Yellow-billed Cuckoo Surveys on the Coronado National Forest within Eight Sky Island Mountain Ranges in Southeast Arizona – Public Version

"The Conservation Puzzle" by Gay Gilbert

Public Version of Report Prepared for the Coronado National Forest

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Executive Summary

The main goal of this study was to determine if western Yellow-billed Cuckoos (wYBCU) (*Coccyzus americanus*) use higher elevation habitat on the Coronado National Forest in southeast Arizona during the breeding season than considered typical in the literature. In the American West, cuckoos have primarily been associated with riparian gallery forests that have adjacent wide woodland belts[1]. The proposed Critical Habitat for the species only included areas fitting this description[2].

Cuckoos have been regularly recorded during the breeding season by scientists and birders in higher elevation drainages and around lakes in the foothills of sky island mountain ranges– areas not typically considered as standard wYBCU habitat. In Arizona, these drainages are typically within the Madrean pine-oak woodland ecoregion, with oaks often bordered by either mesquites or junipers. While surveyed drainages occasionally included cottonwoods and willows, they rarely presented a typical gallery forest, which does not match the Primary Constituent Elements as described in the August 2014 proposed Critical Habitat. Most survey routes were dominated by oak, juniper, and mesquite trees with the immediate riparian zone interspersed with sycamore, hackberry, and a few other mesic species.

Surveys were performed on the Coronado National Forest during the months of July and August 2015 in eight of the Sky Islands: Chiricahua, Huachuca, Santa Catalina, Santa Rita, Whetstone, and Patagonia Mountains, the Canelo Hills, and the Atascosa Highlands. Surveys were conducted biweekly in 40 locations consisting of five selected drainages in eight ranges. Surveys documented 19 breeding territories and 24 occupied territories for a total of 43 territories, demonstrating that cuckoos can and do utilize the Madrean pine-oak woodland habitat type within the sky islands of southeastern Arizona during the breeding season. Surveys documented recurring individuals and territories with evidence of breeding in seven of the eight mountain ranges surveyed. Multiple territories were documented in five of the eight mountain ranges surveyed.

Yellow-billed Cuckoos are known to possess a very secretive nature and determining if detection is of one or multiple birds, or if breeding behavior is occurring, is very difficult. The

[1] Western Yellow-billed Cuckoo habitat information from Cornell Lab or Ornithology's Birds of North America Online

[2] Federal Register Notice Vol. 79, No. 158 August 15, 2014: http://www.gpo.gov/fdsys/pkg/FR-2014-08-15/pdf/2014-19178.pdf

number of breeding territories documented by this study represents a conservative number of nesting pairs, and some of the occupied territories documented may also represent nesting pairs.

Areas Surveyed

Routes and drainages that were surveyed are listed by mountain range.

Atascosa Highlands: Arivaca Lake, Peña Blanca Canyon, Peña Blanca Lake, Rock Corral Canyon and Sycamore Canyon. Each of these drainages was surveyed 4 times

Canelo Hills: Collins Canyon, Korn Canyon, Lyle Canyon and Merritt Canyon. Each of these drainages was surveyed 4 times each. Sunnyside/Scotia Canyon complex was surveyed twice and then not a third or fourth time due to private land access issues and the apparent unsuitability of the area as Yellow-billed Cuckoo habitat.

Santa Catalina Mountains: Sabino Canyon was surveyed four times. Butterfly Trail, Canyon del Oro, Bear Canyon at General Hitchcock, Gordon Hirabayashi to Sycamore Reservoir, Molino Basin, Pima Canyon, Tanque Verde Canyon and Ventana Canyon were all surveyed only once. Each route was surveyed completely but on the ground assessment found these areas to be unsuitable for Yellow-billed Cuckoos due to lack of riparian habitat or tall trees and teams were sent to another location during the next survey period. This is why so many locations were surveyed in the Santa Catalinas. Peppersauce Canyon was surveyed twice during the last two count periods of the survey season and was found to be suitable and a pair of Yellow-billed Cuckoos were detected in this drainage, the only wYBCUs found in the entire Santa Catalina Mountain range during this study.

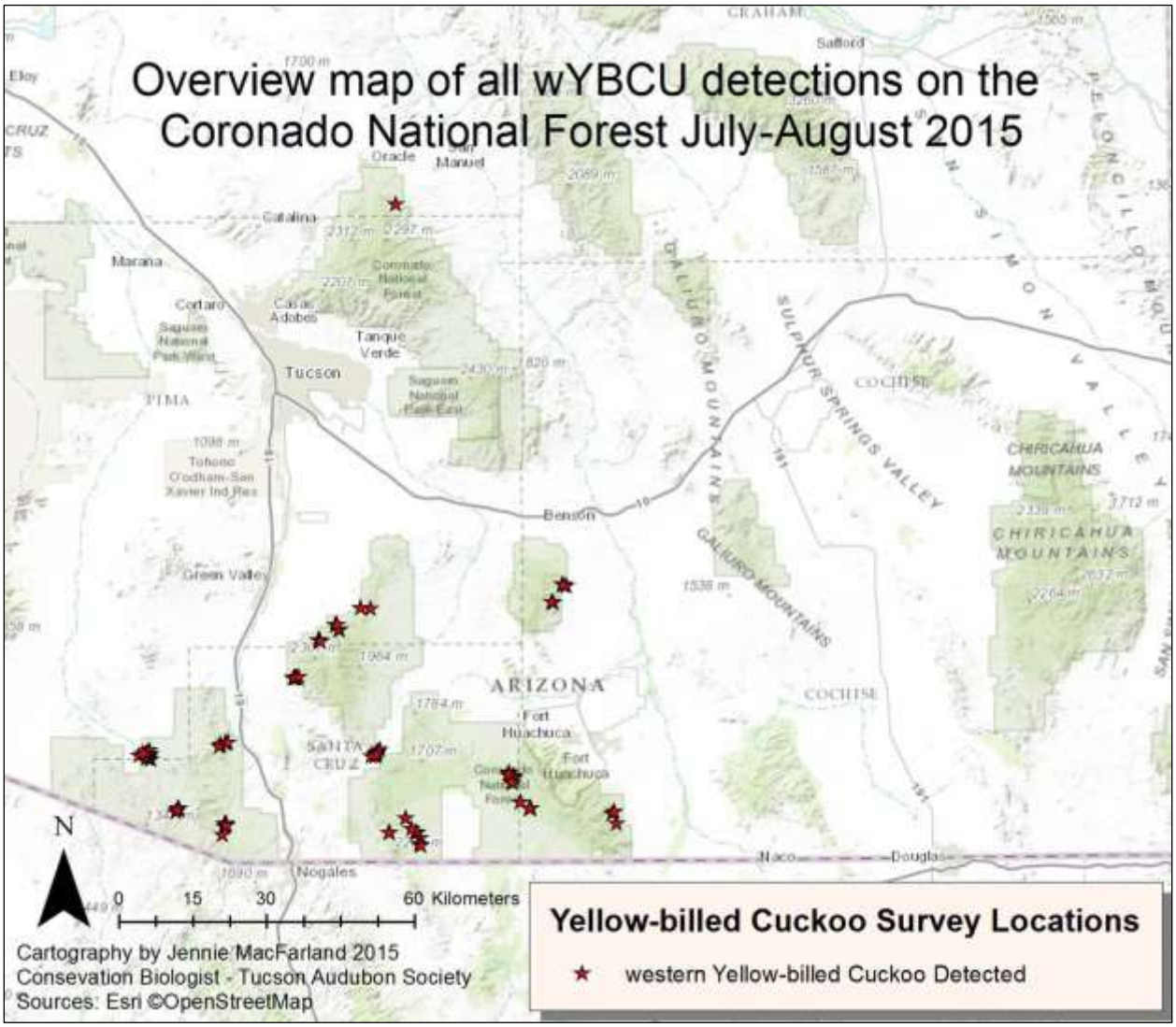
Chiricahua Mountains: South Fork of Cave Creek, Cave Creek at Stewart Campground, Cave Creek at SW Research Station, Lower Cave Creek were all surveyed four times.

Huachuca Mountains: Carr Canyon, Hunter Canton, Miller Canyon and Ramsey Canyon were all surveyed four times.

Patagonia Mountains: Endless Chain Canyon, Finley and Adams Canyon, Flying R Ranch and Paymaster Creek were all surveyed four times. Washington Gulch was surveyed three times and Sycamore Canyon was surveyed twice. The fewer surveys on these two locations was due to logistics issues on survey days.

Santa Rita Mountains: Box Canyon, Florida Canyon, Montosa Canyon and Proctor Road were all surveyed four times. Madera Canyon and Carrie Nation trail were surveyed once and found unsuitable for breeding wYBCU so were not surveyed again due to logistics issues.

Whetstone Mountains: French Joe Canyon and Guindani Canyon were surveyed four times. Dry Canyon, Middle Canyon and Mine Canyon were surveyed once and not repeated as they were found to be totally unsuitable as breeding habitat for wYBCU. A team attempted to survey Cottonwood Canyon and was unable to reach the canyon due to roads being blocked.



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Introduction

The range of the western distinct population segment of the Yellow-billed Cuckoo (wYBCU) has been greatly reduced due to habitat loss. Over the last century the population has decreased, from an estimated 15,000 pairs in California to about 40 pairs, representing about 0.3 percent of their previous numbers. In Arizona, populations have declined up to 80% in the last 30 years with an estimated current population of between 170 - 250 pairs as of 2015 which represents the highest concentration in the US. Arizona is thus an important stronghold in the US for the western Yellow-billed Cuckoo[3]. In 1999, surveys found only 172 pairs and 81 single birds within Arizona.

The western distinct population segment of the Yellow-billed cuckoo was officially listed as threatened under the Endangered Species Act in October, 2014, and the proposed Critical Habitat is currently under revision. In the American West, cuckoos have historically been considered tightly associated with riparian gallery forests with wide woodland belts[4]. This habitat type has suffered devastating reductions in its extent, with only approximately 5% remaining. The proposed Critical Habitat lists the following physical and biological elements as essential to the wYBCU: wide floodplain conditions greater than 100 m wide; large tracts of cottonwood-willow forest or mesquite woodland; and habitat patches greater than 81 hectares to be optimal. Very little habitat that meets this description remains in Arizona. Habitat loss and modification are primary drivers that have resulted in the listing of this species as threatened under the Endangered Species Act.

In the Southwest, especially in Arizona, cottonwoods (*Populus* spp.) and various species of willows (*Salix spp.*) provide the predominant over-story adjacent to the waterways that form green riparian corridors. Riparian corridors are often bordered by belts of dense mesquite trees (*Prosopis* spp.), which then merge into xeric uplands or grasslands as the distance from the riparian area increases.

In public comments to the U.S. Fish and Wildlife Service (USFWS) regarding the wYBCU proposed Critical Habitat designation, Tucson Audubon suggested that certain drainages in the Madrean pine-oak zone of the sky island mountain ranges of southeastern Arizona should be further evaluated for inclusion as critical habitat based on observations and photo documentation of an active wYBCU nest located in an oak tree in Montosa Canyon in the Santa Rita Mountains. This observation was made during the 2014 Tucson Bird and Wildlife Festival.

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[3]Western Yellow-billed Cuckoo population estimates are from Cornell Lab of Ornithology's Birds of North America Online

[4] Hughes, Janice M. 2015. Yellow-billed Cuckoo (Coccyzus americanus), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/418

Subsequently, the Coronado National Forest contracted cuckoo surveys in 40 Madrean pine-oak drainages—five drainages in each of the following eight Sky Island ranges: the Huachuca, Chiricahua, Whetstone, Santa Catalina, Santa Rita, and Patagonia Mountains, the Atascosa Highlands, and the Canelo Hills—in order to determine where additional breeding territories might exist on lands managed by the Coronado.

Mid-elevation drainages on the Coronado National Forest are usually dominated by oaks (*Quercus* spp.), with occasional mesquites on the fringes. The drainages often merge into surrounding vegetation of junipers (*Juniperus* spp.). In the wettest reaches of the drainages, the oaks are interspersed with Arizona sycamore (*Platanus wrightii*), netleaf hackberry (*Celtis reticulata*), willows, occasionally cottonwoods, and a few other infrequently occurring species such as Arizona ash and Arizona walnut.

Western Yellow-billed Cuckoos were recorded by surveyors, occasionally with accompanying photographs, in these higher elevation drainages. In addition to point count surveys, vegetation surveys were conducted. Analysis of the vegetation surveys, which were conducted in addition to what is required as part of the callback survey protocol, document habitat components that may be helpful in revising the proposed Critical Habitat for wYBCU. Both the callback and vegetation surveys lead to few definitive answers and many questions for future studies. However, in conjunction with upcoming survey reports on wYBCU population numbers found during the breeding season in more typical habitats, a clearer picture of the value of the Madrean oak drainages in the sky islands should emerge.

Methods for Yellow-billed Cuckoo Call-back Surveys[5]

The methods employed for the surveys we conducted are as follows:

> Begin surveys as soon as there is enough light to safely walk (just before sunrise) and continue, depending on the temperature, wind, rain, background noise, and other environmental factors, until 1100. Surveys should not be conducted after temperatures reach 40 degrees C (104 F). If the detectability of cuckoos is being reduced by environmental factors (e.g. excessive heat, cold, wind, or noise), surveys planned for that day should be postponed until conditions improve.
>
> Within a study area all potentially suitable habitat patches should be surveyed. A patch is defined as an area of riparian habitat 5 ha or greater in extent that is separated by at least 300 m from an adjacent

[5] This Yellow-billed Cuckoo call-back survey protocol is directly quoted from the official protocol provided by the USFWS (*Halterman, M.D., M.J. Johnson, J.A. Holmes and 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.)* and we strictly followed this protocol as a requirement of our Federal Permit to survey for this Threatened bird.

patch of apparently suitable cuckoo habitat. The 5 ha is considered a typical minimum size for cuckoo occupancy, as no cuckoos have been detected attempting to nest in patches this size or smaller in Arizona or California (Halterman et al. 2001, Johnson et al. 2010). Suitable habitat falls into two types: 1. multi-layered riparian vegetation, with riparian canopy trees (at least a few within the patch) and at least one layer of understory vegetation; 2. mesquite and/or hackberry bosque, primarily in southeastern Arizona or when adjacent to habitat 1 above. Suitable breeding habitat often includes dense young riparian cottonwood/willow vegetation (Halterman 1991, Greco et al. 2002, McNeil et al. 2013).

Surveys can be conducted from the edge (within 10 m) when a patch is less than 200 m in width, provided the entire perimeter is surveyed. It is critical to survey all suitable habitat within an area. Small, linear patches may be thoroughly covered by a single transect along the perimeter. For larger sites, when suitable habitat exceeds 200 m in width, use a systematic survey path that assures complete patch coverage throughout the length and width of the site. Area with multiple, adjacent transects should be surveyed concurrently and in coordination (via text message or radio contact). This will help minimize duplicate detection of the same cuckoo, potentially on different transects/sites, and enable a more accurate territory estimation. The surveyor can skip over areas of unsuitable habitat (e.g. an extensive cobble bar) between patches, if the unsuitable habitat is at least 300 m in extent. Areas with small, narrow stringers of habitat, steep banks, and backwater sloughs can be surveyed by playback from a boat. It is the surveyor's responsibility to ensure all suitable habitat within the site is thoroughly surveyed.
The broadcast consists of five contact/kowlp calls, each spaced one minute apart. For consistency and comparability of the data, use only the call provided during the protocol training workshop (or from the authors). The recording should be played at approximately 70db. The standard survey forms are shown in Appendix 2. Negative data is important, so complete the datasheet for all surveys conducted, regardless of detections. There are other forms which may be better suited to specific research needs. For those forms, it is best to contact specific researchers directly.

Arrive at the broadcast-point and wait at least one minute to listen for unsolicited cuckoo calls (i.e. cuckoos that may be calling before broadcast of the calls). Listen carefully for cuckoos, recognize and shift your attention from other bird species songs and calls, and focus on listening for cuckoos. The majority of responses occur after the first or second broadcast call, so surveyors need to be alert and prepared before beginning playback

If you do not hear any cuckoos during the initial listening period, begin the first broadcast. Listen and watch intently for responding cuckoos during and after each of the five broadcast calls. This includes watching for movement as silent birds may move closer to investigate. If no cuckoo is detected at the broadcast-point after five broadcast calls, continue 100 m along the transect and start a new broadcast as described above. Use additional datasheets, (Appendix 2: Continued Survey Data Form) for additional broadcast-points within the transect. Use the back of each datasheet to record observations and comments, linking the data by recording the "note #" in the right column of the survey data table on the front of the datasheet, and on the back of the datasheet along with the corresponding observations and comments.

Response to the broadcast call could take several forms. One or more Yellow-billed Cuckoos may move quietly (without calling) toward the surveyor, so it is critical to watch carefully for responding birds from any direction, including behind you. Cuckoos that fly silently toward the survey are difficult to detect and necessitate the full attention of the surveyor. In between broadcast calls, surveyors should be listening for

cuckoos, and not be filling out the datasheet. Cuckoos may respond by calling from a distance, so listen for these responses. Cuckoos typically respond with the contact/kowlp call, but may also respond with a coo call or, rarely, an alarm call. When a cuckoo is detected, terminate the broadcast, as it may divert the bird from normal breeding activity or attract the attention of predators. Concentrate on observing the bird rather than immediately recording data. Several hundred cuckoos have been banded in the western United States over the last decade; carefully check cuckoos for leg bands, and carefully record the band color, combination and order. Record all data for the detection(s), including the compass bearing and estimated distance from the observer to the detected cuckoo(s).

After a cuckoo has been detected and appropriate data collected, move 300 m further along the transect before resuming the survey. This will minimize the likelihood of detecting the same cuckoo (Halterman 2009, McNeil et al 2013). While it is unusual for cuckoos to move 300 m after being detected by a surveyor, the surveyor should be aware of the possibility, attempt to track an individual's movements, and use their judgment to estimate if subsequent detections are separate individuals or the same individual. Please make note of all observations about individual movements and the reasoning used in determining number of individuals on the back of the data sheet.

When a cuckoo is encountered between broadcast points (i.e. an unsolicited detection is made while traveling to, from, or between broadcast points), stop and record all information in the same manner as if the detection was made during a broadcast. Do not broadcast calls. After making observations and recording information regarding the detection(s), move 300 m from the point where the detection was made, along the transect. Continue with the procedures for conducting a survey broadcast.

Timing of Surveys

Survey Period 1: June 15 to June 30. One survey is required. This survey occurs as migrating birds are passing through, and breeding birds arrive. Although many birds detected during this time may be migrants, surveys during this time will help with seasonal survey detection interpretation, and will also allow surveyors to familiarize themselves with all survey areas.

Survey Period 2: July 1 (+ or – 3 days) to July 31 (+ or – 3 days). Two surveys are required during this period. Cuckoos encountered during this time are mostly breeders, though migrants, wandering individuals, and young of the year may be encountered. This is the period when breeding activity is most likely to be observed (e.g. copulation, food carries, alarm calls). Extra time should be taken to cautiously observe all cuckoos encountered during this time, while avoiding disrupting potentially breeding birds.

Survey Period 3: August 1 to August 15. One survey is required, and most breeding birds are finishing breeding activities and departing. Cuckoos are typically much less vocal and responsive during this time than during Survey Period 2.

Post-breeding Period: August 16 through September. Cuckoos in the southwest may initiate nesting, build second or third nests, or provide care for fledglings in this period (Halterman 2009; McNeil et al. 2013). This is particularly true in southeastern Arizona where local conditions often allow for a lengthier breeding season. Surveys during this time will help clarify cuckoo use of the site, and length of time on the site. Birds encountered during this period may also be migrants. Cuckoos are less vocal during this time than during Survey Period 2.

> The best way to confirm breeding status of cuckoos detected at a site is to do follow-up visits and observe cuckoo behavior at a distance. Careful notes should be taken during these visits. Playback calls should not be used during follow up visits, and great care must be taken in order to avoid disturbing nesting birds.

Due to the timing of the required wYBCU survey training hosted by AzG&F (Jun 25-26), surveys were not able to be completed during survey period 1 for any locations. A few drainages proved to be of such inappropriate habitat when viewed on the ground, and had no wYBCU found in the initial visit, that additional surveys were not performed in order to survey additional drainages that might have better habitat. The following drainages were discontinued as inappropriate: Sunnyside/Scotia (surveyed twice), Butterfly Trail, Bear Canyon at General Hitchcock, Gordon Hirabayashi to Sycamore Reservoir, Ventana Canyon, Dry Canyon, Mine Canyon and Middle Canyon. The following drainages were added as replacements for the discontinued drainages and so also do not have the full complement of survey periods: Molino Basin, Peppersauce Canyon, Tanque Verde Canyon, Canyon del Oro, and Pima Canyon.

