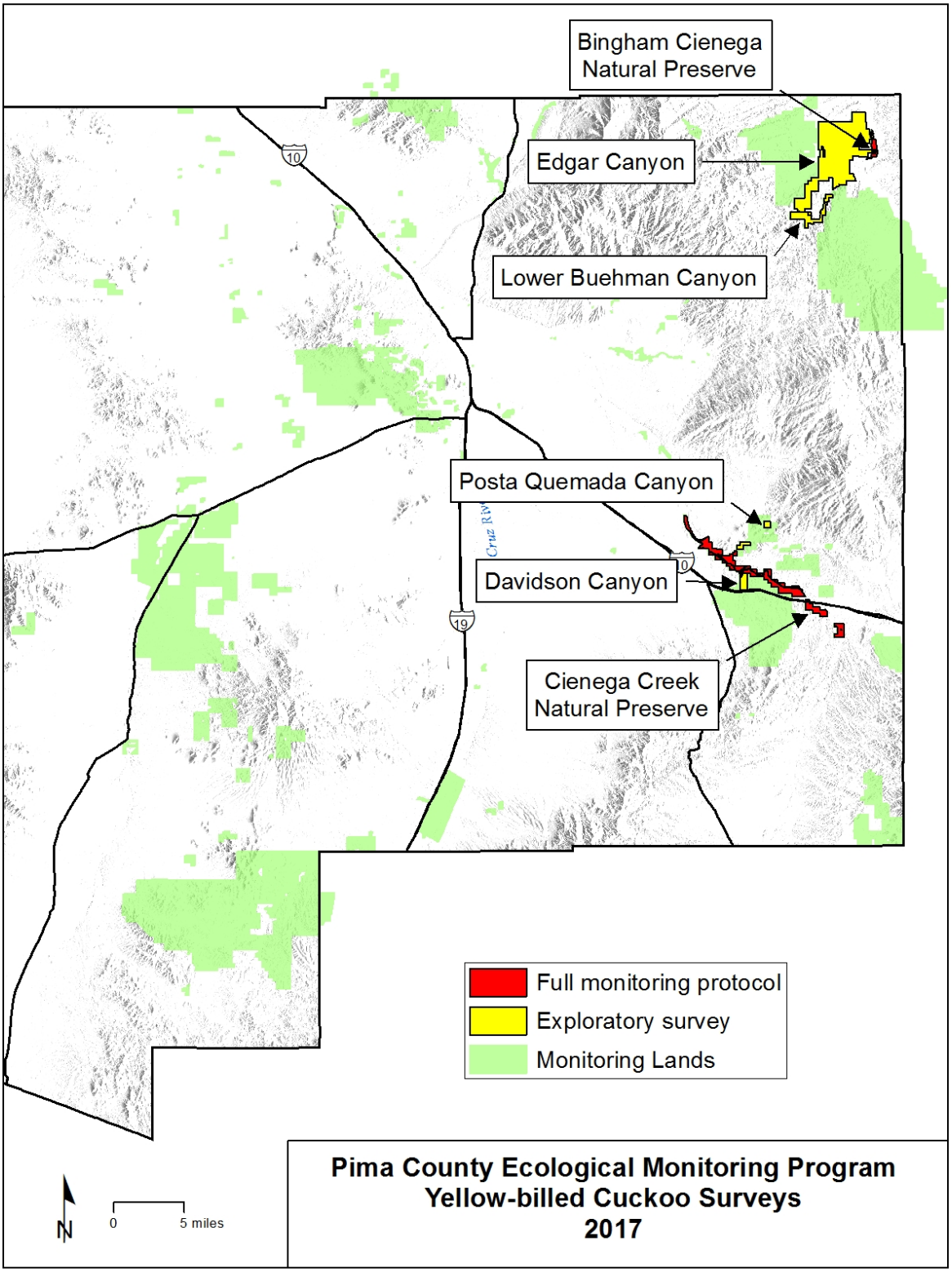

Figure 1. Locations of western yellow-billed cuckoo surveys on Pima County preserve lands. Green shading indicates the breadth of Pima County preserve lands.

Western yellow-billed cuckoo monitoring sites – full protocol surveys

There are patches of appropriate cuckoo habitat (native broad-leafed riparian woodland or mesquite bosque) intermittently spread along much of Pima County's Cienega Creek Natural Preserve. Velvet ash, Goodding's willow, and Fremont cottonwood made up the majority of the broad-leafed riparian woodland. The mesquite bosque was primarily large velvet mesquites and scattered net-leaf hackberry, with understory shrubs such as graythorn. We surveyed approximately 13 km of Cienega Creek, dividing the preserve into two transects with the west transect located between the Del Lago Golf Course diversion dam in the west to the 'Horseshoe Bend' region of Cienega Creek (Figure 2). The east transect took in the area of the Preserve between the 'Horseshoe Bend' region in the west to the abandoned Pantano Townsite in the east, just north of Interstate 10 (Figure 2). Survey transects at Cienega Creek were linear and followed the course of the stream channel (Table 1). Portions of both transects included both wet and dry stretches of Cienega Creek.

Bingham Cienega Natural Preserve is located along a typically dry stretch of the lower San Pedro River. Riparian habitat quality at Bingham Cienega has declined precipitously over the recent past such that the cienega and downstream marshy habitat no longer have surface water, or even moist soil, during early summer. However there are dense mesquite bosques in the north and south end of the Preserve, broad-leaf riparian woodland at the historic cienega (mostly velvet ash with some Fremont cottonwood and Arizona walnut), as well as scattered patches of mesquite with some netleaf hackberry and walnut trees growing along old fencerows and fields. We distributed survey points throughout these habitat patches to ensure complete coverage of the mesquite bosque and broad-leaf deciduous forest habitat which was approximately 2.1 km of survey transect (Table 1; Figure 3).

Western yellow-billed cuckoo monitoring sites – exploratory surveys

Pima County offset a reduction in monitoring for southwestern willow flycatchers due to a lack of suitable habitat, with additional exploratory surveys for western yellow-billed cuckoos. These were single-pass cuckoo surveys implemented in areas of County preserves that in consultation with USFWS staff, were determined to be areas where the status of cuckoo presence was lacking or insufficient. Consequently, we conducted single survey pass cuckoo surveys in suitable habitat in Edgar and Buehman Canyons (Santa Catalina Mountains) and in Posta Quemada Canyon (Rincon Mountains). We also completed a single pass survey in the County-owned portion of Davidson Canyon, south of Cienega Creek Natural Preserve. We completed all of the exploratory periods during survey period 2, when detectability would be likely to be highest.

Posta Quemada Canyon is located in Pima County's Colossal Cave Mountain Park, in the Agua Verde Creek drainage at the south end of the Rincon Mountains. Surveys were in an ephemeral stretch of the canyon with a small section of native broad-leaf riparian woodland (mostly cottonwood with some velvet ash and Goodding's willow) and mesquite bosque (Table 1). County staff also completed an exploratory survey of the County-owned part of Davidson Canyon south of Cienega Creek. Habitat here was mostly velvet mesquite, interspersed with

occasional Goodding's willow and velvet ash, and ephemeral stretches with small amounts of water (Table 1).

Surveys on County-owned lands in Edgar (Figure 1; Table 1) and lower Buehman Canyons (Figure 6; Table 1) (both draining into the lower San Pedro River) were located on the east side of the Santa Catalina Mountains. We completed one transect in Buehman Canyon including on a property that Pima County recently acquired (Tesoro Nueve Ranch). Areas surveyed were intermittent streams, containing some permanent water, under a canopy of native broad-leafed riparian woodland (sycamore, velvet ash, walnut, Goodding's willow and cottonwood) intermixed with mesquite bosque.

Table 1. Location of Pima County western yellow-billed cuckoo survey transects (2017). UTMs are given in the datum NAD83.

Site	Survey Start		Survey End	
	UTM Easting	UTM Northing	UTM Easting	UTM Northing
Cienega Creek Natural Preserve*				
West transect	530586	3544429	535780	3541921
East transect	535886	3541974	540143	3539629
Bingham Cienega Natural Preserve**				
Bingham	548477	3592276	548159	3590113
Exploratory Surveys*				
Posta Quemada Canyon	534631	3546685	534315	3546151
Davidson Canyon	533364	3538656	533704	3542352
Edgar - upstream	541205	3591668	541704	3591346
Edgar -downstream	542936	3590538	543550	3590434
Buehman	542290	3583332	543596	3585876
Buehman – Tesoro Nueve	543281	3586790	543573	3586435

*Locations provided are the start and end points of linear transects following the stream channel.
**Locations provided are the approximate north and south bounds of the area surveyed within Bingham Cienega.

Results

Cienega Creek Natural Preserve

Cuckoos are densely distributed along the surveyed portions of the Cienega Creek property. We detected cuckoos in both mesquite bosque and native riparian woodland habitats. We made 52 detections of an estimated 50 individual cuckoos across the survey periods. The greatest number of cuckoos detected was 18 during survey period 3, and the fewest detected was eight during survey period two (survey 2a; 14 and 17 July 2017; Table 2). Thirty of these detections were aural only, three detections were visual only (silent birds), and 17 detections were birds that were both heard and seen (in two cases detection method was not recorded). In cases where cuckoos were detected through their calls, two were alarm calls, 41 were contact calls, one individual made both a contact and an uncategorized vocalization, and one was a coo call. Ten cuckoo detections were made before any playback was broadcasted at a station. For

cuckoos detected after broadcasting calls, it took an average of about two rounds of calls before detecting a bird.

Estimated Territories

We used the guidelines presented in Halterman et al. (2015) to estimate and qualify the number of potential cuckoo territories along survey transects. In the western part of the Cienega Creek Preserve, we estimate that there were two possible breeding territories and one probable breeding territory. In the eastern part of the Preserve, we estimate that there were five probable breeding territories, four possible breeding territories, and one confirmed breeding territory.