Survey Results Discussion

The Atascosa Highlands, the furthest west of the ranges surveyed, was the area where the most wYBCU were recorded. The remoteness and difficulty of access presented some logistical challenges worth noting for future surveys. Rock Corral Canyon had two occupied territories where surveyors watched a cuckoo foraging in the ocotillos that line the canyon walls, very atypical behavior. The famed Sycamore Canyon had two breeding territories and one occupied territory. During one survey in Sycamore Canyon, an entire family of Elegant Trogons, both parents and two full-sized fledglings, flew in towards surveyors in response to a wYBCU playback call. A wYBCU was recorded once at the entrance to Peña Blanca Canyon. Surveyors also discovered Rufous-capped Warblers in this canyon, an exceptionally unusual siting that led many recreational birders to visit the canyon in ensuing weeks, none of which reported any wYBCU observations. Peña Blanca Lake had at least two breeding territories, one of which contained the only nest found during this study, and the other was documented twice by canoe used at this location access the more remote side of the lake. At Arivaca Lake, survey teams found three breeding territories and four occupied territories. There may be more territories in some of the lush canyons draining into the lake. However, these canyons were abandoned early in the survey window without full exploration after the survey crew encountered drug smugglers.

The Canelo Hills, the foothill region between the Huachuca and Patagonia Mountains, was exceptionally green and lush during the summer of 2015. Cuckoos were documented in four out of the five survey routes in the Canelo Hills. Three drainages supported multiple territories. Many surveyors here also reported Elegant Trogons responding, sometimes stridently, to the broadcasted wYBCU call. Interestingly, Elegant Trogons had never been reported to eBird, a

popular user-generated content website used for citizen science projects and hosted by the Cornell Lab of Ornithology, from the Canelo Hills and every survey we conducted there encountered them. In Collins Canyon, located north of Parker Canyon Lake, one breeding territory was found with a confirmed pair exhibiting breeding behavior. Lyle and Korn Canyons were both surveyed, and it appears that some wYBCU were utilizing both canyons. Between these two canyons, three breeding territories and one occupied territory were documented. One occupied territory was documented in Merritt Canyon, which is a broad oak and juniper lined drainage. The habitat in the Canelo Hills was nearly devoid of mesquite trees which is interesting to note for evaluating the needs of nesting wYBCU.

The Santa Catalina Mountains are the closest range to Tucson and maintain a reputation for lush canyons (e.g., Sabino and Ventana Canyons). Surveys were conducted in Sabino Canyon, Tanque Verde Canyon, Pima Canyon, and Ventana Canyon in the foothills. Higher elevation surveys covered Molino Creek, Bear Canyon, the Butterfly Trail, and Sycamore Reservoir. Although surveyor expectations were high for finding wYBCU in the Santa Catalina Mountains, none were found on the southern or western aspects of this mountain range, none of these survey routes recorded wYBCU. Surveyors even covered the remote Canyon del Oro without finding wYBCU. The only detection of wYBCU in the Santa Catalina Mountains was in Peppersauce Canyon (at Peppersauce Campground) on the north end of the range, where a wYBCU pair was documented.

The Chiricahua Mountains have the highest avian diversity of any range in southeastern Arizona. All surveys were performed on the eastern side of the Chiricahuas. The expectation that wYBCU would be present here in abundance was not realized and no individuals were recorded within the Coronado National Forest lands of this mountain range. At least one territory has been documented by surveyors outside the Coronado in the town of Portal, but was outside the official survey effort.

Surveys conducted in the Huachuca Mountains documented two occupied territories and wYBCU were detected twice in Miller Canyon. Surveys in Hunter Canyon resulted in one wYBCU detection. In Ramsey and Carr Canyons no wYBCU were recorded. These four canyons are all located on the eastern side of the Huachuca Mountains. Sunnyside and Scotia Canyons, located on the west side of the Huachucas, were surveyed as part of the Canelo Hills surveys and no wYBCU were detected.

The Patagonia Mountains also proved to contain suitable habitat, as wYBCU were recorded in four out of the five drainages surveyed. In Finley and Adams Canyons, three occupied territories were documented. Paymaster Creek at Flying R Ranch was found to have one occupied territory, where wYBCU were detected in both July surveys, but not during the two August surveys. In Washington Gulch one occupied territory was found. In Sycamore Canyon both an

occupied territory and a breeding territory were documented. The pair was observed displaying breeding behavior, including observations of food carrying and copulation.

Surveys conducted in the Santa Rita Mountains recorded many more wYBCU. Four separate breeding territories exist in Montosa Canyon, located on the southwestern slope of this mountain range. Both copulation and food carrying were breeding behaviors observed in this canyon. One occupied territory was recorded in Proctor Creek, two occupied territories in Florida Canyon, and two territories in Box Canyon. One territory in Box Canyon had a nesting pair where surveyors observed the pair carrying food, presumably into an unseen nest.

The driest of the sky island ranges surveyed, the Whetstones, contained at least two wYBCU territories. One was found in French Joe Canyon and the other in Guindani Canyon, which is accessed from Kartchner Caverns State Park.

Habitat Characteristics and Vegetation Survey Analysis

Summary

The vegetation and habitat quantification surveys reveal no statistically significant trends that would allow for strong inferences regarding habitat selection and utilization as breeding or occupied territories, as compared to portions of the mid-elevation drainages where detections did not occur. The strongest trends point to a preference for wider, portions of drainages with less steeply sloped walls (as opposed to the steeper narrower portions of the canyons), and the prevalence of mesquite trees, usually in the form of a belt just outside the riparian strip. While drainages identified for survey were jointly determined between Coronado and Tucson Audubon, many had not been previously visited by anyone involved and not all survey locations included the Madrean-oak woodland community that was the primary target habitat type for the study. Vegetation and Habitat Characteristics surveys were not performed in those canyons which did not contain this target vegetative community nor wYBCU in the initial survey and for which surveys were discontinued as outlined above.

Methodology

The vegetation and habitat characteristics survey protocol is attached as Appendix 1. As the habitat preferences of the wYBCU Distinct Population Segment are not well understood, especially in the Madrean Oak drainages, surveys attempted to quantify an exceptionally broad range of criteria at a coarse granularity so that components that might be impacting territory selection would not be missed. A gross assessment also makes statistical significance of the results unlikely.

Habitat assessment points were created for each area that was repeatedly surveyed. We completed vegetation surveys in each drainage or lake with a known occupied territory, as established by the call-back surveys. In an effort to decrease observer bias, surveyors were not informed as to whether points at which vegetation surveys were completed were points where wYBCU had been recorded.

The habitat assessment included a range of biological (vegetation) and geographic components. The biological assessment quantified the following:

Canopy/Over-story: Composition, density, and height of the canopy cover for the six most prevalent species in a 100 meter radius from the survey point.

Mid-story: Mid-story was defined as the suite of vegetation from taller than 1m but shorter than 3m within a 100m radius of the survey point. Quantifications were qualitative and designated as: none, slight, moderate, and dense. Because some sites had vast variation in vegetation, usually driven by the adjacency of canyon walls, mid-story was assessed in quadrants relative to the flow of the drainage. Breaking the assessment into quadrants allowed for a more nuanced analysis that might have otherwise been skewed by the presence of a steep canyon wall or a more linear territory. The three most prevalent species were recorded for the area.

Under-story: The under-story was assessed in a radius of 50m. The total percent of cover was recorded, as well the percentage contribution to that overall amount for each of the following vegetation guilds: sod-like grasses, bunch grasses, tall grasses, agave/cactus/succulent, forbes/wildflowers, and perennial/woody-stemmed subshrubs. The three most common under-story species were also recorded where possible.

Invasive/non-native plants: The presence or absence of known non-native species were recorded and identified at each site.

Width of the green belt: The total width of the denser riparian vegetation (including meso- and xero- riparian) was recorded. In most cases the transition from riparian to upland vegetation was distinctly observable. Remote sensing and satellite imagery could allow more precise measurements for increased analysis.

The geologic assessment quantified the following:

Canyon Walls/cliffs: Surveyors denoted whether there were canyon walls or cliffs at the survey point designated as: no sides, one side, or both sides.

Canyon width: An estimate of the canyon-bottom width was recorded within the following size classes: 15-50m, 50-100m, 100-300m, >300m. Future analysis could

provide precise measurements from remote sensing or satellite imagery and allow for more detailed analysis.

Canyon wall height and angle: the height and estimated angle of the canyon sides were recorded.

Additionally, on a drainage-wide scale, vegetation and geo-physical information were recorded, as required by USFWS as part of the standard wYBCU callback survey protocol.

Tucson Audubon also voluntarily attempted to record prey-base information. As that component was out-of-scope for the project, it is not reported here but mentioned to explain its presence on the datasheet and protocol.

Results and Discussion

Vegetation and habitat assessment surveys were conducted at 136 points, 61 of which were locations where wYBCU were documented (17 with pairs or nesting behavior detected), and 75 locations where wYBCU were not detected. The first level of analysis compares characteristics of survey points where wYBCU were found with points where they were not found. None of the results are statistically significant due to the large variability between sites. However, some hints at patterns emerge, including some that seem counter-intuitive.

Some generalized characteristics for the entire surveyed area are that oaks were the predominant over-story species recorded (overall average 40.2%), followed by juniper (17.7%) and mesquite (13.4%). The most frequent riparian over-story species were sycamore (5.6%) followed by canyon hackberry (2.8%) and willow (2.4%). The average height of the most prevalent over-story tree species at each point recorded was 6.1m.

Table 1 summarizes some of the more noteworthy vegetative and geophysical differences between occupied territories and unoccupied sites. For canyon width and wall heights and angles, sites at Peña Blanca and Arivaca Lakes have been excluded due to lack of canyon presence at the survey sites. Numbers reported are the mean followed by one standard deviation (SD).

Table 1.

Characteristic	Occupied Territory	Unoccupied
Total Canopy Cover %	52.4(SD=17.5)	56.3(SD=20.2)
Oak % Canopy Cover	35.0(SD=23.7)	44.4(SD=22.6)
Mesquite % Canopy Cover	19.5(SD=26.3)	8.4(SD=16.8)
Mesquite + Oak % Canopy Cover	54.5(SD=23.9)	52.8(SD=22.2)
Juniper % Canopy Cover	15.8(SD=21.0)	19.3(SD=17.1)
Sycamore % Canopy Cover	2.8(SD=5.8)	7.9(SD=12.3)
Hackberry	5.1(SD=8.3)	0.9(SD=3.3)
Understory % Cover: Total	73.8 (SD=16.2)	68.8(SD=18.3)
Understory % Cover: Sod-like grass	1.6(SD=7.3)	0.8(SD=3.5)
Understory % Cover: Bunch grasses	43.1(SD=20.9)	35.6(SD=21.3)
Understory % Cover: Agave / Cactus	2.6(SD=3.5)	4.6(SD=6.5)
Canyon Width Class	3.3	2.9
Canyon Wall Height (m)	54.9	83.3
Canyon Wall Angle (degrees)	29.6	45.5

Occupied territories tended to have a higher percentage of mesquites in the community composition, while unoccupied survey points had a higher percentage of junipers. This suggests that the land surrounding the riparian corridor is contributing to wYBCU presence in an undetermined way. Occupied sites tended to have fewer sycamores, which could be potentially explained by two differing readily apparent hypotheses: 1) an elevation component to the distribution or 2) to a link to a habitat preference by Elegant Trogons (the relationship between wYBCU and Elegant Trogons is addressed in the next section). Though hackberries were overall a minor component of the over-story composition, on average there was a distinct increase of hackberry prevalence in occupied territories.

Positive wYBCU detections ranged in elevation from 3564 ft. in Rock Corral Canyon in the Atascosa Highlands to 5480 ft. in Merritt Canyon in the Canelo Hills, the highest elevation detected in the study. Of the 120 total wYBCU detections in this study, 36 occurred between 3564 and 4000 ft., 50 occurred between 4000 - 5000 ft., and 34 occurred between 5000 and 5480 ft.

Occupied territories on average had very slightly increased levels of under-story cover with the greatest differences being that occupied territories had more sod-like and bunch grasses, while unoccupied sites had more agaves and cactus. This relationship points to a possible link between cuckoo habitat selection and overall moisture levels in the drainage and surrounding slopes.

While the average canyon width class averages are numerically close, they represent differences of a much larger scale than the numerical difference, with many more occupied sites being in the largest class (broader than 300m) in occupied (36%) than unoccupied (29%). This would benefit from re-analysis with actual canyon widths determined by interpretation of satellite imagery. Canyon wall height and angle were also much lower in occupied sites.

There were no discernible differences for height of the primary tree species or normalized mid-story plant density when viewed across all quadrants, nor in the under-story categories of tall grasses, forbes/wildflowers, or woody stemmed/perennial plants. Further analysis should re-assess mid-story density, which should be normalized by removing any quadrants whose data are invalidated or skewed by the presence of steep canyon or cliff walls. Counter-intuitively, the width of the green belt astride the surveyed drainages was not significantly different between occupied and unoccupied sites (average of 107.3m and 103.7m, respectively)

Another interesting finding, first reported anecdotally by surveyors and congruent with YBCU habits in the eastern US, is their affinity for low-cropped grassy areas that reflect current or historic human habitation. In Arizona, most yards and horse grazing areas are comprised of Bermuda grass (*Cynodon dactylon*). Of occupied territories, 11% had Bermuda grass, while only 4% of unoccupied sites did. This could also reflect relative drainage moisture, as Bermuda grass is an aggressive invasive species in areas of higher moisture levels.

We conducted a second set of analyses in order to tease out any differences between sites where pairs or nesting behavior was documented. Table 2 summarizes the more noteworthy vegetative and geophysical differences between territories occupied by pairs as compared with single-bird occupied territories and unoccupied sites. Major differences from Table 1, or where there was previously no difference between occupied and unoccupied territories but a difference shows up with analysis of pair territories are denoted with italics. Categories that showed the same pattern at the same magnitude have been deleted. For canyon width and wall heights and angles, sites at Peña Blanca and Arivaca Lakes have been excluded due to lack of canyon presence at the survey sites.

Table 2.

Characteristic	Pair territory	Occupied Territory	Unoccupied
Total Canopy Cover %	57.5(SD=19.0)	51.1(SD=18.2)	56.3 (SD=20.2)
Oak % Canopy Cover	31.1(SD=19.5)	36.5(SD=25.0)	44.4(SD=22.6)
Mesquite % Canopy Cover	17.1(SD=22.6)	20.4(SD=27.5)	8.4(SD=16.8)
Mesquite + Oak % Canopy Cover	48.1(SD=24.7	56.9(SD=23.0)	52.8(SD=22.2)
Juniper % Canopy Cover	*9.4(SD=19.4)*	*18.3(SD=21.0)*	*19.3(SD=17.1)*
Cottonwood % Canopy Cover	4.4(SD=8.7)	0.8(SD=2.6)	0.4(SD=1.4)

Sycamore % Canopy Cover	3.1(SD=5.9)	2.6(SD=5.7)	7.9(SD=12.3)
Hackberry	5.0(SD=6.9)	5.1(SD=8.8)	0.9(SD=3.3)
Riparian Obligate % Canopy Cover	*22.6(SD=18.4)*	*10.9(SD=10.5)*	*11.1(SD=13.6)*
Dry Affinity species % Canopy Cover	*9.6(SD=20.1)*	*19.4(SD=22.5)*	*21.8(SD=19.8)*
Understory % Cover: Sod-like grass	*5.6(SD=15.7)*	*0.8(SD=3.6)*	*0.8(SD=3.5)*
Understory % Cover: Bunch grasses	*34.0(SD=16.7)*	*45.6(SD=21.2)*	*35.6(SD=21.3)*
Understory % Cover: Agave / Cactus	*1.7(SD=2.4)*	*2.8(SD=3.8)*	*4.6(SD=6.5)*
Canyon Width Class	3.5	3.1	2.9
Canyon Wall Height (m)	58.8	53.2	83.3
Canyon Wall Angle (degrees)	29.2	29.8	45.5

Only a few changes in over-story composition occur when analyzing a three-way comparison of pair territories vs territories occupied by a single bird vs unoccupied. The prevalence of juniper in pair territories decreases quite significantly. Pair territories also had appreciably more cottonwoods which was not apparent from the occupied/unoccupied analysis. The greatest difference is in the percent cover of riparian obligate species, indicating that pairs selected distinctly wetter drainages, especially when considered in conjunction with the percent canopy cover of a few dry affinity species. While difficult to accurately quantify because the observations were qualitative, the mid-story density was also highest in pair territories.

Pair territories on average had slightly lower levels of under-story cover (equal to unoccupied territories); while singly occupied territories had greater under-story cover. Nearly all the prevalence shown above for sod-like grasses in occupied territories specifically occurred within pair occupied territories, while singly and unoccupied sites were equal.

The difference in average canyon width class increases when isolating the pair territories. This is highlighted by the percent of sites in the largest class (broader than 300m). 59% of pair territories were located in the widest class (not including the lake points which were not considered to be in drainages), while 27% of occupied territories and 29% of unoccupied territories were in the largest width class. Again, re-analysis with actual canyon-bottom widths determined by interpretation of satellite imagery could provide further insights. Wall height and angle did not noticeably change.

These analyses only include canyons that contained the appropriate Madrean-oak woodland community. Results including vegetation and geophysical characteristics of the subset of canyons initially chosen and then abandoned in favor of additional areas with the appropriate vegetation community would have artificially skewed results.

Elegant Trogons As Competitors?

Male Elegant Trogon by Bruce Taubert

An interesting phenomenon occasionally occurred during the surveys and was first recorded by surveyors in the Patagonia Mountains. Sometimes, during the playback series of the official survey protocol, an Elegant Trogon would appear. In one instance a pair of Elegant Trogons flew in to the call and the male trogon swooped at the surveyor holding the playback speaker. The recurrence of this trogon response to the wYBCU call certainly hints at the possibility that Elegant Trogons and wYBCU are direct competitors in these higher elevations.

In the Atascosa Highlands Elegant Trogons were detected in Peña Blanca Canyon and in Sycamore Canyon. In Peña Blanca Canyon a wYBCU was detected on 07/23/2015 on the north end of the canyon and wYBCU were not detected on either of the two surveys in August. Elegant Trogons were detected on all four surveys of this canyon. In Sycamore Canyon two territories of wYBCU were documented on the north end of the canyon, a portion of the canyon where Elegant Trogons were not recorded on all four surveys. In these two territories, wYBCU were recorded throughout July and August. The third wYBCU territory documented in Sycamore Canyon was over a kilometer south of the other wYBCU territories and no cuckoos were recorded in this territory after July 23, 2015. During the August 20, 2015 survey of Sycamore Canyon, the southern territory was surveyed and during the call-back portion of the survey a family of Elegant Trogons flew to the site and looked right at the surveyors and appeared to be attempting to locate the source of the wYBCU call emanating from the speaker.

Female Elegant Trogon by Bob Wenrick

Elegant Trogons were detected on all five areas surveyed in the Canelo Hills – an indication of high quality habitat for this species. The one breeding territory of wYBCU found in Collins Canyon was located nearly a kilometer north of the site where a female Elegant Trogon responded during a call-back survey on two separate survey dates by flying in to the surveyors during the recorded playback period. In Korn Canyon, Elegant Trogons were observed in the

southern reach of the survey route and all wYBCU detections in this canyon were at least half a kilometer north of this area.

Male Elegant Trogon with insect by Nancy Rivera in the Patagonia Mountains during a 2015 wYBCU survey

The Patagonia Mountains were shown to be an excellent mountain range for Elegant Trogons during 2013-2015 Elegant Trogon census surveys by Tucson Audubon. Elegant Trogons were detected on all five routes during this 2015 wYBCU study. Endless Chain Canyon is the only route that had no wYBCU detections. Elegant Trogons were detected in this area on all four surveys and were observed "appearing" right before surveyors after they played the call of the wYBCU. In Finley and Adams Canyon, Elegant Trogons were detected on every survey and in one case "dive bombed" the surveyor playing the wYBCU call during a point count. In this canyon wYBCUs were documented during both July surveys and none were recorded during both August surveys. This could be an indication that competitive pressure from Elegant Trogons caused the wYBCU to abandon the canyon and set up breeding territories in another drainage not covered in this study. Paymaster Creek at Flying R Ranch is another interesting case where a wYBCU was detected in the same location on both July surveys, but not on either August survey. Elegant Trogons were detected during all four surveys at Flying R Ranch along Paymaster Creek. During the first survey in August an Elegant Trogon was observed at almost the exact same location where wYBCU were detected in July.

Male Elegant Trogon by Laurens Halsey in Corral Canyon in the Patagonia Mountains during 2014 ELTR survey.

This study was not designed with the intention of studying interspecies competition between Elegant Trogons and Yellow-billed Cuckoos. The information presented here was gathered as supplemental information during surveys. The aggressive behavior exhibited by Elegant Trogons in response to wYBCU playback calls as described above was so striking that most teams documented locations and specific behaviors when these behaviors were observed. In the United States the Sly Islands of southeastern Arizona are the only areas of habitat overlap for these two species. Habitat and territory selection, as well as interspecies competition between Elegant Trogon and wYBCU are deserving of further study.