Habitat Characteristics

The surveyed stretches were primarily native vegetation (> 75%) with the four most prevalent overstory species being Fremont's cottonwood, Goodding's willow, velvet ash, and velvet mesquite. There are four reaches of perennial water throughout the survey transect. We estimated that overall there was about 75% canopy cover and that the canopy was on average 12 m tall. There was also about 30% canopy cover of understory vegetation (~ 2.5 m tall on average), and the five most common understory species were velvet mesquite, velvet ash, Goodding's willow, netleaf hackberry, and seep willow. Tamarisk, though present, was widely scattered and relatively rare.

Table 2. Summary survey results for Pima County western yellow-billed cuckoo monitoring (2017).

Site	Transect distance (km)	Survey Period 1 June 15 - 30	Survey Period 2 July 1 – 31 (2 surveys)	Survey Period 3 August 1 - 15
		YBCU detections	YBCU detections	YBCU detections
Full protocol sites				
Cienega Creek Natural Preserve*	13.0	18	8 (survey 2a) 16 (survey 2b)	10
Bingham Cienega Natural Preserve	2.1	5	9 (survey 2a) 6 (survey 2b)	6
Exploratory survey sites				
Lower Buehman Canyon	3.3	1 (incidental)	2	N/A
Tesoro Nueve (Lower Buehman Canyon)	0.6	N/A	2	N/A
Edgar Canyon**	1.2	N/A	0	1 (incidental – 09/19/2017)
Posta Quemada Canyon	0.6	N/A	0	N/A
Davidson Canyon	4.4	N/A	0	N/A

**Two discontinuous stretches surveyed combined.

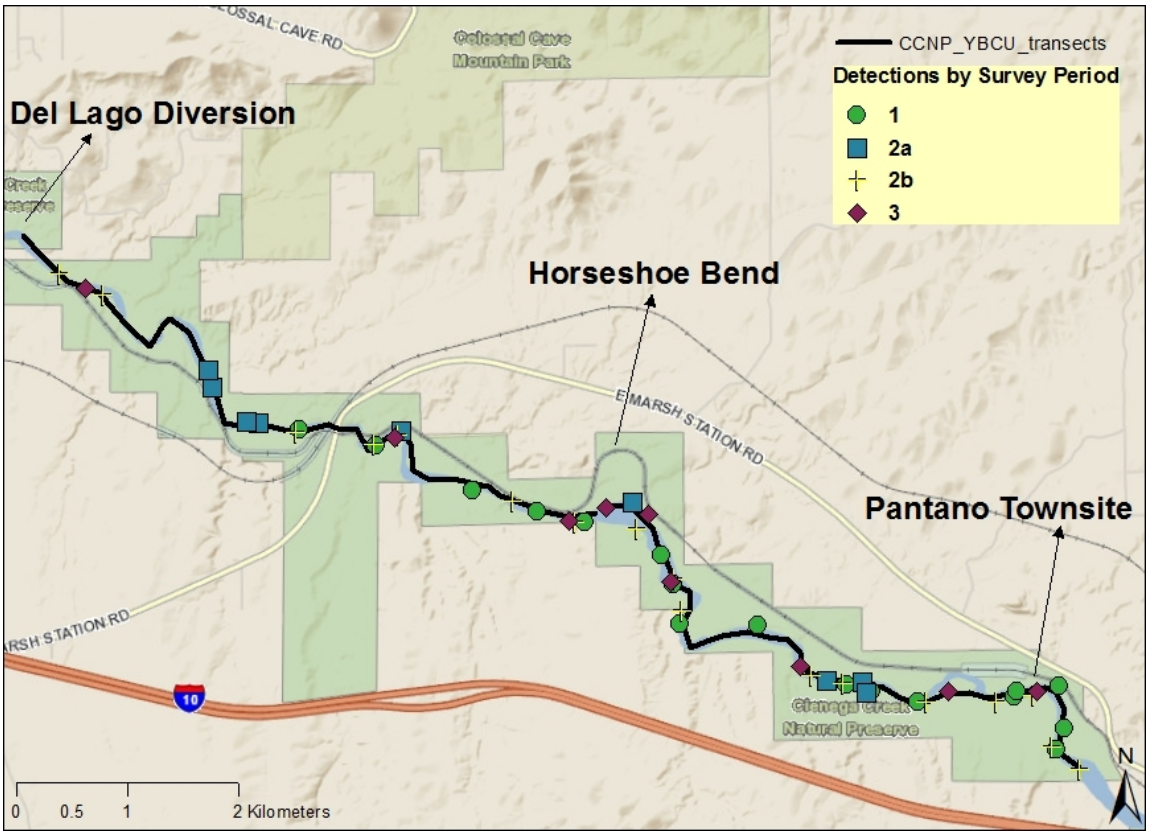

Figure 2. Western yellow-billed cuckoo detections by survey period on Cienega Creek Natural Preserve.

Figure 3. Survey stretch with a well-developed canopy of Fremont cottonwood, velvet ash, and Goodding's willow at Cienega Creek Natural Preserve.

Bingham Cienega Natural Preserve

We detected cuckoos throughout the Bingham Cienega Natural Preserve property. We made 26 detections of an estimated 24 individual cuckoos across the survey periods. The most cuckoos detected on a particular survey (survey 2a; 14 July 2017) was nine, while the fewest detected birds on a given survey was four in periods one and two (survey 2b; 07/26/2017; Table 2). Cuckoos were detected throughout the preserve with detections occurring during all of the surveys in mesquite bosque habitat in the northern part of the property as well as the mix of riparian broad-leaf woodland near the dry cienega in the central part of the preserve. We detected cuckoos during some (but not all) of the survey periods in the mesquite bosque habitat in the southern part of the preserve. Twelve of these detections were aural only, three detections were visual only (silent birds), and 11 detections were heard and seen. In cases where cuckoos were detected through their calls, 15 were contact calls, three were coo calls, five were coo and contact calls, and one was an alarm call. We made nine cuckoo detections before any playback was broadcasted at a station. For cuckoos detected after broadcasting calls, it took an average of about three rounds of calls before detecting a bird.

Estimated Territories

Using the instructions regarding interpretation of breeding status given in Halterman et al. (2015) we estimate that there were three probable breeding territories and two possible breeding territories at this site.

Habitat Characteristics

The surveyed areas were primarily native vegetation (> 75%) with the five most prevalent overstory species being velvet mesquite, netleaf hackberry, velvet ash, Goodding's willow, and Fremont's cottonwood. The only available permanent surface water on the site is a small well-fed pond that is adjacent to the Bingham Cienega ranch house. The broad-leaf riparian trees have experience substantial levels of canopy dieback and mortality due to ongoing drought and decline of the shallow groundwater level. We estimated that overall there was about 65% canopy cover and that the canopy was on average 8 m tall. There was also about 10% canopy cover of understory vegetation (~ 1.5 m tall on average), and the three most common understory species were buttonbush, graythorn, and velvet mesquite.