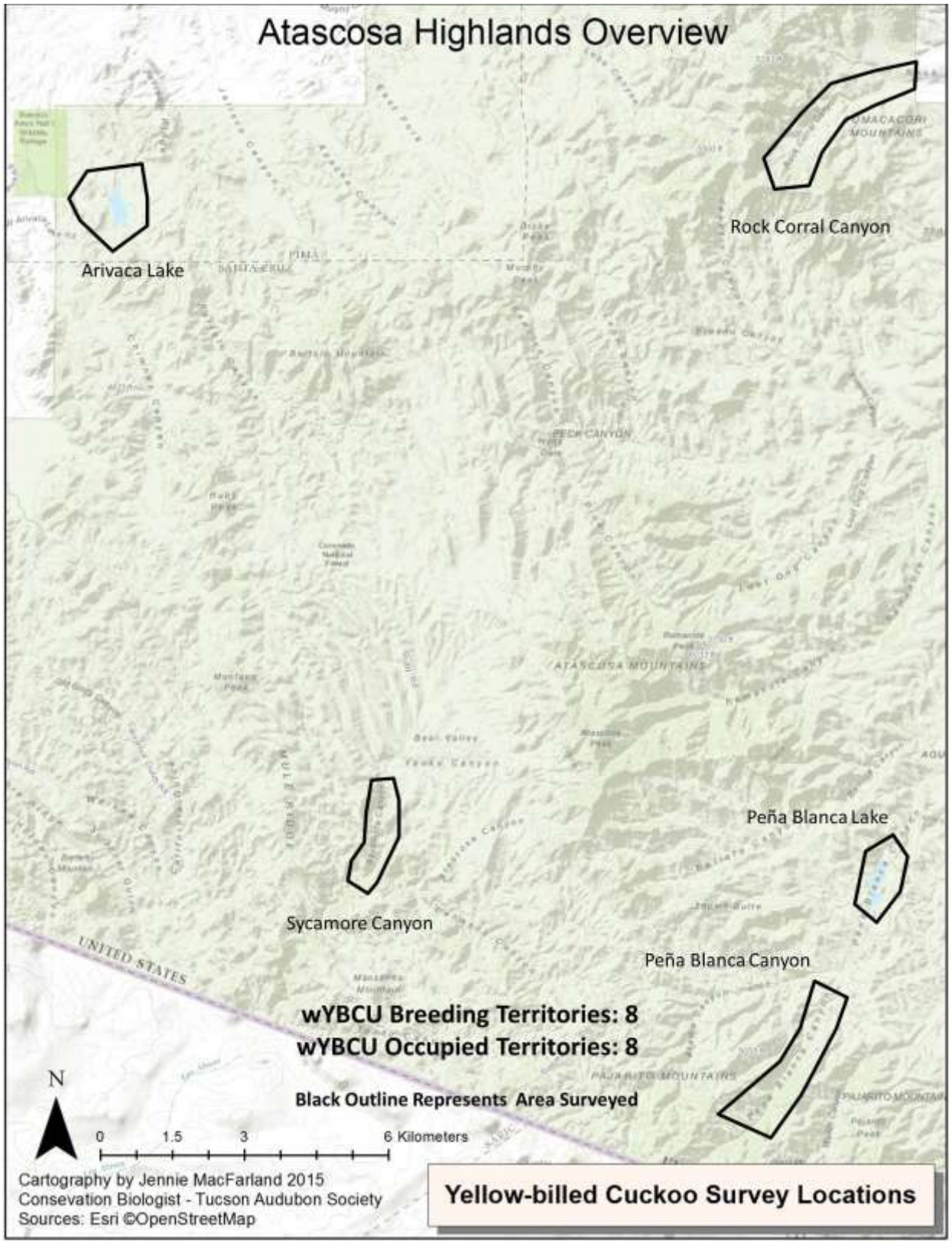
Atascosa Highlands

Total Breeding Territories: 8 Total Occupied Territories: 8

What we are calling the Atascosa Highlands is actually a group of three small mountain ranges: The Tumacacori Mountains, the Atascosa Mountains and the Pajarito Mountains. This area is commonly known as the Atascosa Highlands to many Arizona birders and we are using that language here as well.

This is a lower elevation “sky island” that is known for its abundance of rare “border birds” that are highly sought after by birders. The famed California Gulch with its seasonal Buff-collared Nightjars and Five-striped Sparrows has made this region a top destination for birders for decades. For this study we surveyed areas other than the well-known birding hot spots and visited canyons that birders rarely explore. We also did survey some better known sights such as Sycamore Canyon, a hiking destination and Peña Blanca Lake which does turn up rarities periodically.

Overall the Atascosa Mountains proved to be excellent for Yellow-billed Cuckoos and they were found in all five survey areas with Arivaca Lake being a stand-out location for the entire study with three breeding territories and four occupied territories.


Atascosa Highlands Overview
Arivaca Lake
Rock Corral Canyon
Sycamore Canyon
Peña Blanca Lake
Peña Blanca Canyon
UNITED STATES
wYBCU Breeding Territories: 8
wYBCU Occupied Territories: 8
Black Outline Represents Area Surveyed
N
0 1.5 3 6 Kilometers
Cartography by Jennie MacFarland 2015
Consevation Biologist - Tucson Audubon Society
Sources: Esri ©OpenStreetMap
Yellow-billed Cuckoo Survey Locations

Arivaca Lake

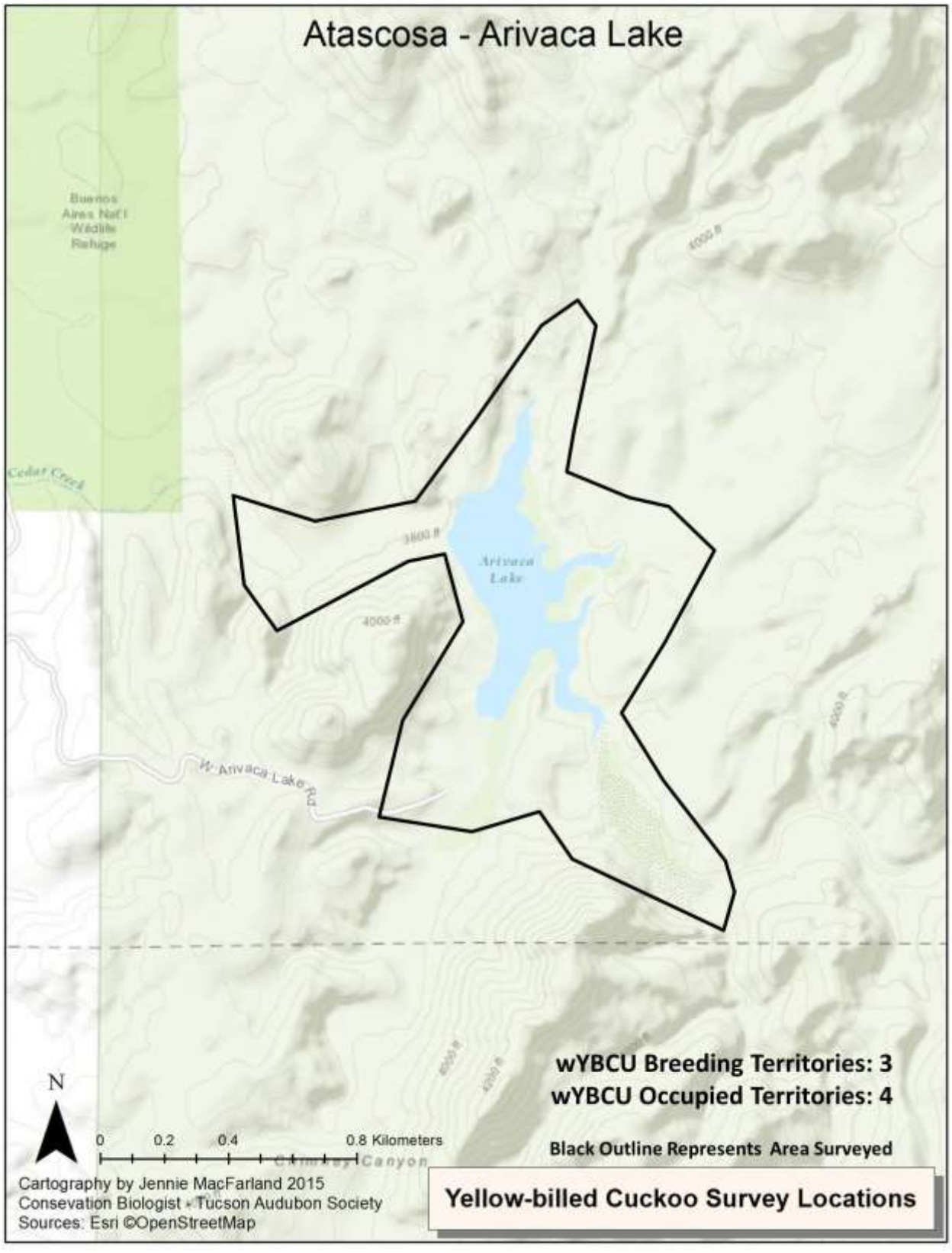
Breeding Territories: 3 Occupied Territories: 4

This lake proved to be excellent for Yellow-billed Cuckoos and birds were detected on every visit. Some parts of the lake were only surveyed once due to safety concerns and the difficulty of walking on the rough terrain and through dense vegetation. The cuckoos detected on the southeast portion of the lake on 7/23/2015 were not revisited on later dates due to a group of drug smugglers encountered by the team during the first detections. Without further information on these birds we are classifying them as "occupied territories" as we have no evidence of breeding or nesting.

Surveyors commented that adjacent areas and side canyons flowing into the lake also looked like excellent habitat for Yellow-billed Cuckoos that should be explored in the future if possible. This habitat is excellent and our findings of three breeding territories and four occupied territories are reasonable and likely lower than the actual number of cuckoos using this area.

Code Key: Detection Type: P = detected during playback, I = incidental detection. A/V or B: A = audio, V = visual, B = both. Vocal codes: CON = contact call, ALA = alarm call, COO = coo call. Behaviour/Breeding: ST = sitting, FLY = flying, NV = no visual, CP = copulation, CF = carrying food

Date	# YBCU	A/V/B	Vocal	Behavior	Note	Elevation ft.
07/09/2015	1	A	CON		Contact vocal after second playback.	3823
07/23/2015	1	A	ALA		At parking lot, alarm call only.	3819
07/23/2015	1	A	CON		Across lake from this position.	3818
07/23/2015	1	B	ALA	FLY	Flew across Lake.	3822
07/23/2015	1	A	CON		Likely a new cuckoo.	3842
07/23/2015	1	V		ST		3824
07/23/2015	1	A	CON			3828
08/06/2015	1	A	ALA	NV		3807
08/06/2015	2	B	CON	FLY	Pairs	3822
08/06/2015	2	B	CON	FLY/SIT	Pairs	3826
08/06/2015	1	B	ALA	FLY/SIT		3842
08/06/2015	1	A	ALA	NV	Short ALA call then no response to caller.	3848
08/06/2015	1	A	CON	NV	The "parking lot cuckoo" calling off and on	3817
08/06/2015	1	A	CON	NV	This entire drainage looks like YBCU heaven.	3776
08/20/2015	2	B	COO, CON			3812
08/20/2015	1	B	CON		Flying up canyon from lake.	3777
08/20/2015	1				Probably same on bc it flew this way.	3767
08/20/2015	1	A	CON		Is this the same bird following us for 1000m?	3758


Atascosa - Arivaca Lake
Buenos Aires Nat'l Wildlife Refuge
Cedar Creek
3800 ft
4000 ft
Arivaca Lake
W Arivaca Lake Rd
Chimney Canyon
N
0 0.2 0.4 0.8 Kilometers
wYBCU Breeding Territories: 3
wYBCU Occupied Territories: 4
Black Outline Represents Area Surveyed
Cartography by Jennie MacFarland 2015
Consevation Biologist - Tucson Audubon Society
Sources: Esri ©OpenStreetMap
Yellow-billed Cuckoo Survey Locations

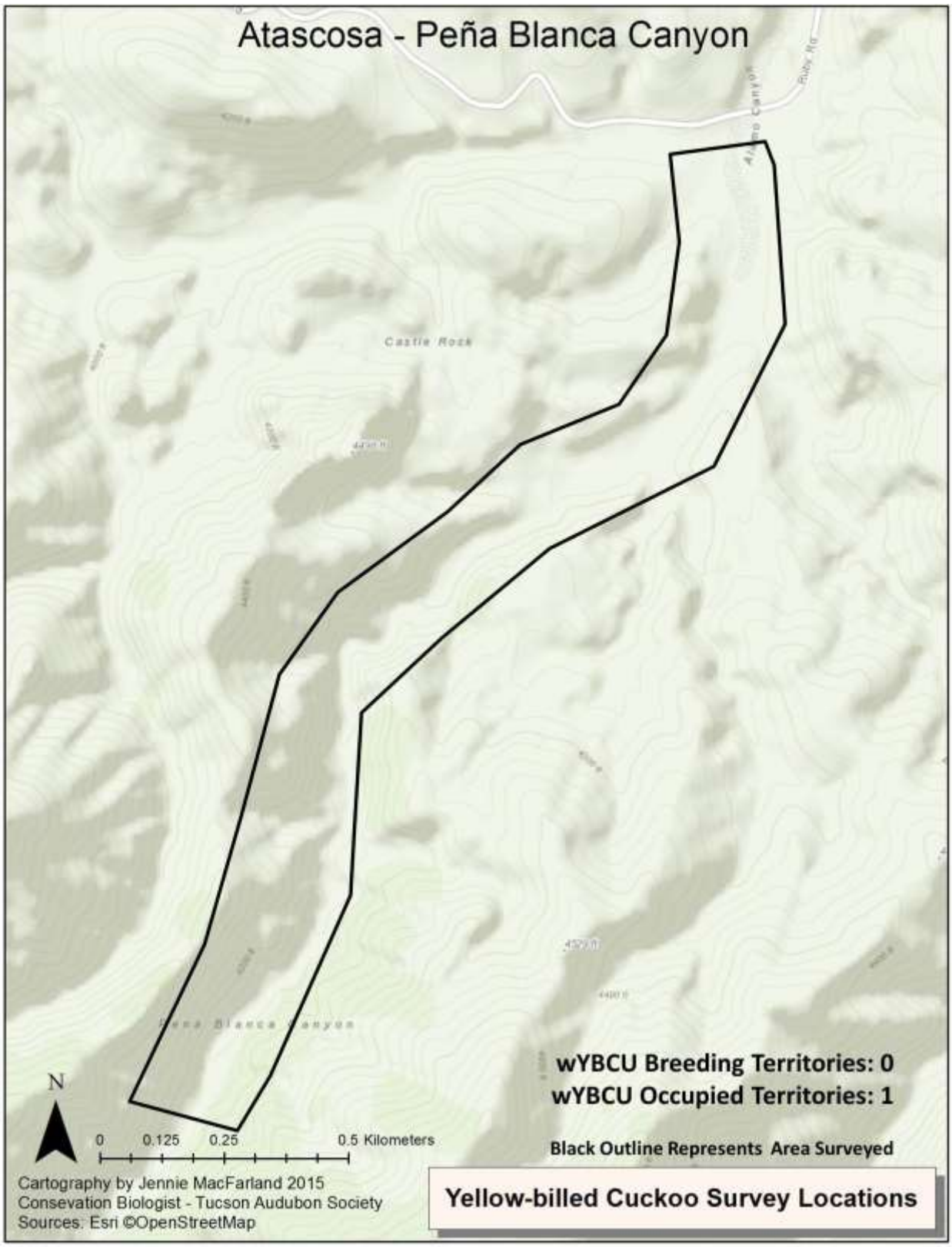
Peña Blanca Canyon

Occupied Territories: 1

This canyon has been surveyed in the past for Elegant Trogons by Tucson Audubon and for the past three years has been an excellent site for this species. The bottom of this canyon is lined with large Arizona sycamore trees and oaks and we found many bird species here including Montezuma Quail, nesting Gray Hawks and surveyors discovered the pair of Rufous-capped Warblers in this canyon to the delight of Arizona's birding community.

The one detection of a Yellow-billed Cuckoo in this canyon was at the north end of the canyon where the habitat is wider than further down canyon and the bird was only detected once in late July. Elegant Trogons were detected in this canyon during the May Elegant Trogon census by Tucson Audubon and also by cuckoo surveyors and this canyon could be an example of competition from Elegant Trogons making an area unusable by cuckoos.

Date	# YBCU	A/V/B	Vocal	Behavior	Note	Elevation ft.
07/09/2015	none					
07/23/2015	1	B	CON	FLY	Montezuma Quail seen at same location	3908
08/06/2015	none					
08/20/2015	none					

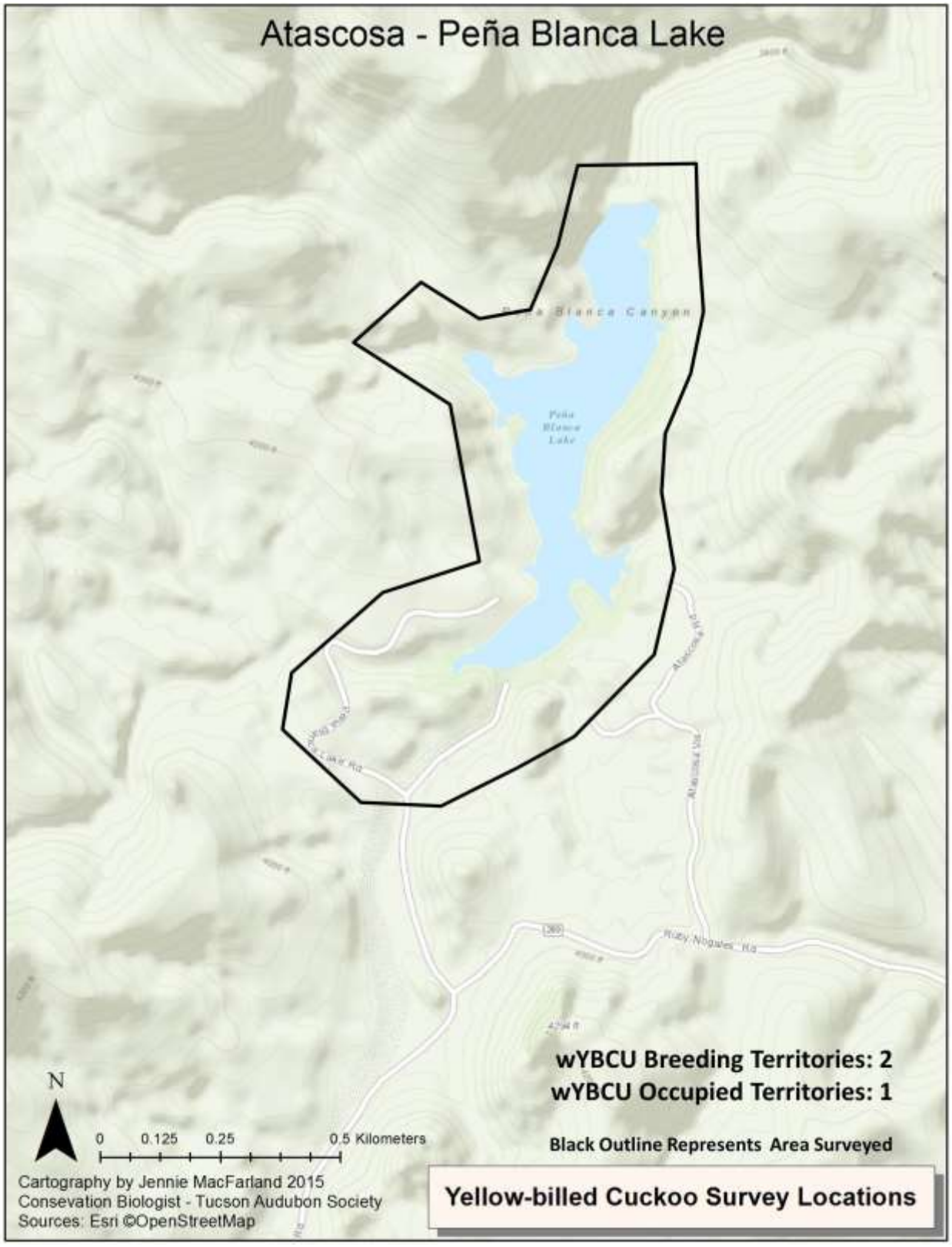

Atascosa - Peña Blanca Canyon
Castle Rock
N
0 0.125 0.25 0.5 Kilometers
wYBCU Breeding Territories: 0
wYBCU Occupied Territories: 1
Black Outline Represents Area Surveyed
Cartography by Jennie MacFarland 2015
Consevation Biologist - Tucson Audubon Society
Sources: Esri ©OpenStreetMap
Yellow-billed Cuckoo Survey Locations

Peña Blanca Lake

Breeding Territories: 2 Occupied Territories: 1

This lake provided some excellent Yellow-billed Cuckoo habitat and birds were detected on each visit. The only nest detected during the whole project was on the south end of this lake. Access proved to be quite difficult at this lake so the two surveys in August were conducted with a canoe which proved to be a great improvement and made it easier to see how the cuckoos were using the habtiat. Surveyor observations of the birds flying back and forth over the lake is how we determined that one territory could encompass both sides of the lake.

Date	# YBCU	A/V/B	Vocal	Behavior	Note	Elevation ft.
07/09/2015	1	A	CON		Across Lake.	3839
07/23/2015	1	V		ST FLY	Appeared to be sitting on nest, however could not see nest 100%.	3830
07/23/2015	1	B	CON	FLY	Heard con then bird flew south east across lake.	3838
08/06/2015	1	B	CON	ST	544 Photo; bird sitting on live oak.	3826
08/06/2015	2	A	CON	CF FLY	No visual/ full contact call/ opposite side of lake from #1/ heard and saw two cuckoos, one flying with something in its mouth back and forth across the lake.	3824
08/20/2015	1	A	CON			3836
08/20/2015	1	A	CON			3834


Atascosa - Peña Blanca Lake
Peña Blanca Canyon
Peña Blanca Lake
Ruby Nogales Rd
wYBCU Breeding Territories: 2
wYBCU Occupied Territories: 1
Black Outline Represents Area Surveyed
N
0 0.125 0.25 0.5 Kilometers
Cartography by Jennie MacFarland 2015
Consevation Biologist - Tucson Audubon Society
Sources: Esri ©OpenStreetMap
Yellow-billed Cuckoo Survey Locations

Rock Corral Canyon

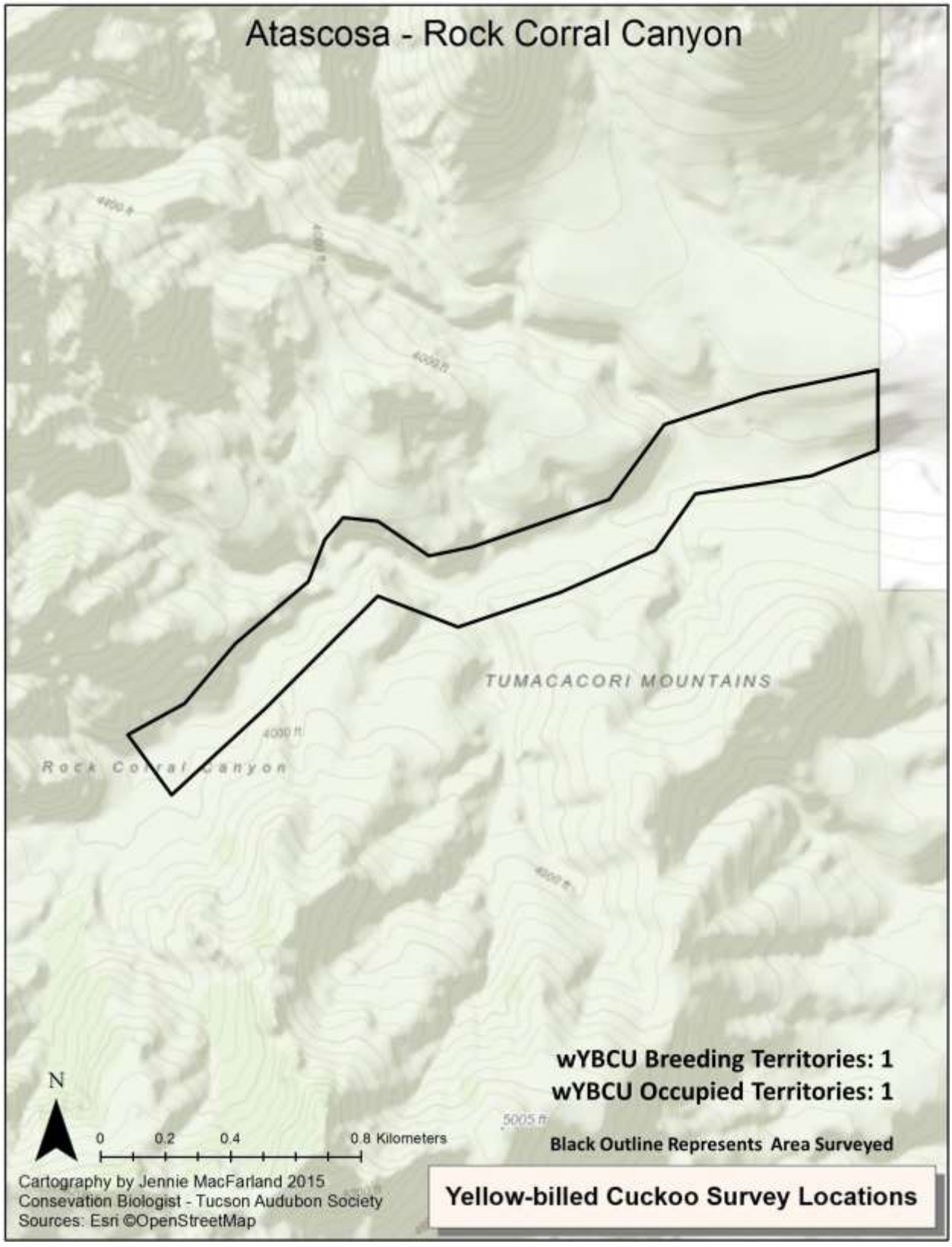
Breeding Territories: 1 Occupied Territory: 1

This canyon is part of the Tumacacori Mountains that contains amazing bird and plant diversity and was amazingly lush and green during the wet summer months.

Yellow-billed Cuckoos were detected on all four surveys and surveyors did observe a wYBCU foraging in ocotillos growing on the slopes of the canyon walls. The breeding territory had multiple detections over nearly a kilometer.

Yellow-billed Cuckoo by Ben Smith taken during survey

Date	# YBCU	A/V/B	Vocal	Behavior	Note	Elevation ft.
07/09/2015	1	A	CON COO ALA			3748
07/09/2015	1	A	COO ALA		We heard the cuckoo before we played so did not play	3839
07/23/2015	1	B	CON		After 1st playback.	3564
07/23/2015	1	B	CON		Heard on way back, closet to point 194.	3627
08/06/2015	2	A	COO CON		Second cuckoo at compass bearing 220 100m away.	3570
08/06/2015	1	B	CON			3610
08/20/2015	1	A	CON		After 1st playback, also Coo call; heard again on way	3564


Atascosa - Rock Corral Canyon
TUMACACORI MOUNTAINS
Rock Corral Canyon
wYBCU Breeding Territories: 1
wYBCU Occupied Territories: 1
Black Outline Represents Area Surveyed
N
0 0.2 0.4 0.8 Kilometers
Cartography by Jennie MacFarland 2015
Consevation Biologist - Tucson Audubon Society
Sources: Esri ©OpenStreetMap
Yellow-billed Cuckoo Survey Locations

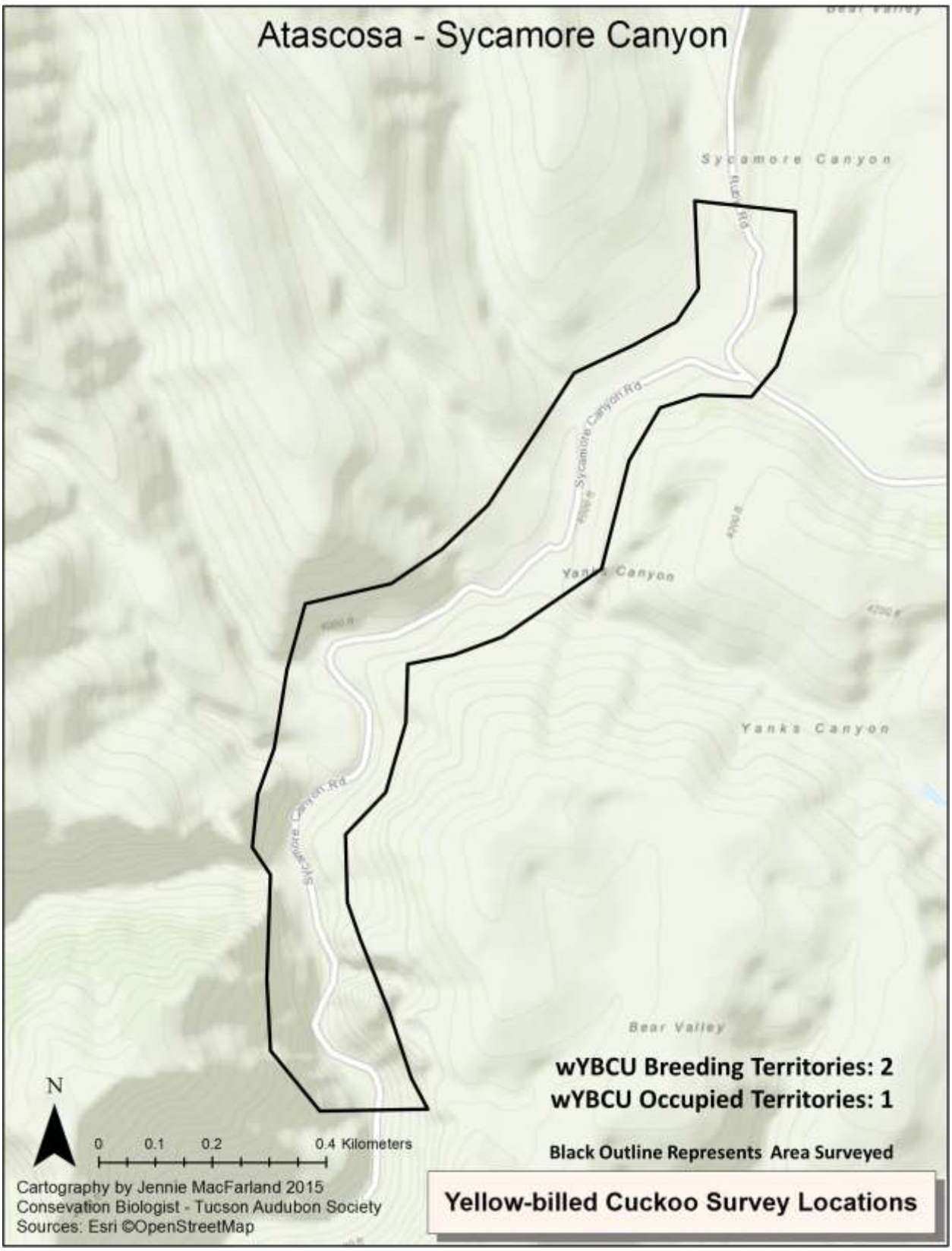
Sycamore Canyon

Breeding Territories: 2
Occupied Territory: 1

This canyon is famous as a beautiful and challenging hike and one of the most accessible sites in the Atascosa Highlands for recreation. It is a canyon that is excellent for Elegant Trogons and has stunningly beautiful rock formations. The drainage that flows through this canyon is lined with large trees of several species including several large Arizona Cypress trees.

During the last survey on Aug. 20 surveyors observed a wYBCU sitting in a large oak tree near the parking area. The wYBCU held a large, fuzzy catterpillar in its beak and worked it from side to side and then flew off towards the creek with the food.

Date	# YBCU	A/V/B	Vocal	Behavior	Note	Elevation ft.
07/09/2015	none					
07/23/2015	1	A	ALA VO	ST	Heard first half of contact call in response to first playback, didn't hear anything again, and heard another call after just as we were leaving.	4034
07/23/2015	2	A	CON ALA	NV FLY	Other bird 200m away	4010
07/23/2015	1	B	ALA	FLY ST	Only visual after playback, heard calls between 7th + 8th locations.	3953
08/06/2015	1	A	CON			4034
08/20/2015	1	V		ST CP CF	At parking lot- totally silent- caught caterpillar.	4014
08/20/2015	1	B	CON	ST FLY	Called after 5th playback perched then flew south.	4006

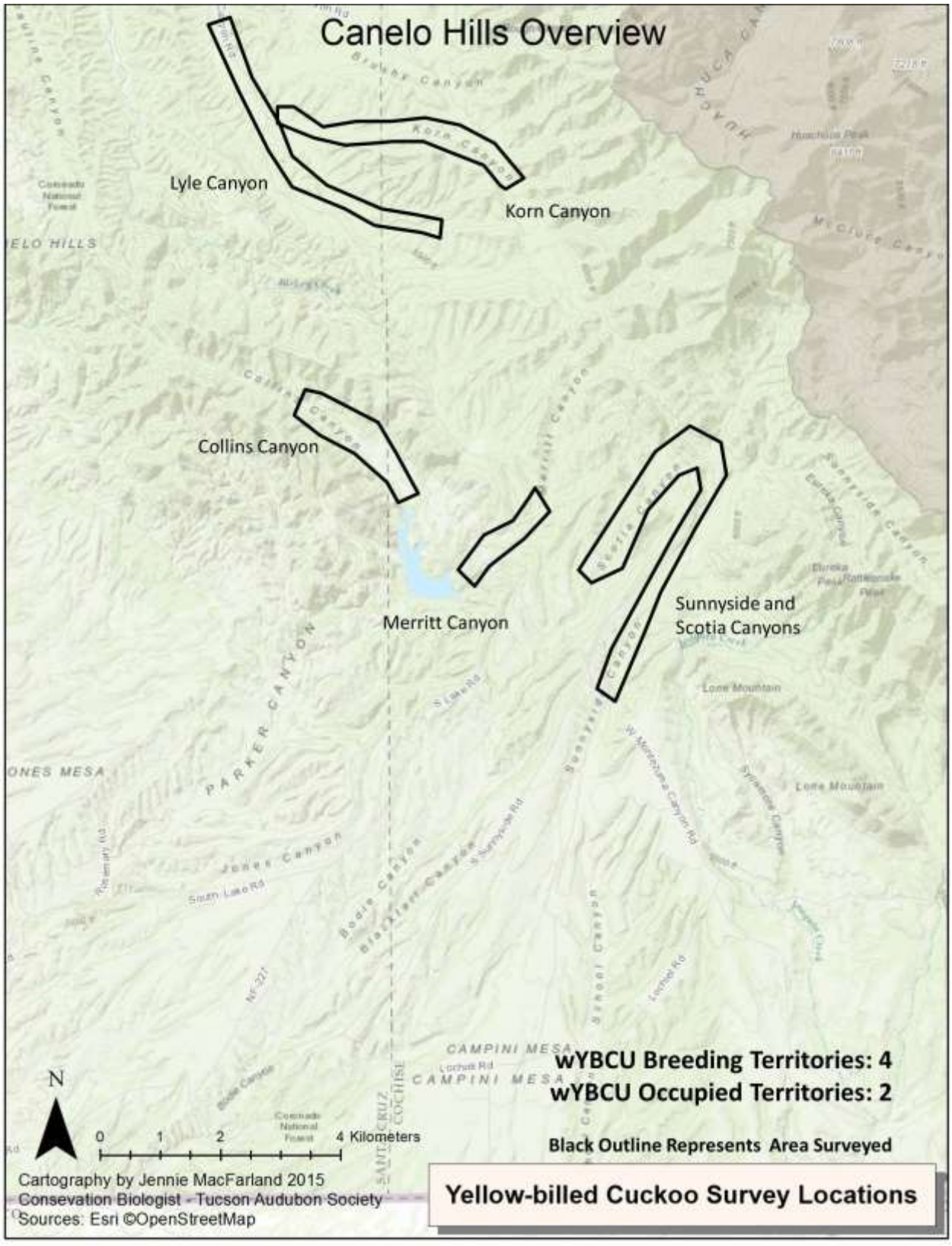

Atascosa - Sycamore Canyon
Sycamore Canyon
Sycamore Canyon Rd
Yanks Canyon
Yanks Canyon
Sycamore Canyon Rd
Bear Valley
N
0 0.1 0.2 0.4 Kilometers
wYBCU Breeding Territories: 2
wYBCU Occupied Territories: 1
Black Outline Represents Area Surveyed
Cartography by Jennie MacFarland 2015
Consevation Biologist - Tucson Audubon Society
Sources: Esri ©OpenStreetMap
Yellow-billed Cuckoo Survey Locations

Canelo Hills

Total Breeding Territories: 4 Total Occupied Territories: 2

The Canelo Hills, known for Parker Canyon Lake, are a western foothills of the Huachuca Mountains. There were very few eBird checklists for this area and several bird species of interest were documented by surveyors including Elegant Trogons, Eastern “Azure” Bluebirds, Montezuma Quail and Gray Hawks. wYBCUs were documented in four of the five drainages surveyed and this habitat did seem excellent for this species with insect prey being very abundant. There were several interesting Elegant Trogon behaviors documented in this range.

wYBCU by Dorian Escalante taken during survey


Canelo Hills Overview
Lyle Canyon
Korn Canyon
Collins Canyon
Merritt Canyon
Sunnyside and
Scotia Canyons
wYBCU Breeding Territories: 4
wYBCU Occupied Territories: 2
Black Outline Represents Area Surveyed
N
0 1 2 4 Kilometers
Cartography by Jennie MacFarland 2015
Consevation Biologist - Tucson Audubon Society
Sources: Esri ©OpenStreetMap
Yellow-billed Cuckoo Survey Locations

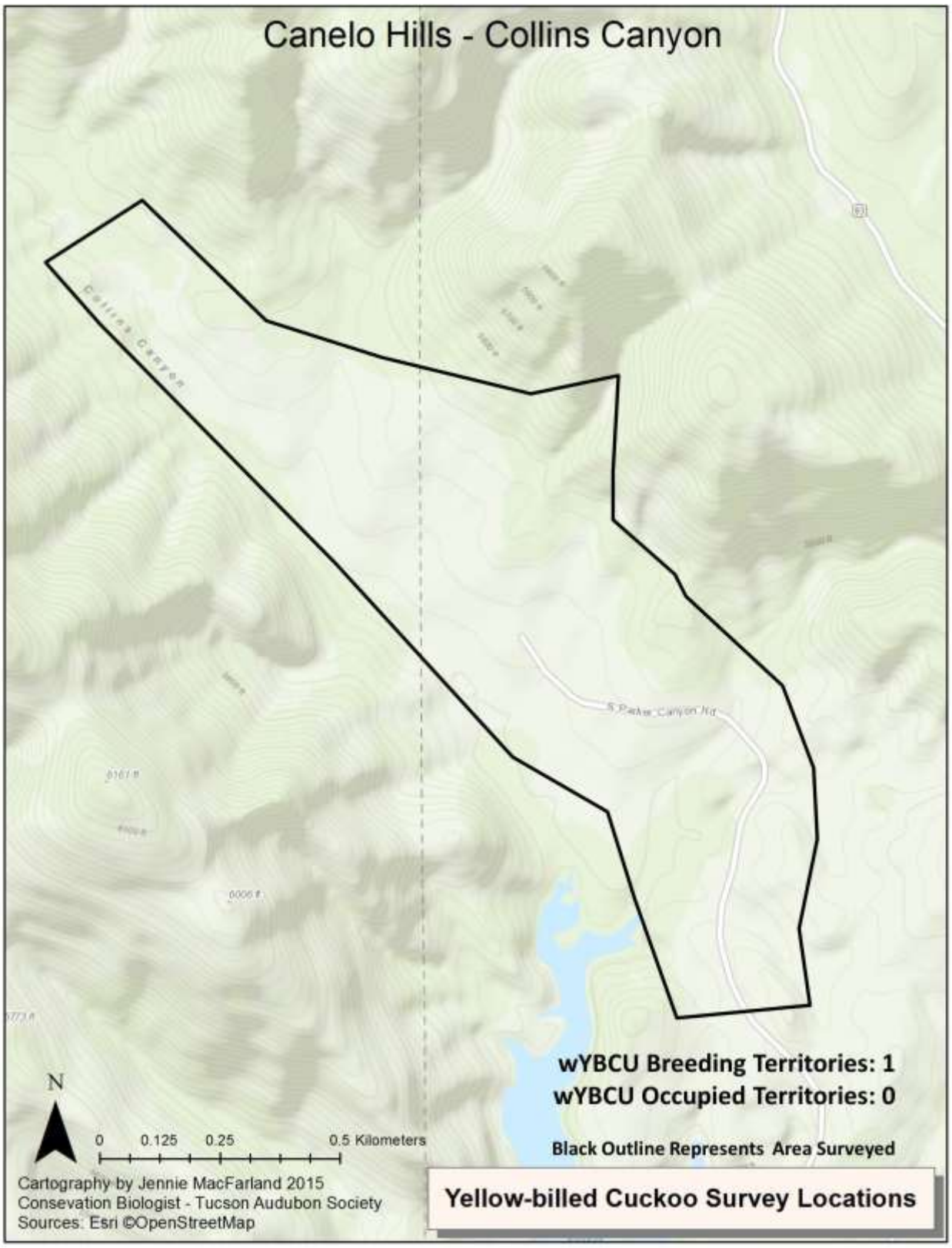
Collins Canyon

Breeding Territories: 1

This canyon was the highest elevation cuckoo pair we found during the entire study. The main drainage of the canyon contained Elegant Trogons and we never detected cuckoos along this lush, flowing part of the canyon. The portion of the canyon where we detected cuckoos was on the west side along a tributary drainage that had large oak and juniper trees. This canyon is also notable for the complete lack of mesquite trees.