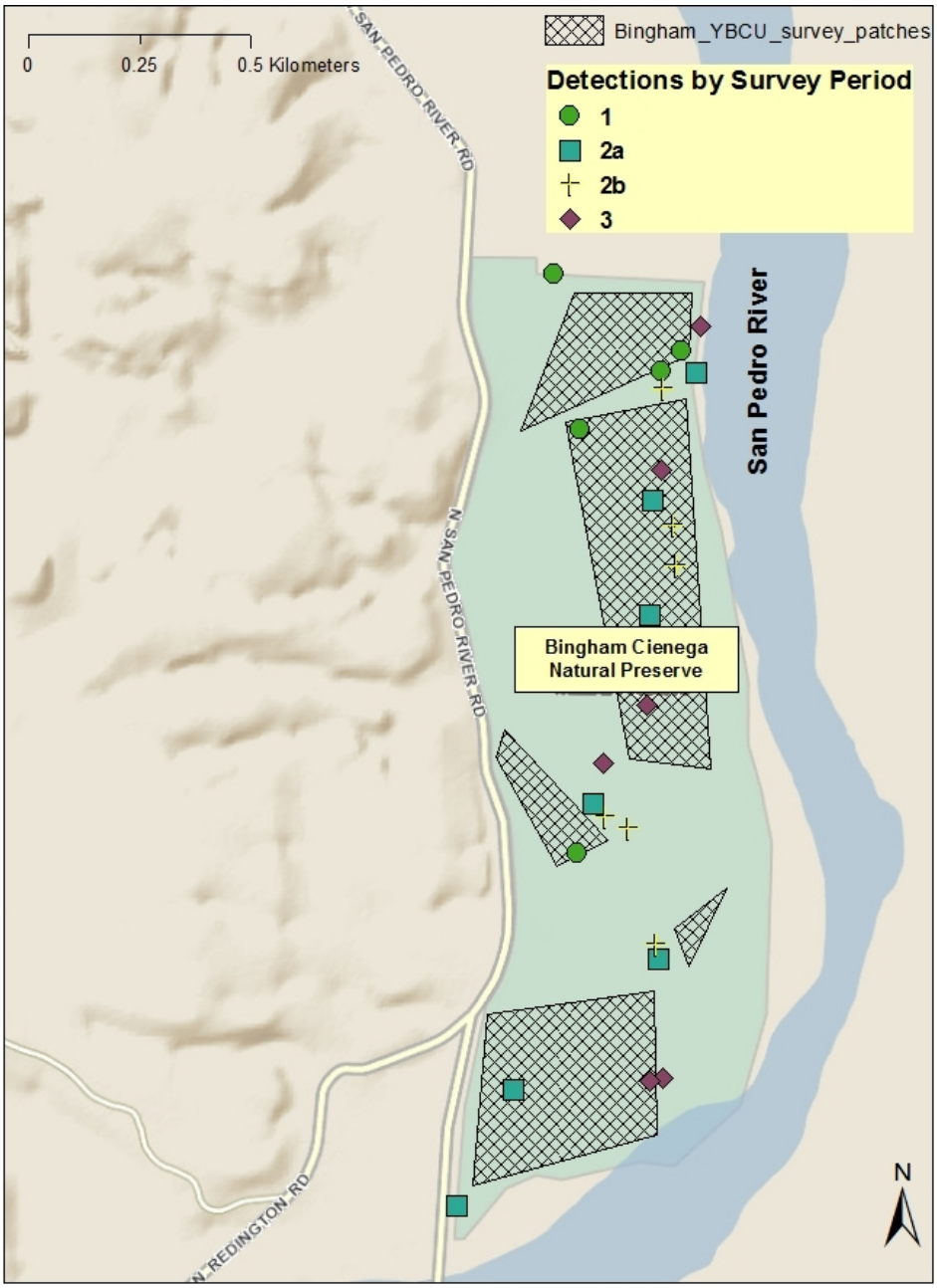

Figure 4. Western yellow-billed cuckoo detections by survey period on Cienega Creek Natural Preserve. Survey patches approximate the area of potential mesquite bosque or broad-leaf deciduous tree habitat that are interspersed with more open and shrubby habitat.

Figure 5. Survey area made up of a mesquite bosque with scattered velvet ash and netleaf hackberry trees, and an understory of graythorn in the northern part of Bingham Cienega Natural Preserve.

Lower Buehman Canyon

We made four cuckoo detections of four different individuals during a single pass exploratory survey (across two separate surveyed lengths) of Lower Buehman Canyon (Figure 6, Table 2). We also made a visual incidental observation of a silent cuckoo in lower Buehman Canyon during other work in survey period 1 (26 June 2017). Two of the four protocol detections were made before any broadcasted calls were played at a station. In the other two cases, birds responded after two and four series of broadcasted calls. Three individuals were only detected aurally, and one bird flew into the station after call broadcast, but never vocalized. The three birds that vocalized all made contact calls.

Estimated Territories

We only completed a single survey, but given the incidentally observed bird made in June during survey period 1 (about 490 m away from the closest observation in July), we can say that there was at least one possible breeding territory.

Habitat Characteristics

The surveyed areas were primarily native vegetation (> 75%) with the five most prevalent overstory species in the lower Buehman transect being in order of abundance Arizona

sycamore, Fremont cottonwood, Goodding's willow, Arizona walnut, and velvet ash. This part of Buehman Canyon contains perennial, but intermittent flow, and all call stations were at a minimum within several hundred meters of surface water. We estimated that overall there was about 80% canopy cover and that the canopy was on average 15 m tall. There was also about 40% canopy cover of understory vegetation (~ 3 m tall on average), and the five most common understory species were netleaf hackberry, velvet ash, Arizona walnut, canyon grape, and velvet mesquite. The Tesoro Nueve transect was also centered along an area of permanent surface water in Buehman Canyon (Figure 7) and we estimated that it had about 85% canopy cover (on average about 18 m high) of overstory tree species including Fremont cottonwood, velvet ash, Goodding's willow, velvet mesquite, and Arizona walnut. The most common understory species (about 20% understory canopy coverage and 1.5 m tall) included graythorn, catclaw acacia, Cochise sedge, velvet ash, and netleaf hackberry.