The first survey focused on the main drainage of the canyon that had abundant flowing water and large trees. No wYBCU were found in this part of the canyon, though notably Elegant Trogons were found in this area. The second survey focused on the eastern side of the canyon and the wYBCU detected was an audio only. The third survey was also an audio detection. The final visit resulted in great views of both birds of the pair that called repeatedly and flew from tree to tree.

Date	# YBCU	A/V/B	Vocal	Behavior	Note	Elevation ft.
07/16/2015	none					
07/29/2015	1	A	ALA		Quiet or distant knocking heard upside drainage; only heard once.	5446
08/11/2015	1	A	COO		Thought heard cuckoo, soft but distinctive cooing. spent next 3 pts chasing it and playing again. recorded this probable cuckoo on the 9:37 pt. thinking not roadrunner b/c of details of noise, elevation and habitat.	5472
08/25/2015	2	B	VO/ALA	FLY	Heard one alarm call and immediately heard second cuckoo from different direction.	5477


Canelo Hills - Collins Canyon
Collins Canyon
S Parker Canyon Rd
wYBCU Breeding Territories: 1
wYBCU Occupied Territories: 0
Black Outline Represents Area Surveyed
N
0 0.125 0.25 0.5 Kilometers
Cartography by Jennie MacFarland 2015
Consevation Biologist - Tucson Audubon Society
Sources: Esri ©OpenStreetMap
Yellow-billed Cuckoo Survey Locations

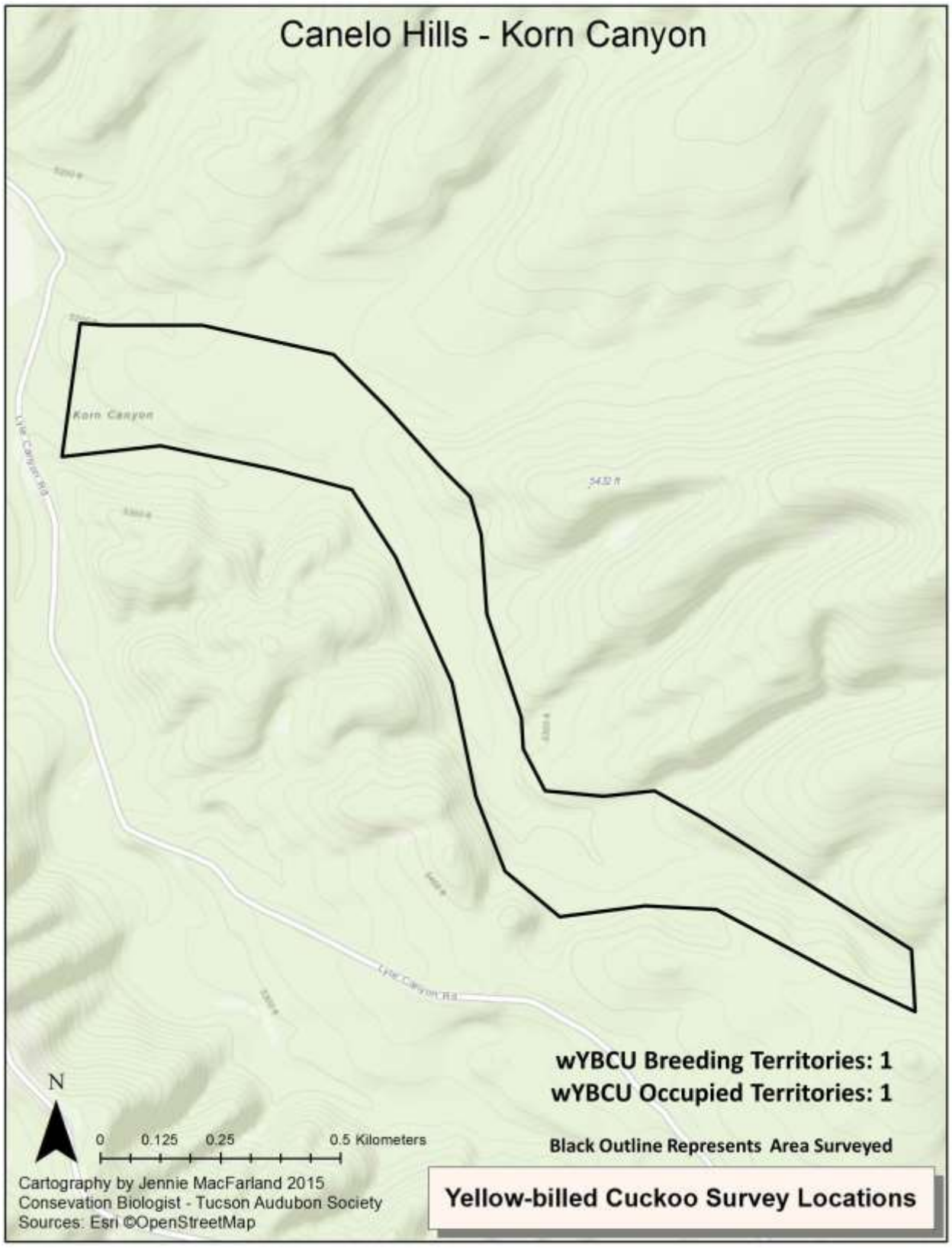
Korn Canyon

Breeding Territories: 1 Occupied Territories: 1

With large oak and sycamore trees and flowing water, the habitat in this canyon did prove appropriate habitat for wYBCU with one occupied and one breeding territory being documented. This was also a canyon where Elegant Trogons were documented and could have had an effect on the distribution of wYBCU territories along this route. Elegant Trogons were recorded on the southern end of this route and wYBCUs were only detected on the north end of the survey route.

Notably no wYBCUs were detected during the second survey in late July. During the third and fourth surveys wYBCUs were detected within the original territories. The lack of detections during the second survey could be due to a secretive stage of the breeding cycle for this species.

Date	# YBCU	A/V/B	Vocal	Behavior	Note	Elevation ft.
07/16/2015	1	B	VO			5246
07/16/2015	1	A	COO			5286
07/28/2015	NONE					
08/11/2015	2	B	ALA		Two cuckoos flew into cottonwood nearby.	5222
08/11/2015	1	V				5266
08/25/2015	1	V		ST FLY	Likely 1st territory.	5247

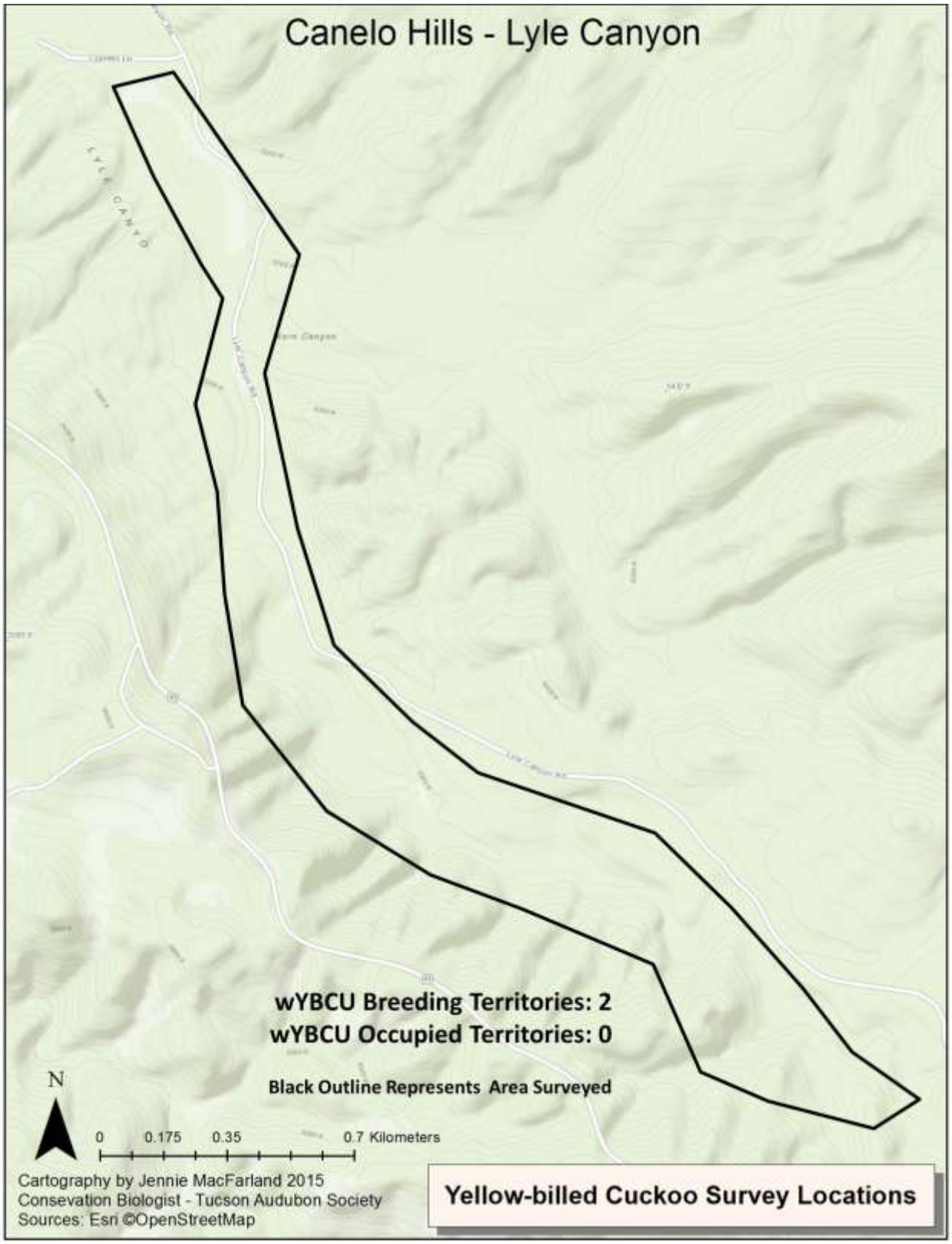

Canelo Hills - Korn Canyon
Korn Canyon
Lyle Canyon Rd
5432 ft
wYBCU Breeding Territories: 1
wYBCU Occupied Territories: 1
Black Outline Represents Area Surveyed
N
0 0.125 0.25 0.5 Kilometers
Cartography by Jennie MacFarland 2015
Consevation Biologist - Tucson Audubon Society
Sources: Esri ©OpenStreetMap
Yellow-billed Cuckoo Survey Locations

Lyle Canyon

Breeding Territories: 2

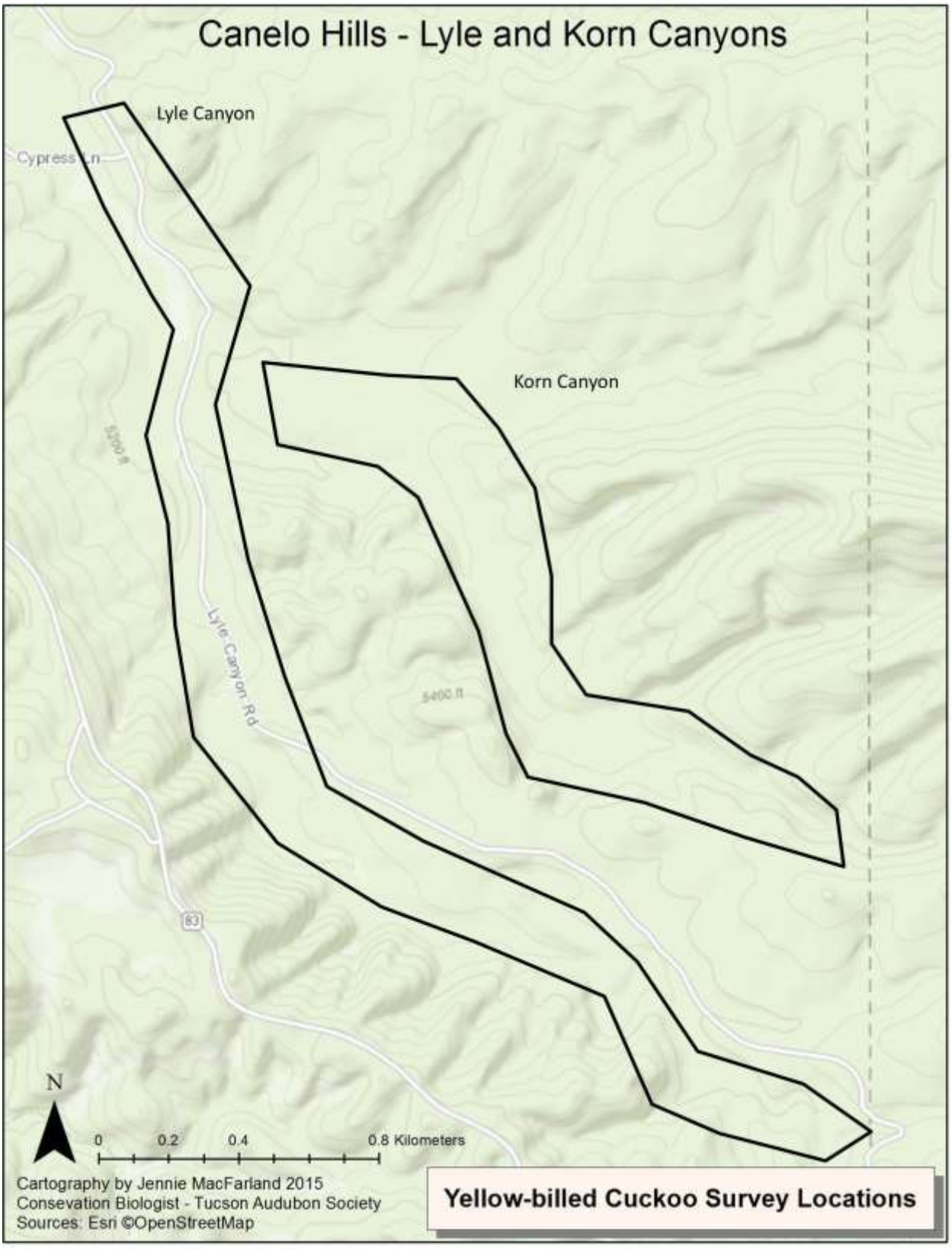
wYBCUs were detected on each visit to this drainage. This route contained very lush and green habitat and surveyors reported many insects. During the first survey on this route a black bear was observed and it quickly ran away from the survey team.

Date	# YBCU	A/V/B	Vocal	Behavior	Note	Elevation ft.
07/16/2015	2	V		ST FLY EF	Photo of YBCU Camera #5 Pic 74. Possible Nest switching, birds became preoccupied with us so we moved away. Nest not seen.	5285
07/16/2015	1	A	ALA			5323
07/28/2015	1	A	CON		1st detection: only kwolp call, no knocking. Seemed to be on west side of wash.	5194
07/28/2015	1	B	CON	FLY PERCH		5217
08/11/2015	2	A	ALA		Heard from parking spot; seemed to be on W side of creek toward houses.	5220
08/11/2015	1	A	CON		Same bird as previous detection. Almost sounded like 2 birds at times-- not positive.	5189
08/25/2015	1	B	ALA/COO/FLY PERCH			5316


Canelo Hills - Lyle Canyon
wYBCU Breeding Territories: 2
wYBCU Occupied Territories: 0
Black Outline Represents Area Surveyed
N
0 0.175 0.35 0.7 Kilometers
Cartography by Jennie MacFarland 2015
Consevation Biologist - Tucson Audubon Society
Sources: Esri ©OpenStreetMap
Yellow-billed Cuckoo Survey Locations

Korn and Lyle Canyon Complex

These canyons should also be looked at together as the wYBCUs from one of the breeding territories seemed to be moving between the two routes.

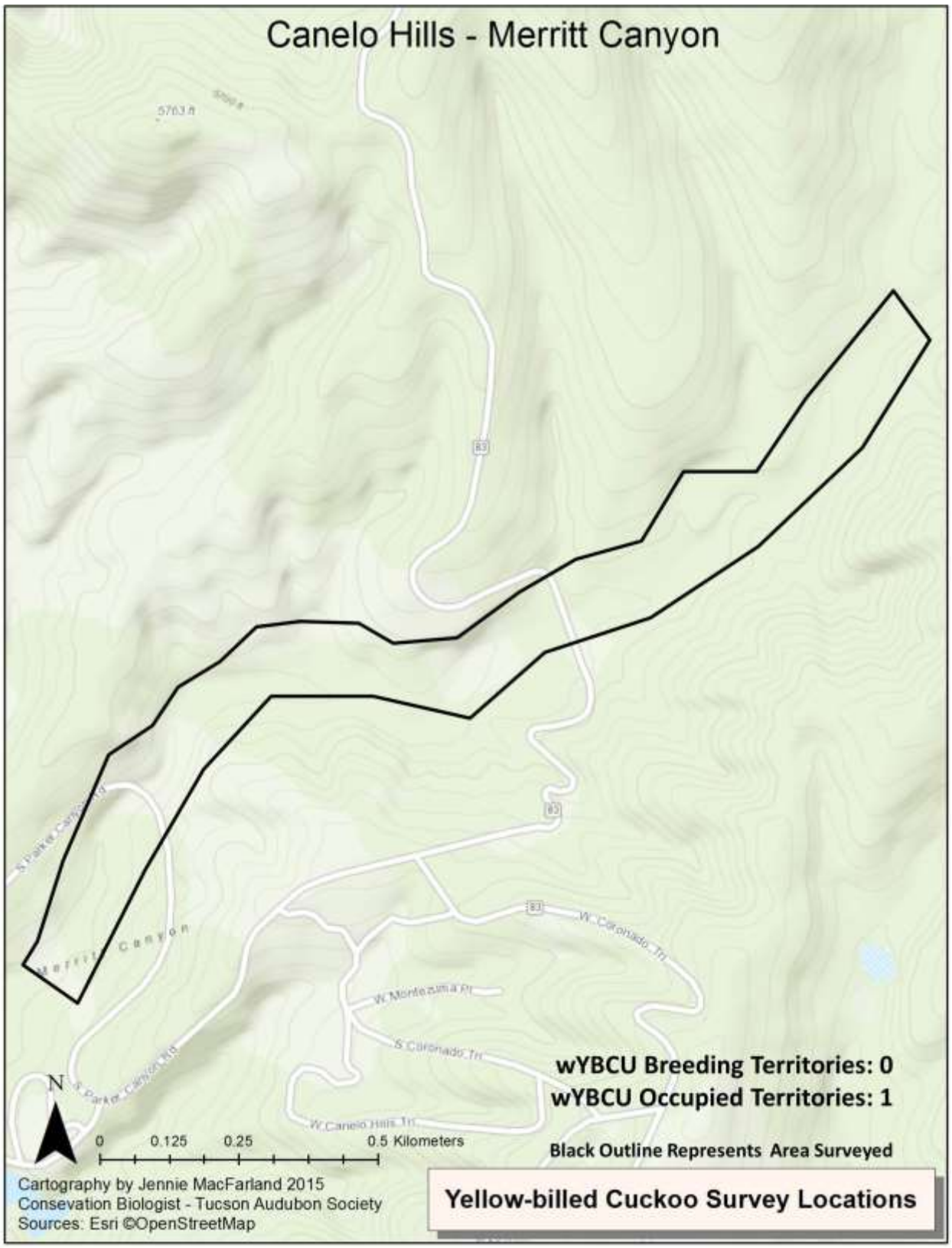

Canelo Hills - Lyle and Korn Canyons
Lyle Canyon
Korn Canyon
Lyle Canyon Rd
5200 ft
5400 ft
83
N
0
0.2
0.4
0.8 Kilometers
Cartography by Jennie MacFarland 2015
Consevation Biologist - Tucson Audubon Society
Sources: Esri ©OpenStreetMap
Yellow-billed Cuckoo Survey Locations

Merritt Canyon

Occupied Territories: 1

This route was along a shallow and wide drainage with large trees and flowing water. There were several private inholdings adjacent to the route and the wYBCUs on this route were several times observed entering this private inholding that contained large, ornamental trees and a large turf lawn.