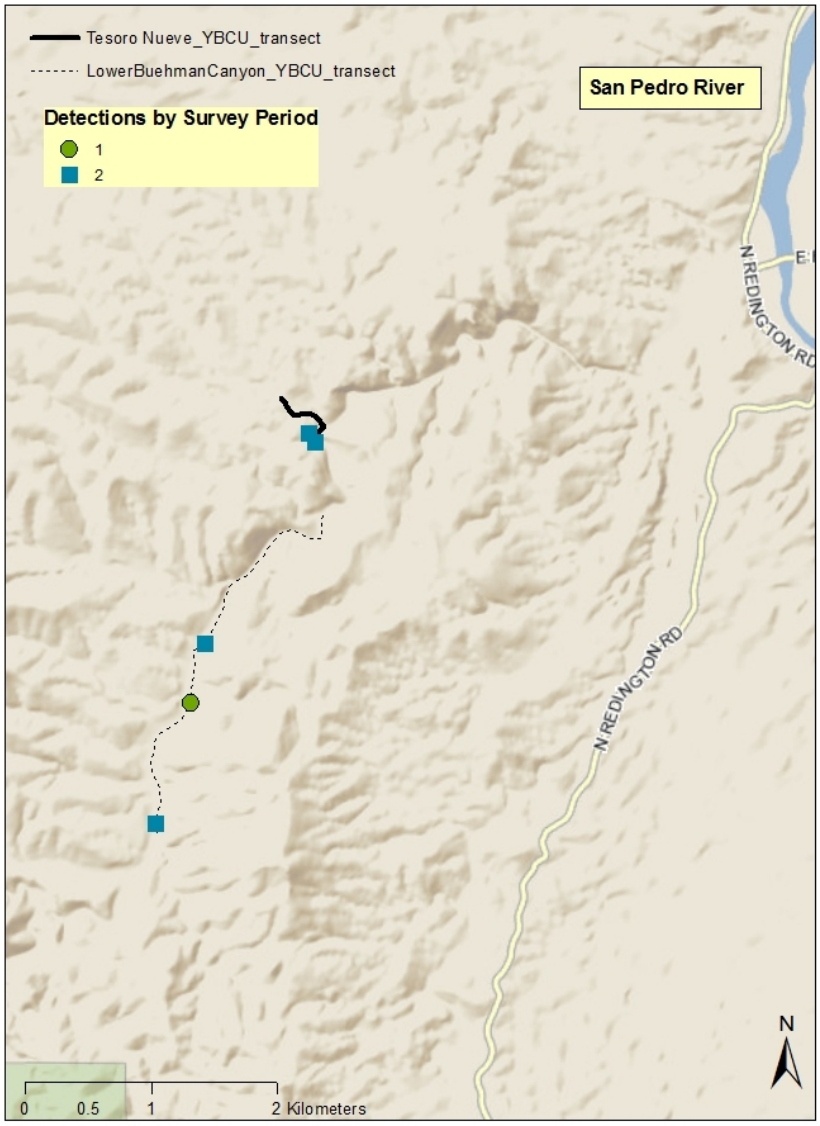

Figure 6. Western yellow-billed cuckoo detections during a single, exploratory survey during survey period 2. The green circle indicates a cuckoo that was incidentally observed during other work in June.

Figure 7. Spring at part of the Tesoro Nueve survey transect for western yellow-billed cuckoo in the Buehman Canyon Preserve.

Edgar Canyon

We did not detect any cuckoos during a single pass exploratory survey (across two separate surveyed lengths) of Edgar Canyon (Figure 8, Table 2). However, we made a single incidental observation here of a cuckoo giving an alarm call on 19 September in the course of other work. Addendum: during other work in 2018, we detected a calling cuckoo about 150 m downstream of the 2017 detection, on 13 June 2018.

Estimated Territories

We only surveyed once at this location, but the fact that we observed and heard a cuckoo giving repeated alarm calls in September, indicates that there may have been a breeding territory at this site.

Habitat Characteristics

The surveyed areas were primarily native vegetation (> 75%) with the five most prevalent overstory species being in order of abundance Arizona sycamore, Fremont cottonwood, Goodding's willow, velvet ash, and velvet mesquite. This part of Edgar Canyon contains perennial, but intermittent flow, and all call stations were at a minimum within several hundred meters of surface water (Figure 9). We estimated that overall there was about 65% canopy

cover and that the canopy was on average 12 m tall. There was also about 20% canopy cover of understory vegetation (~ 1.5 m tall), and the five most common understory species were netleaf hackberry, velvet mesquite, velvet ash, graythorn, and desertbroom.

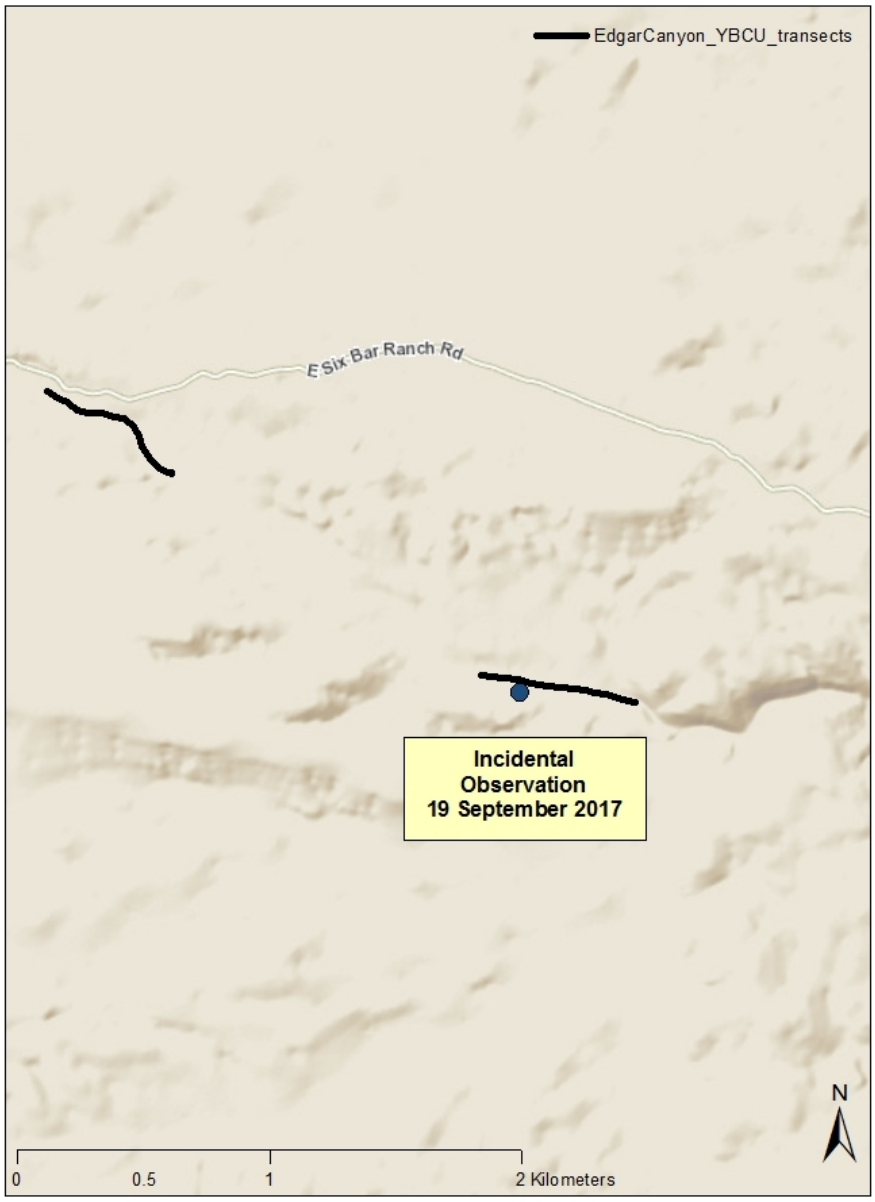

Figure 8. Western yellow-billed cuckoo survey transect, Edgar Canyon. We detected no cuckoos during a single, exploratory survey during July, but did incidentally observe a cuckoo at this site in September.

Figure 9. Native broadleaf deciduous riparian forest characterizing western yellow-billed cuckoo survey areas at Edgar Canyon.

Posta Quemada Canyon

We did not detect any cuckoos during a single pass exploratory survey of Posta Quemada Canyon (Figure 10, Table 2).

Habitat Characteristics

The surveyed areas were primarily native vegetation (> 75%) with the four most prevalent overstory species being in order of abundance, Fremont cottonwood, Goodding's willow, velvet mesquite, and netleaf hackberry. During our survey, there was no available surface water. We estimated that overall there was about 75% canopy cover and that the canopy was on average 8 m tall. There was also about 40% canopy cover of understory vegetation (~ 3 m tall), and the five most common understory species were velvet mesquite, netleaf hackberry, Goodding's willow, velvet ash, and buttonbush.

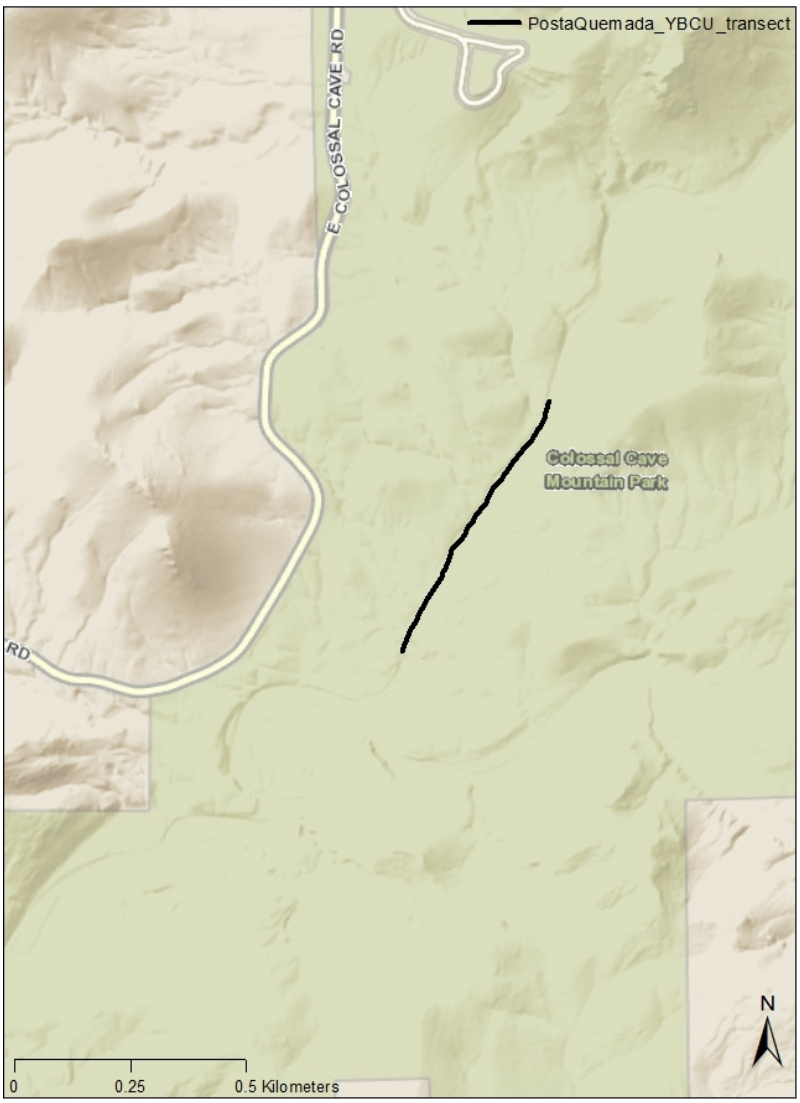

Figure 10. Western yellow-billed cuckoo survey transect in Posta Quemada Canyon, Colossal Cave Mountain Park, Rincon Mountains.