Date	# YBCU	A/V/B	Vocal	Behavior	Note	Elevation Ft.
08/25/2015	1	V	NO	ST	Dorian has cuckoo photo: his camera.	5470
07/16/2015	1	A	CON		Called after 3rd Playback.	5463
07/28/2015	1	A	ALA CON COO			5470
08/11/2015	1	P	CON		Mix of oak & juniper 5-8 m height; heard him again on way out doing CON call.	5456
08/11/2015	1	P	CON		Large junipers 8-10 m good canopy	5480

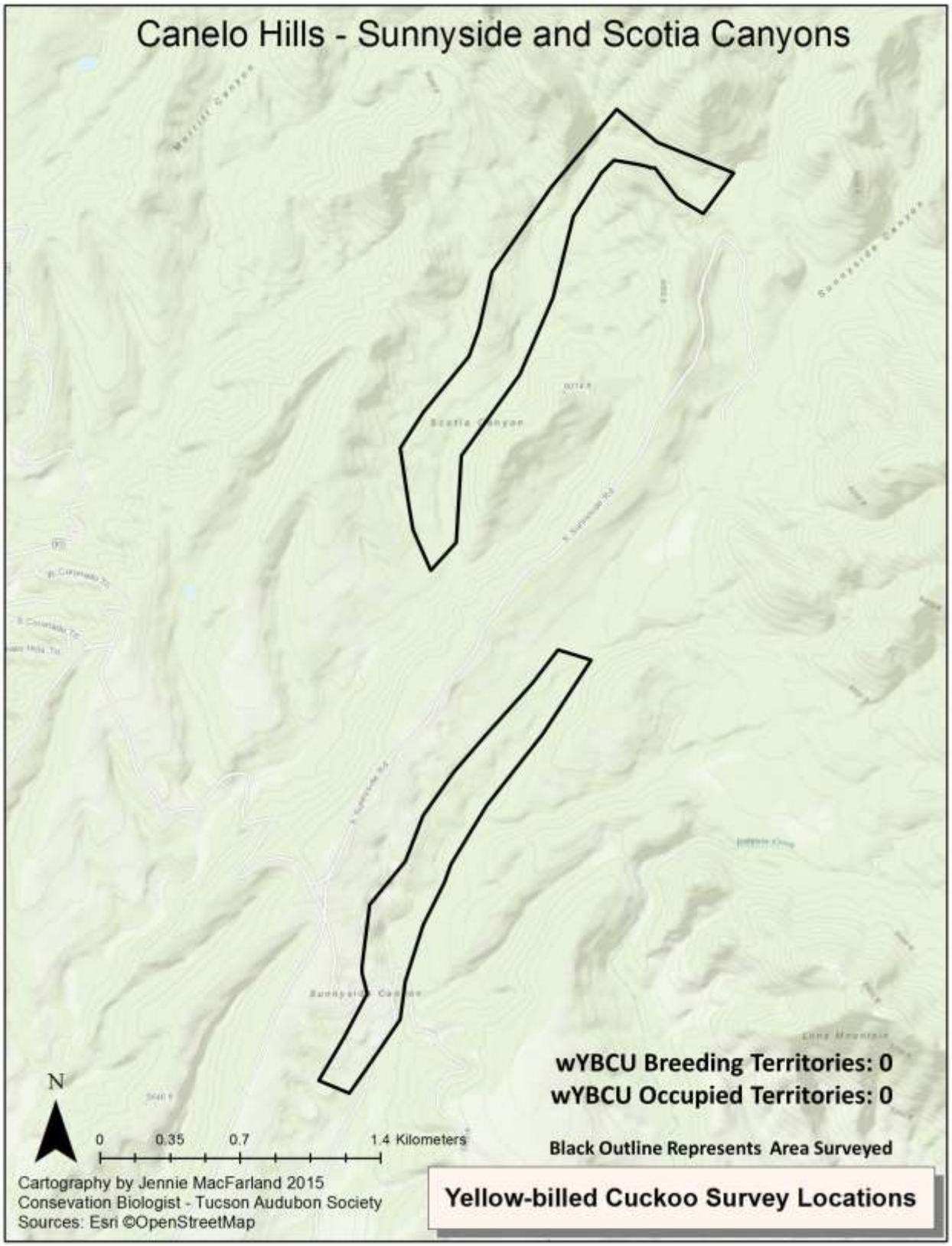

Canelo Hills - Merritt Canyon
5763 ft
Merritt Canyon
S Parker Canyon Rd
W Montezuma Pl
S Coronado Trl
W Canelo Hills Trl
N
0 0.125 0.25 0.5 Kilometers
wYBCU Breeding Territories: 0
wYBCU Occupied Territories: 1
Black Outline Represents Area Surveyed
Cartography by Jennie MacFarland 2015
Consevation Biologist - Tucson Audubon Society
Sources: Esri ©OpenStreetMap
Yellow-billed Cuckoo Survey Locations

Sunnyside and Scotia Canyons

No Territories

Surveyors in these two canyons on the east side of the Huachcas are best accessed from the Canelo Hills and were organized as part of there surveys. No wYBCUs were detected in these lush canyons despite surveyors checking different elevational zones and habitats. There were some access issues with private land that made it difficult to manuver through the area but surveyors did survey much of both canyons. This is notably an excellent area for Elegant Trogons and several were detected during these wYBCU surveys.

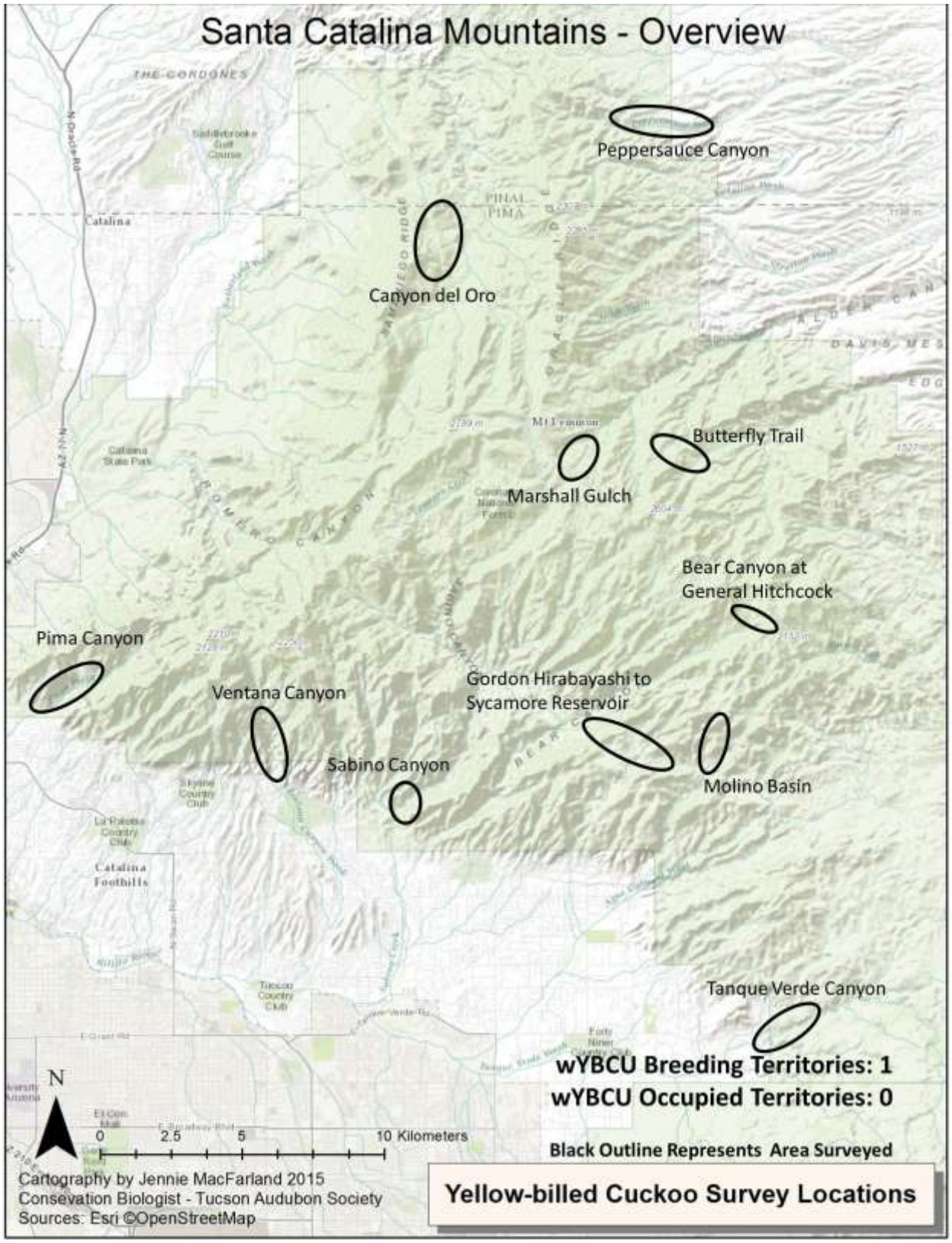
Date	# YBCU	A/V/B	Vocal	Behavior	Note	Elevation Ft.
07/16/2015	none					
07/28/2015	none					


Canelo Hills - Sunnyside and Scotia Canyons
N
0
0.35
0.7
1.4 Kilometers
wYBCU Breeding Territories: 0
wYBCU Occupied Territories: 0
Black Outline Represents Area Surveyed
Yellow-billed Cuckoo Survey Locations
Cartography by Jennie MacFarland 2015
Consevation Biologist - Tucson Audubon Society
Sources: Esri ©OpenStreetMap

Santa Catalina Mountains

Total Breeding Territories: 1

The Santa Catalina Mountains are a large Sky Island north of Tucson with many different habitat types and life zones at the different elevations traveling up the mountain range. Survey routes included higher and mid elevation areas accessed from Catalina Highway traveling up Mount Lemmon from Tucson and the lower elevation drainages such as Pima and Ventana Canyons were accessed directly from Tucson. Most routes were on the south side of the mountain range but Canyon del Oro is central within the range and accessed from the west, and Peppersauce Canyon, the only site of a wYBCU detection, is on the north side of the range.

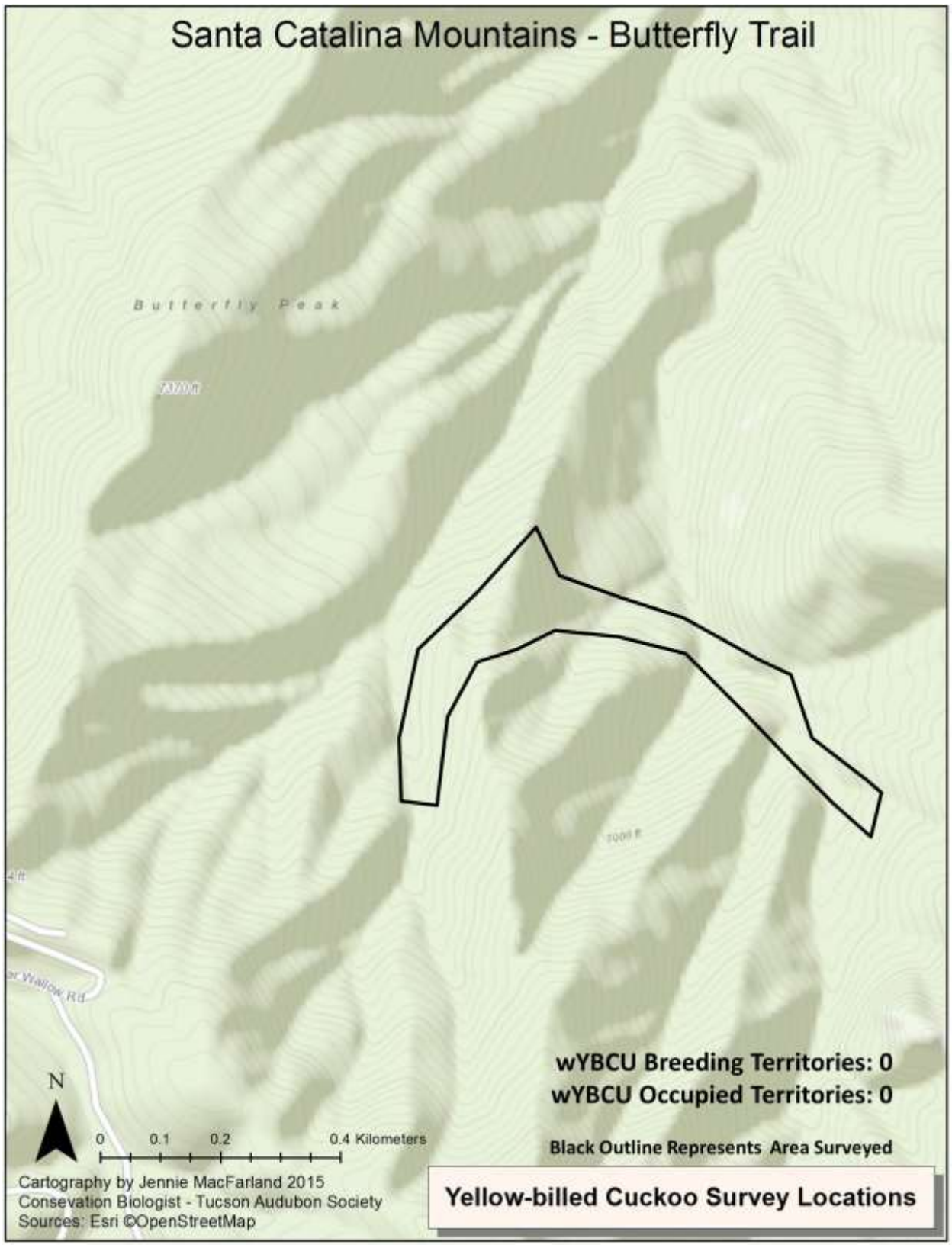

Santa Catalina Mountains - Overview
Peppersauce Canyon
Canyon del Oro
Butterfly Trail
Marshall Gulch
Bear Canyon at
General Hitchcock
Pima Canyon
Ventana Canyon
Gordon Hirabayashi to
Sycamore Reservoir
Sabino Canyon
Molino Basin
Tanque Verde Canyon
wYBCU Breeding Territories: 1
wYBCU Occupied Territories: 0
Black Outline Represents Area Surveyed
N
0 2.5 5 10 Kilometers
Cartography by Jennie MacFarland 2015
Consevation Biologist - Tucson Audubon Society
Sources: Esri ©OpenStreetMap
Yellow-billed Cuckoo Survey Locations

Butterfly Trail

No Detections

The butterfly trail is an access point to the Butterfly Natural Area which is remarkably beautiful and lush. We surveyed this route because a wYBCU had been reported earlier in the season but surveyors did not detect any wYBCUs during the survey. The bird reported earlier in the season could have been passing over the mountain range to access the San Pedro River on the north side.

Date	# YBCU	A/V/B	Vocal	Behavior	Note	Elevation Ft.
07/20/2015	none					

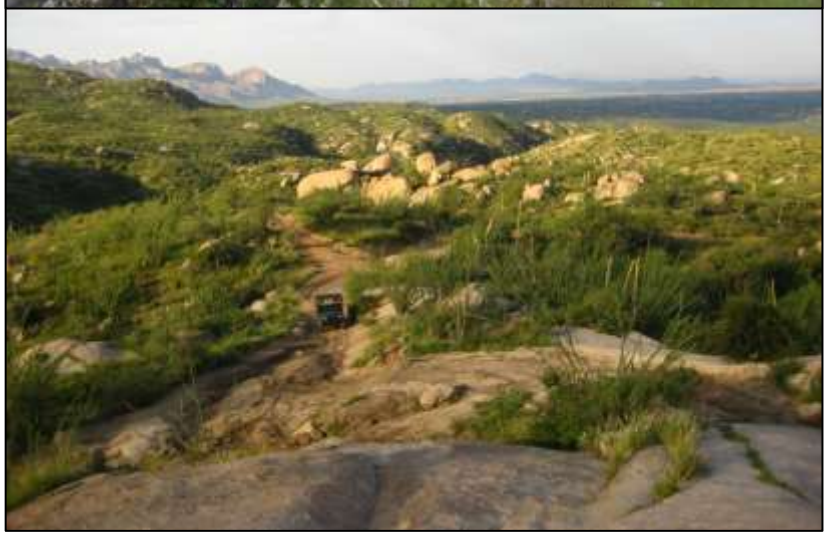

Santa Catalina Mountains - Butterfly Trail
Butterfly Peak
wYBCU Breeding Territories: 0
wYBCU Occupied Territories: 0
Black Outline Represents Area Surveyed
N
0 0.1 0.2 0.4 Kilometers
Cartography by Jennie MacFarland 2015
Consevation Biologist - Tucson Audubon Society
Sources: Esri ©OpenStreetMap
Yellow-billed Cuckoo Survey Locations

Canyon del Oro

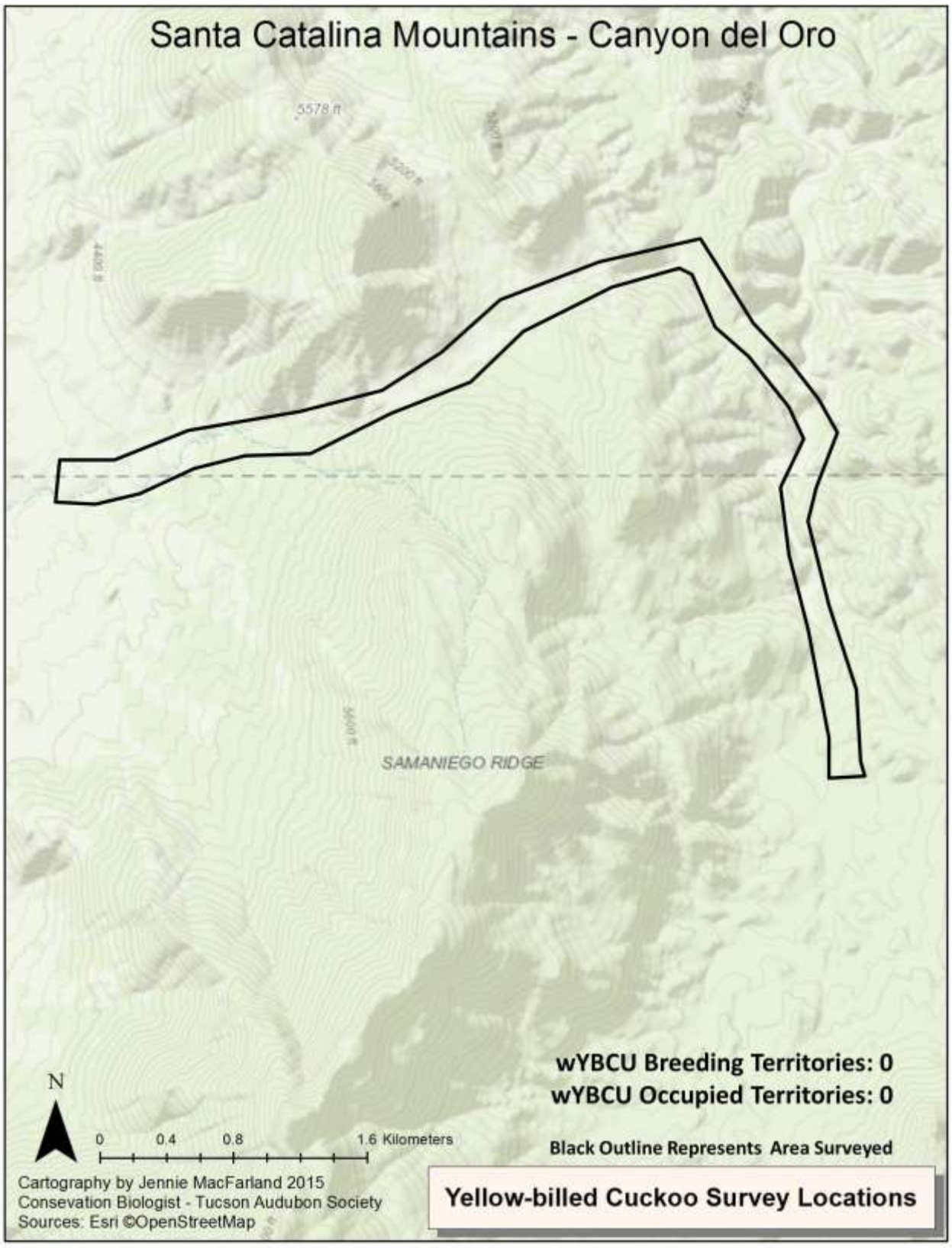
No Detections

This remote and rugged canyon was accessed from the west side of the mountain range and required the use of Tucson Audubon's Ranger, a rugged OHV to access the survey route. Once the appropriate habitat was reached by the survey team they conducted the survey and did not detect wYBCU and reported that the habitat seemed to still be recovering from a fire.

This area is very infrequently accessed due to its rugged nature and portions of the habitat were reported to look very good for wYBCU. This is a drainage that should be checked again in another season to see if wYBCU could be using this habitat. Surveyors reoprted many White-tailed Deer in the area and one Gray Fox and many bird species including Arizona Woodpecker, Bridled Titmouse, Hutton's Vireo, Western Scrub-Jay, Rock Wren and Rufous-crowned Sparrow.



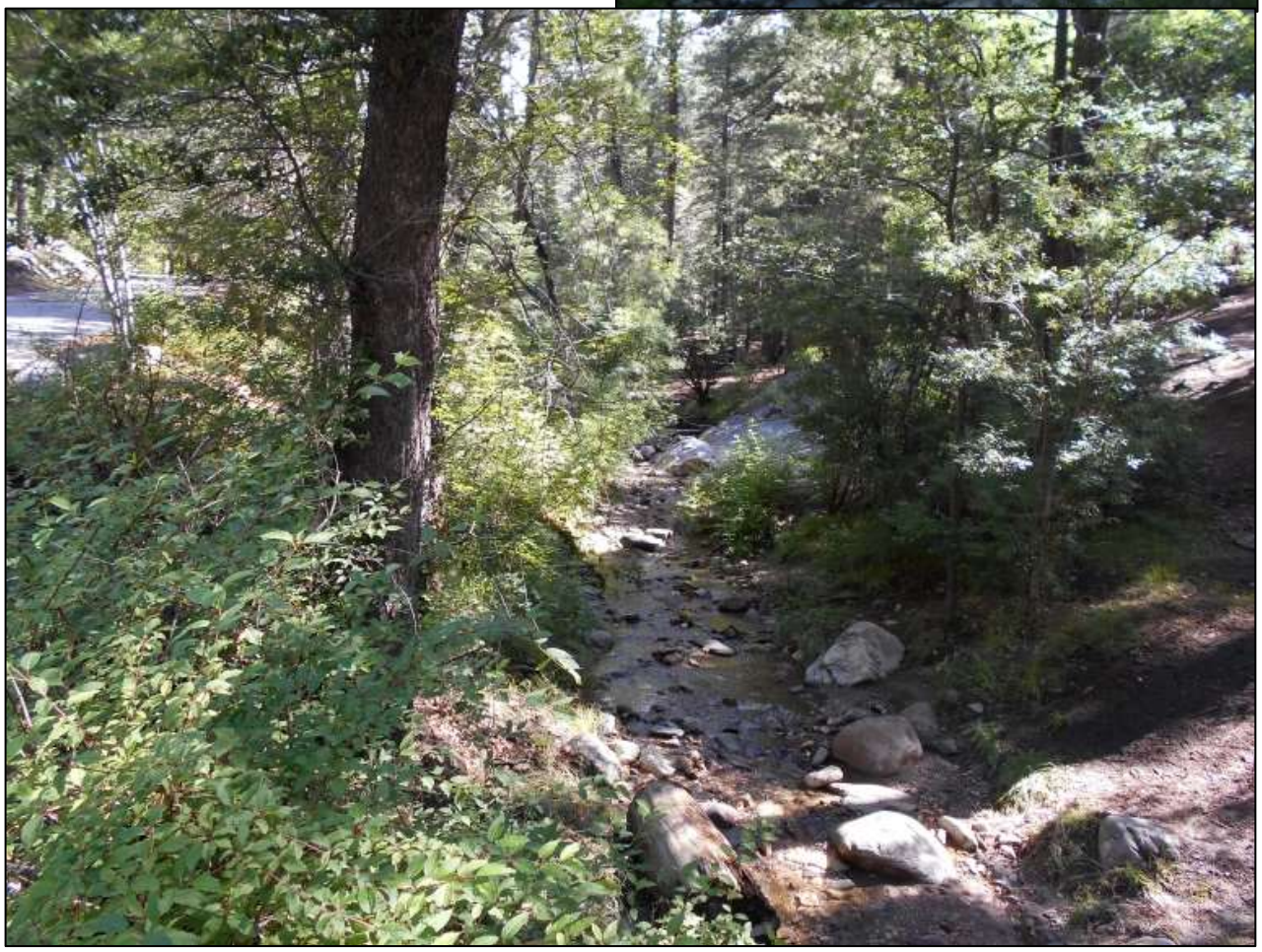
Date	# YBCU	A/V/B	Vocal	Behavior	Note	Elevation Ft.
08/26/2015	none					


Santa Catalina Mountains - Canyon del Oro
5578 ft
SAMANIEGO RIDGE
N
0
0.4
0.8
1.6 Kilometers
wYBCU Breeding Territories: 0
wYBCU Occupied Territories: 0
Black Outline Represents Area Surveyed
Cartography by Jennie MacFarland 2015
Consevation Biologist - Tucson Audubon Society
Sources: Esri ©OpenStreetMap
Yellow-billed Cuckoo Survey Locations

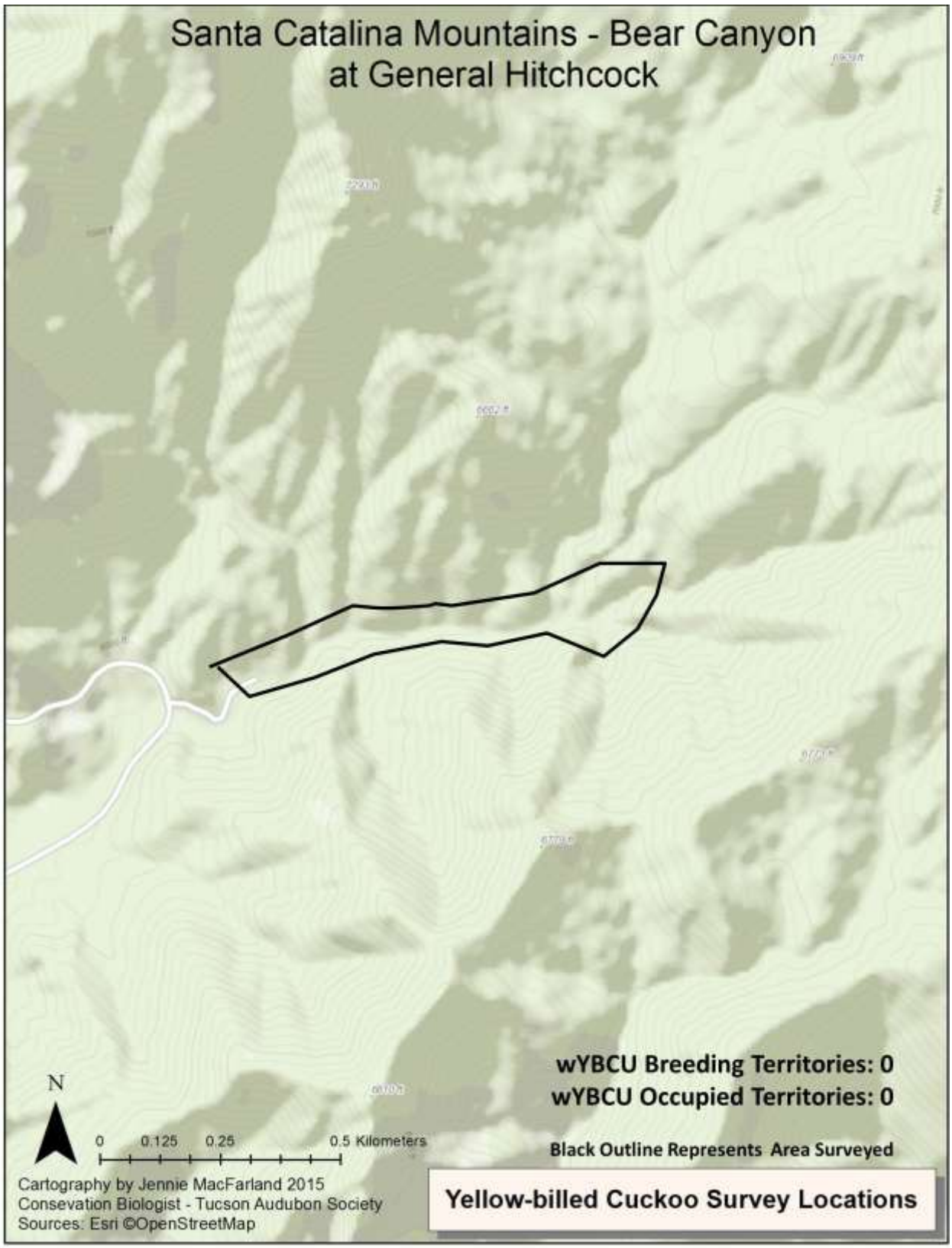
Bear Canyon at General Hitchcock

No Detections

There is an eBird report for wYBCU in June of 2014 from an excellent birder which is why this route was surveyed. No wYBCU were detected but many other bird species were observed using this habitat including Painted Redstart, Western Wood-pewee, Mexican Jay, Hermit Thrush, Yellow-eyed Junco and Hepatic Tanager.



Date	# YBCU	A/V/B	Vocal	Behavior	Note	Elevation Ft.
07/20/2015	none					

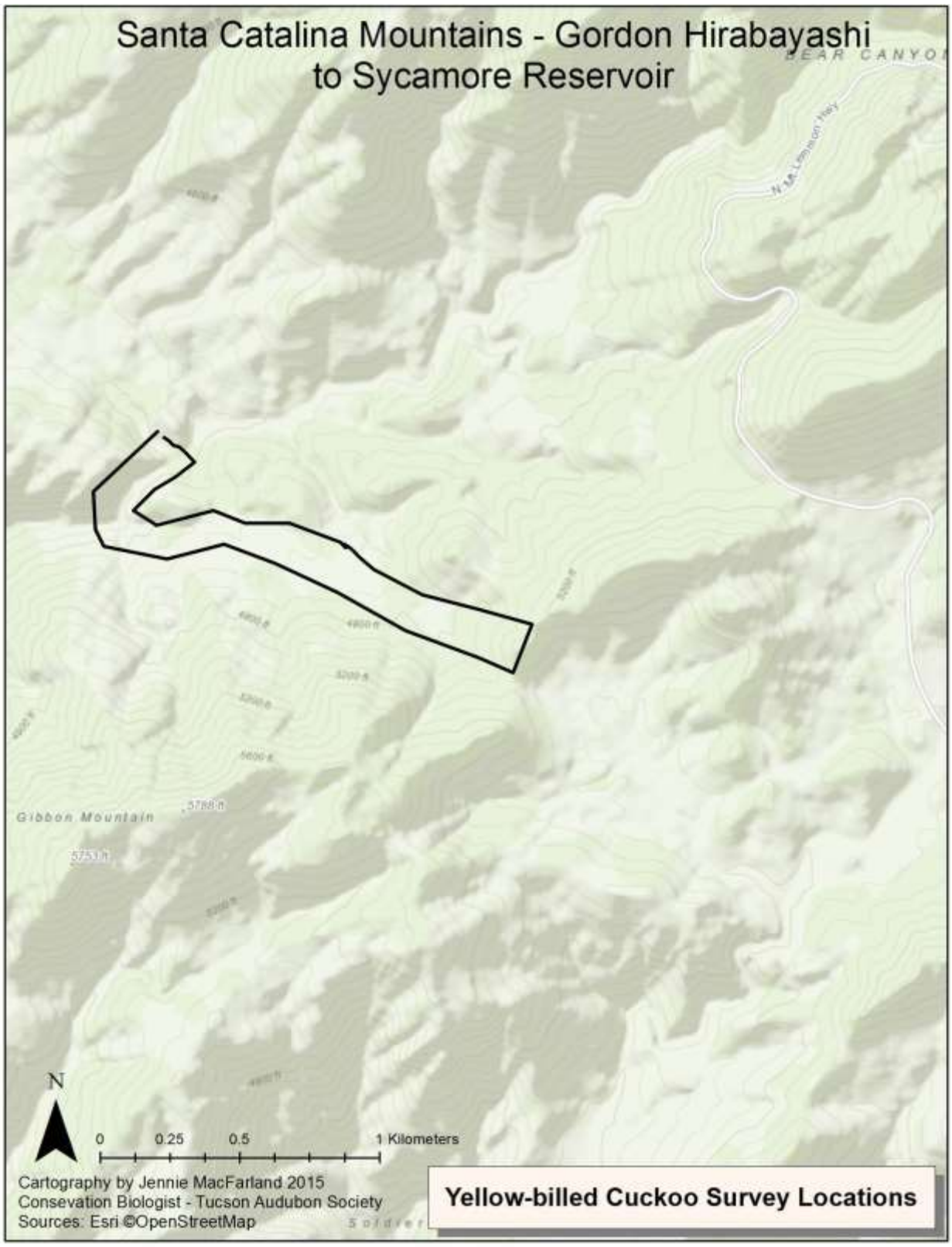

Santa Catalina Mountains - Bear Canyon
at General Hitchcock
wYBCU Breeding Territories: 0
wYBCU Occupied Territories: 0
Black Outline Represents Area Surveyed
N
0 0.125 0.25 0.5 Kilometers
Cartography by Jennie MacFarland 2015
Consevation Biologist - Tucson Audubon Society
Sources: Esri ©OpenStreetMap
Yellow-billed Cuckoo Survey Locations

Gordon Hirabayashi to Sycamore Reservoir

No Detections

This route out to the reservoir is sparse without tall trees but does follow a drainage that is still recovering from a forest fire. The reservoir itself has flowing water and dense vegetation including willows. The reservoir seemed like a likely location for wYBCU but none were detected during the survey. Other bird species detected include Greater Roadrunner and Bell's Vireo.

Date	# YBCU	A/V/B	Vocal	Behavior	Note	Elevation Ft.
07/20/2015	none					

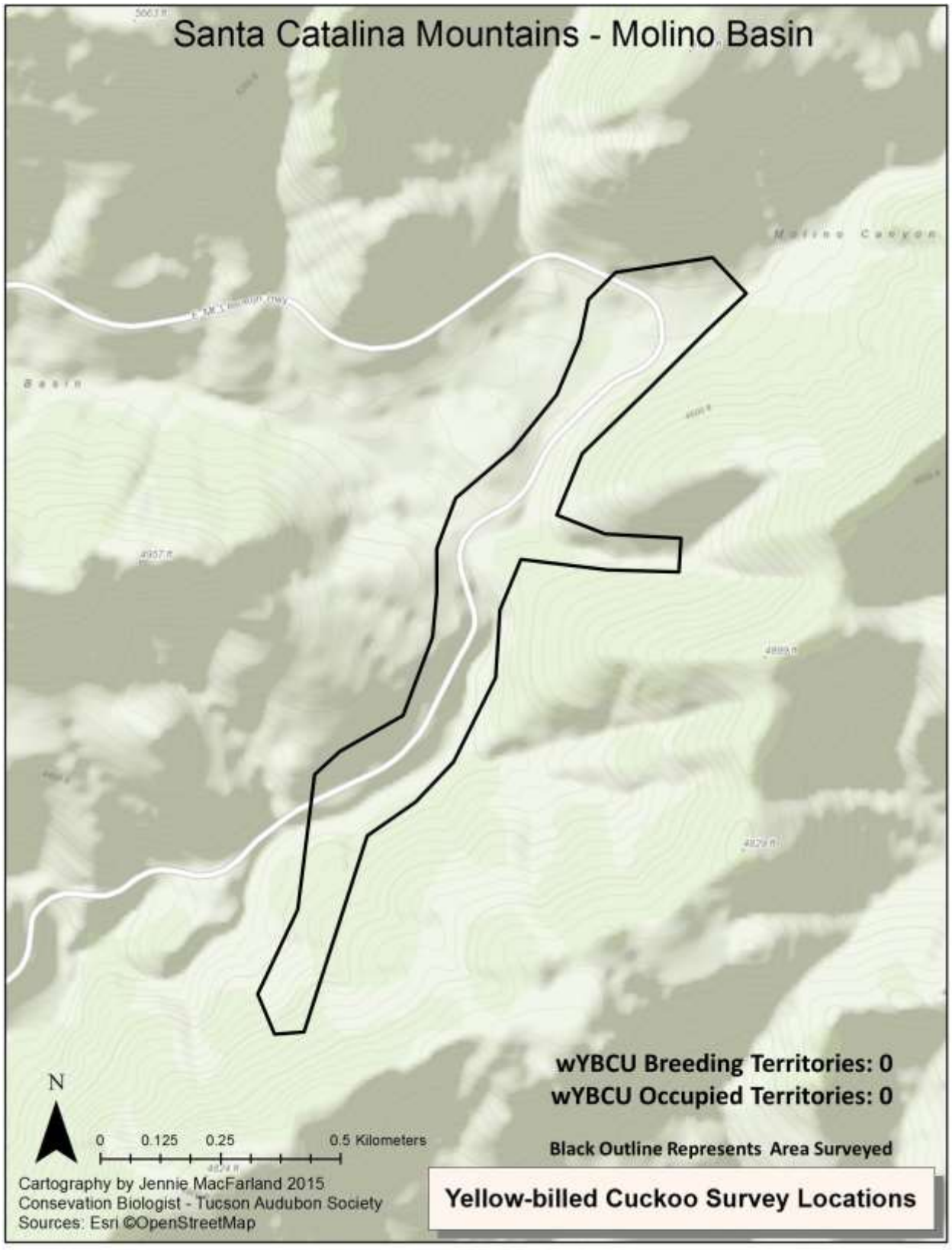

Santa Catalina Mountains - Gordon Hirabayashi to Sycamore Reservoir
BEAR CANYON
N Mt Lemmon Hwy
Gibbon Mountain
5788 ft
5753 ft
N
0
0.25
0.5
1 Kilometers
Cartography by Jennie MacFarland 2015
Consevation Biologist - Tucson Audubon Society
Sources: Esri ©OpenStreetMap
Yellow-billed Cuckoo Survey Locations

Molino Basin

No Detections

A well known birding hot spot on Mount Lemmon, these was a very logical location to check for wYBCU due to its large sycamore trees and large riparian zone. No wYBCU were detected during surveys but other species documented include Broad-billed Hummingbird, Ash-throated Flycatcher, Hutton's Vireo, Rock Wren, Canyon Wren, Cactus Wren, Blue-gray Gnatcatcher and Black-tailed Gnatcatcher.

Date	# YBCU	A/V/B	Vocal	Behavior	Note	Elevation Ft.
08/03/2015	none					

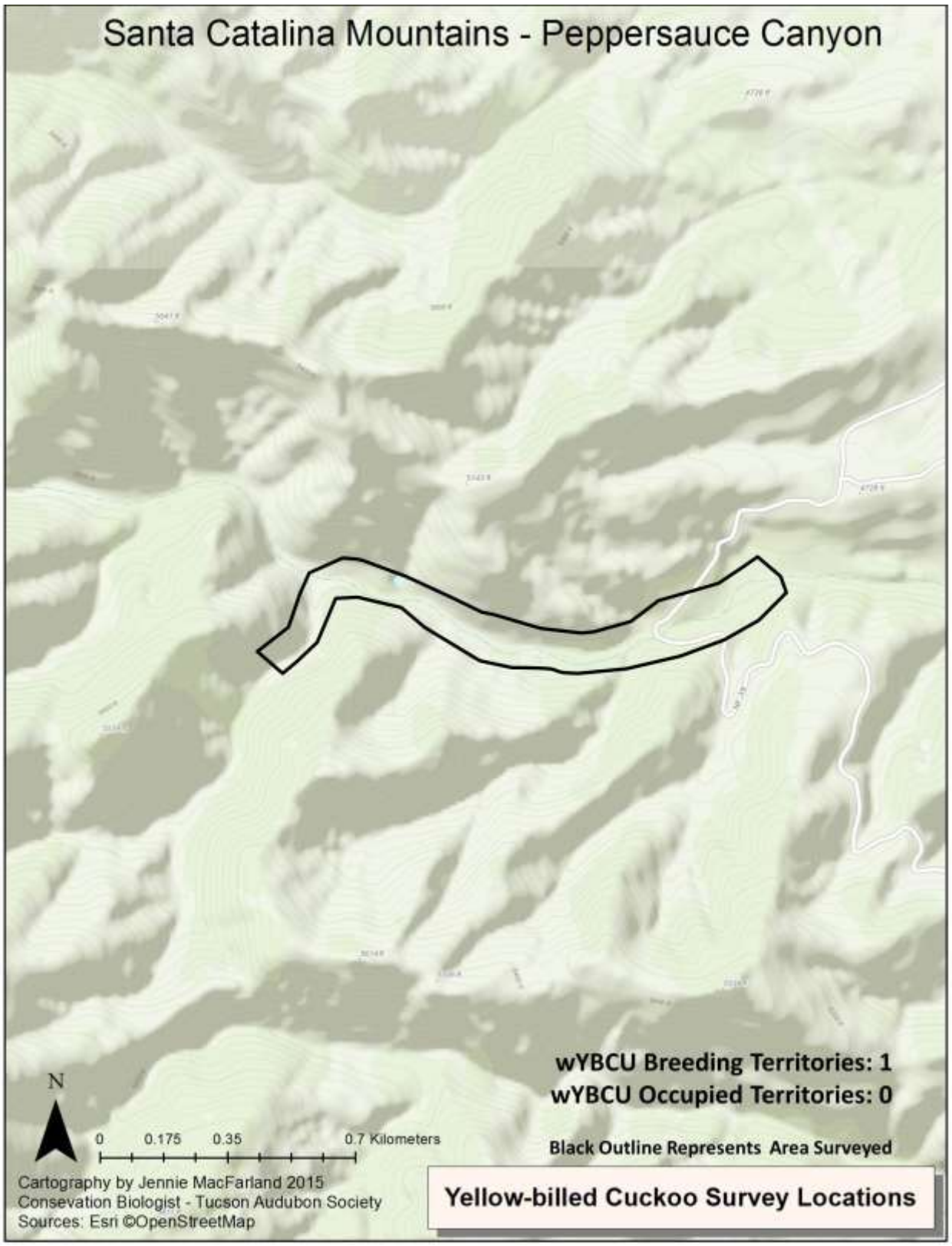

Santa Catalina Mountains - Molino Basin
wYBCU Breeding Territories: 0
wYBCU Occupied Territories: 0
Black Outline Represents Area Surveyed
N
0 0.125 0.25 0.5 Kilometers
Cartography by Jennie MacFarland 2015
Consevation Biologist - Tucson Audubon Society
Sources: Esri ©OpenStreetMap
Yellow-billed Cuckoo Survey Locations

Peppersauce Canyon

Breeding Territories: 1

This canyon is on the north side of the range and is accessed from the town of Oracle. This was the only route surveyed in the Santa Catalina mountains where wYBCU were detected. They were documented on both surveys that were conducted in this drainage and on the second visit were confirmed as a pair. Other species detected in this canyon include: Broad-billed Hummingbird, Olive-sided Flycatcher (an early migrant), Bell's Vireo, White-breasted Nuthatch and Verdin.