Davidson Canyon

We did not detect any cuckoos during a single pass exploratory survey of Davidson Canyon (Figure 11, Table 2).

Habitat Characteristics

The surveyed areas were primarily native vegetation (> 75%) with relatively sparse overstory canopy cover. The four most prevalent overstory being in order of abundance were velvet mesquite, velvet ash, Goodding's willow, and netleaf hackberry. By far the the majority of the canopy cover was velvet mesquite. Throughout the survey length, there were intermittent length of surface water flow, although much of this flow is not considered to be permanent. We estimated that overall there was about 25% canopy cover and that it was on average 8 m tall. There was also about 10% canopy cover of understory vegetation (~ 1.5 m tall), and the four most common understory species were velvet mesquite, netleaf hackberry, desertbroom, and seepwillow.

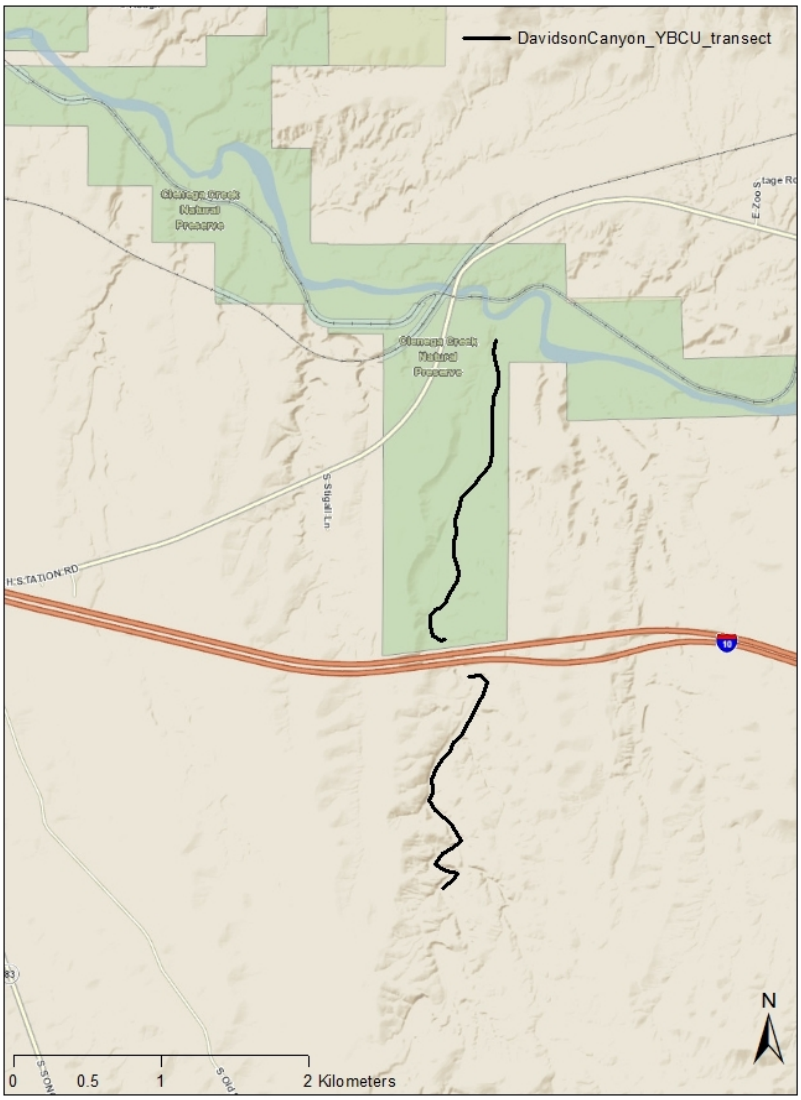

Figure 11. Western yellow-billed cuckoo survey transect in Davidson Canyon, south of Cienega Creek Natural Preserve.

Figure 12. Scattered and sparse riparian forest along western yellow-billed cuckoo survey area in lower Davidson Canyon. Outside of wet periods, surface water flow is drastically reduced or absent.

Literature Cited

Halterman, M.D., Johnson, M.D., Holmes, J.A., & S.A. Laymon. 2015. A Natural History Summary and Survey Protocol for the Western Distinct Population Segment of the Yellow-billed Cuckoo: U.S. Fish and Wildlife Techniques and Methods, 45 p.

Pima County. 2016. Multi-species Conservation Plan for Pima County, Arizona: Final. Submitted to the Arizona Ecological Services office of the U.S. Fish and Wildlife Service, Tucson, Arizona.