Date	# YBCU	A/V/B	Vocal	Behavior	Note	Elevation Ft.
08/03/2015	1	A	ALA			4671
08/17/2015	2	A	CON		One cuckoo heard to left (2 knocks) 2nd cuckoo to right (full Kwalop).	4623

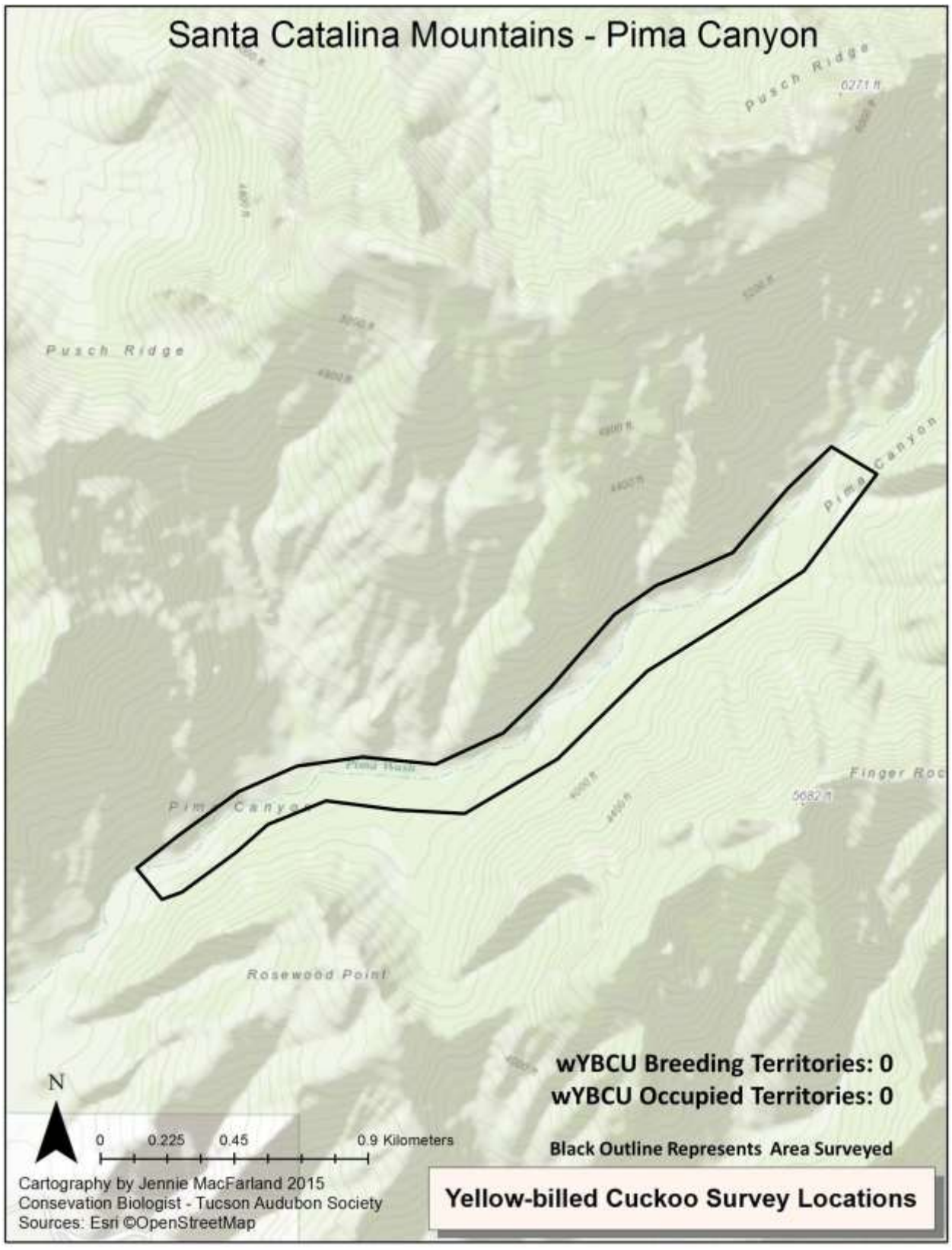

Santa Catalina Mountains - Peppersauce Canyon
wYBCU Breeding Territories: 1
wYBCU Occupied Territories: 0
Black Outline Represents Area Surveyed
N
0 0.175 0.35 0.7 Kilometers
Cartography by Jennie MacFarland 2015
Consevation Biologist - Tucson Audubon Society
Sources: Esri ©OpenStreetMap
Yellow-billed Cuckoo Survey Locations

Pima Canyon

No Detections

This survey route lies within a low elevation canyon with high walls and a narrow riparian zone. No wYBCU were detected but other birds seen include: Gila Woodpecker, Gilded Flicker, Costa's Hummingbird, Cassin's Kingbird, Western Scrub-jay, Rock Wren, Canyon Wren, Bewick's Wren and Cactus Wren. A Western Tanager was seen as well which would be an early migrant at the time of this survey.

Date	# YBCU	A/V/B	Vocal	Behavior	Note	Elevation Ft.
07/20/2015	none					

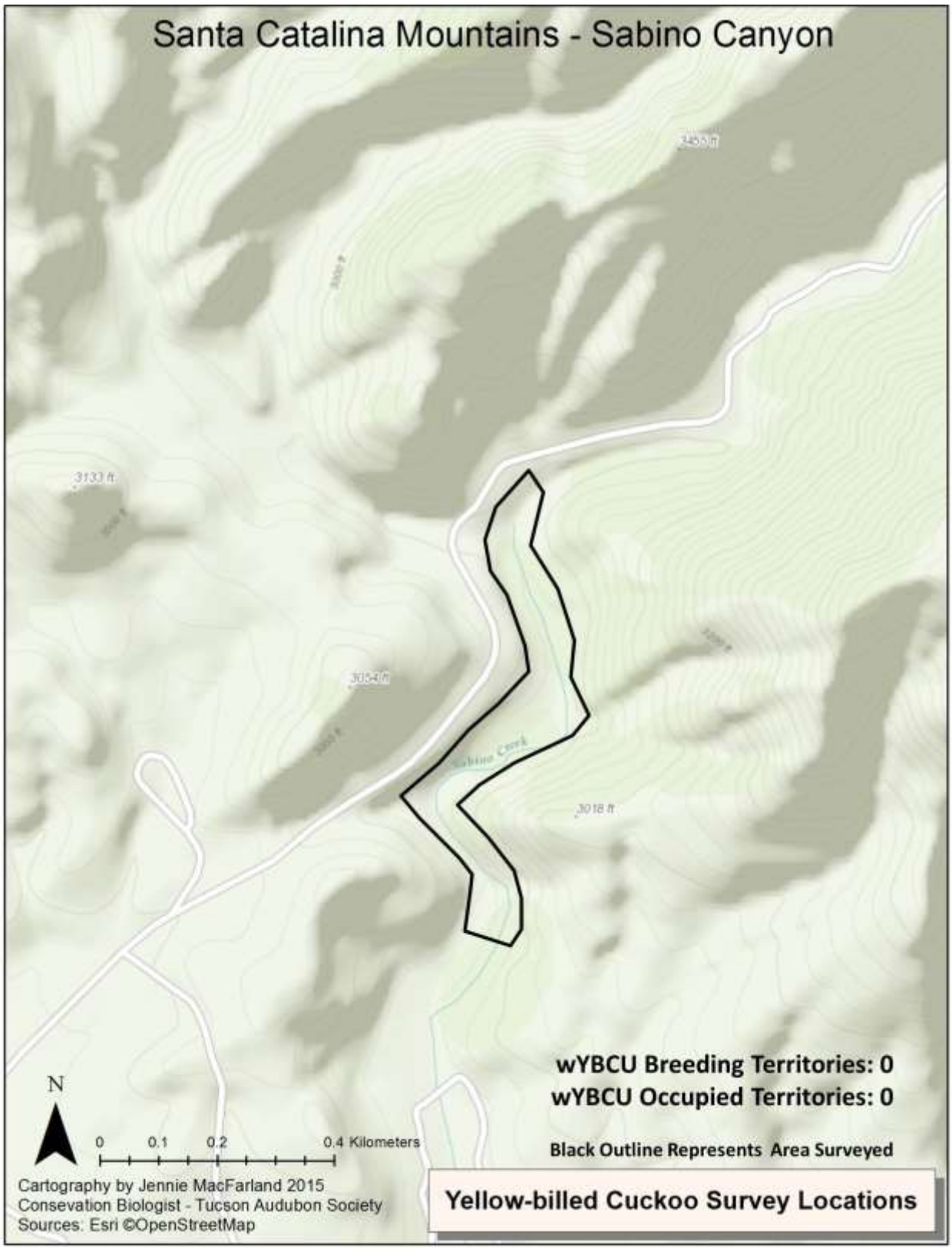

Santa Catalina Mountains - Pima Canyon
Pusch Ridge
Pusch Ridge
Pima Canyon
Pima Canyon
Finger Roc
5682 ft
Rosewood Point
N
0
0.225
0.45
0.9 Kilometers
wYBCU Breeding Territories: 0
wYBCU Occupied Territories: 0
Black Outline Represents Area Surveyed
Cartography by Jennie MacFarland 2015
Consevation Biologist - Tucson Audubon Society
Sources: Esri ©OpenStreetMap
Yellow-billed Cuckoo Survey Locations

Sabino Canyon

No Detections

There are several eBird reports for this area but they are all dated in July, none in August. This canyon contains some of the best canyon riparian vegetation in the entire mountain range and has long been a favorite birding spot within the Tucson area. No wYBCUs were detected during the four surveys conducted here and other bird species documented include: Summer Tanager, Yellow Warbler, Lucy's Warbler, Abert's Towhee, Song Sparrow, Ash-throated Flycatcher, Brown-crested Flycatcher, Broad-billed Hummingbird and Bell's Vireo.

Date	YBCU	A/V/B	Vocal	Behavior	Note	Elevation
07/10/2015	none					
07/24/2015	none					
08/06/2015	none					
08/15/2015	none					


Santa Catalina Mountains - Sabino Canyon
3455 ft
3133 ft
3054 ft
3018 ft
Sabino Creek
N
0 0.1 0.2 0.4 Kilometers
Cartography by Jennie MacFarland 2015
Consevation Biologist - Tucson Audubon Society
Sources: Esri ©OpenStreetMap
wYBCU Breeding Territories: 0
wYBCU Occupied Territories: 0
Black Outline Represents Area Surveyed
Yellow-billed Cuckoo Survey Locations

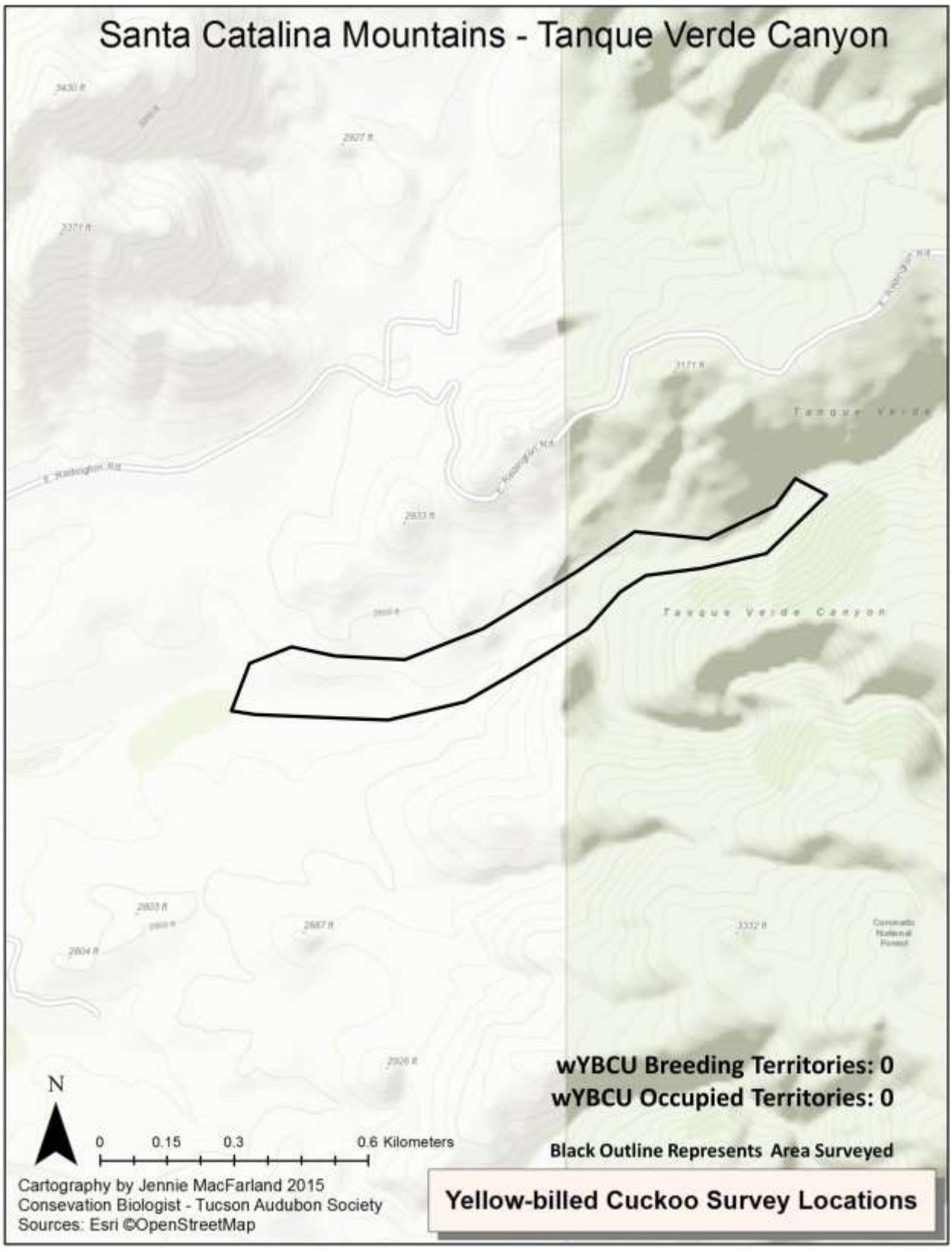
Tanque Verde Canyon

No Detections

As the canyon on the south east side of the Catalina Mountains that drains into Tanque Verde Canyon a large amount of water moves through this drainage and into the Tucson valley. It is perhaps the extreme torrents of water that come through this route that have caused the riparian habitat to be patchy and narrow. The pools of water on the rocks that line the bottom of the canyon did harbour wildlife including a canyon tree frog (top, right) and a checkered garter snake (center, right). Bird species detected on this route include: Curve-billed Thrasher, Phainopepla, Warbling Vireo, Nashville Warbler and Bell's Vireo.

Checkered Garter snake and Canyon Treefrog in canyon pools by Ben Smith

Date	#YBCU	A/V/B	Vocal	Behavior	Note	Elevation Ft.
08/03/2015	none					

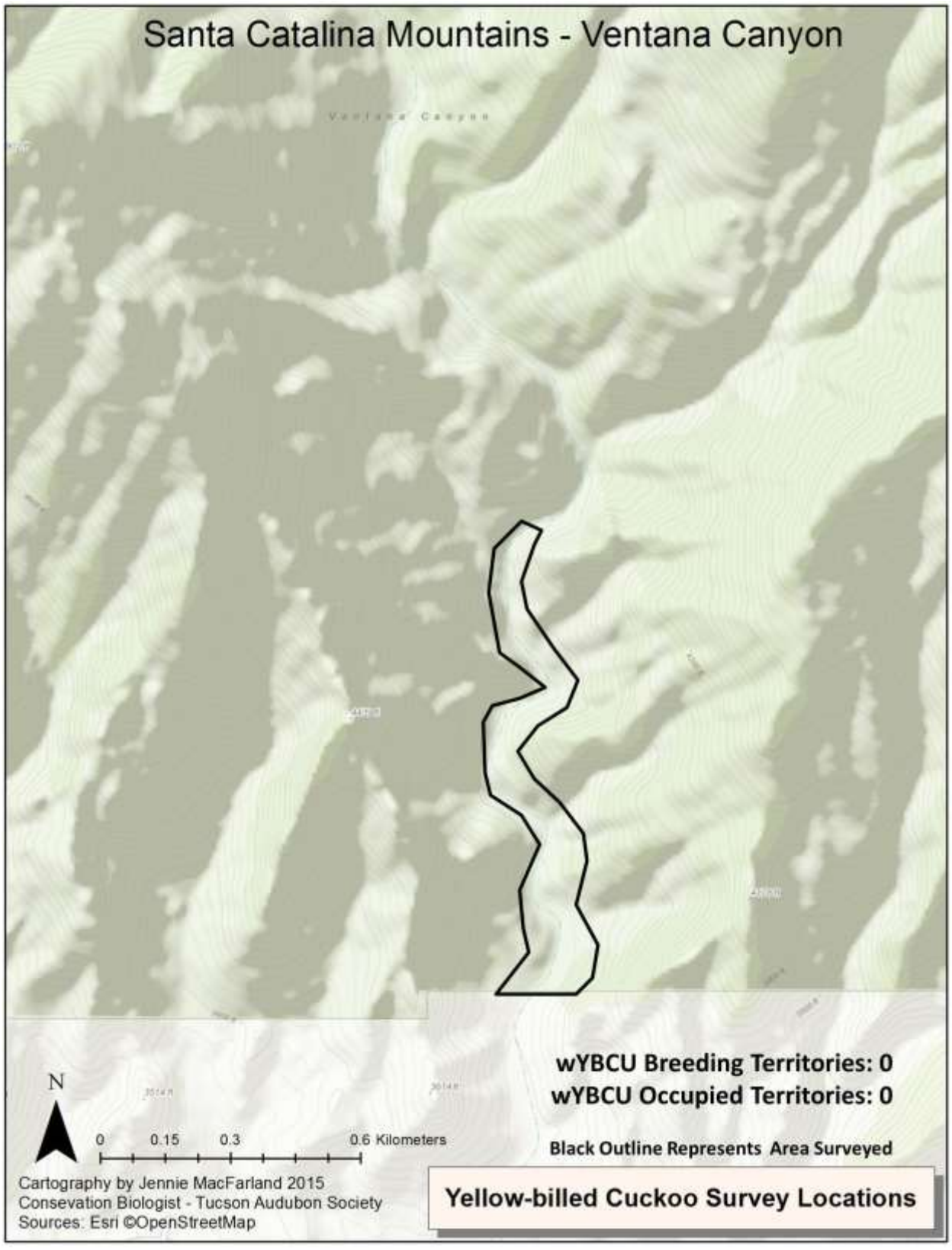

Santa Catalina Mountains - Tanque Verde Canyon
Tanque Verde
Tanque Verde Canyon
N
0 0.15 0.3 0.6 Kilometers
wYBCU Breeding Territories: 0
wYBCU Occupied Territories: 0
Black Outline Represents Area Surveyed
Cartography by Jennie MacFarland 2015
Consevation Biologist - Tucson Audubon Society
Sources: Esri ©OpenStreetMap
Yellow-billed Cuckoo Survey Locations

Ventana Canyon

No Sightings

This canyon contains a low elevation riparian zone and the trees that were cottonwoods at the beginning of the route were replaced by oaks as the route went up in elevation. This drainage has portions of habitat that look suitable for wYBCU but are perhaps too small and isolated. No wYBCU were detected and other bird species that were recorded include: Greater Roadrunner, Costa's Hummingbird, Northern Beardless-tyrannulet, Desert-nesting Purple Martin, Verdin, Canyon Wren, Black-throated Sparrow, Western Tanager, Canyon Towhee, Northern Cardinal, Pyrrhuloxia, Black-tailed Gnatcatcher and Phainopepla.

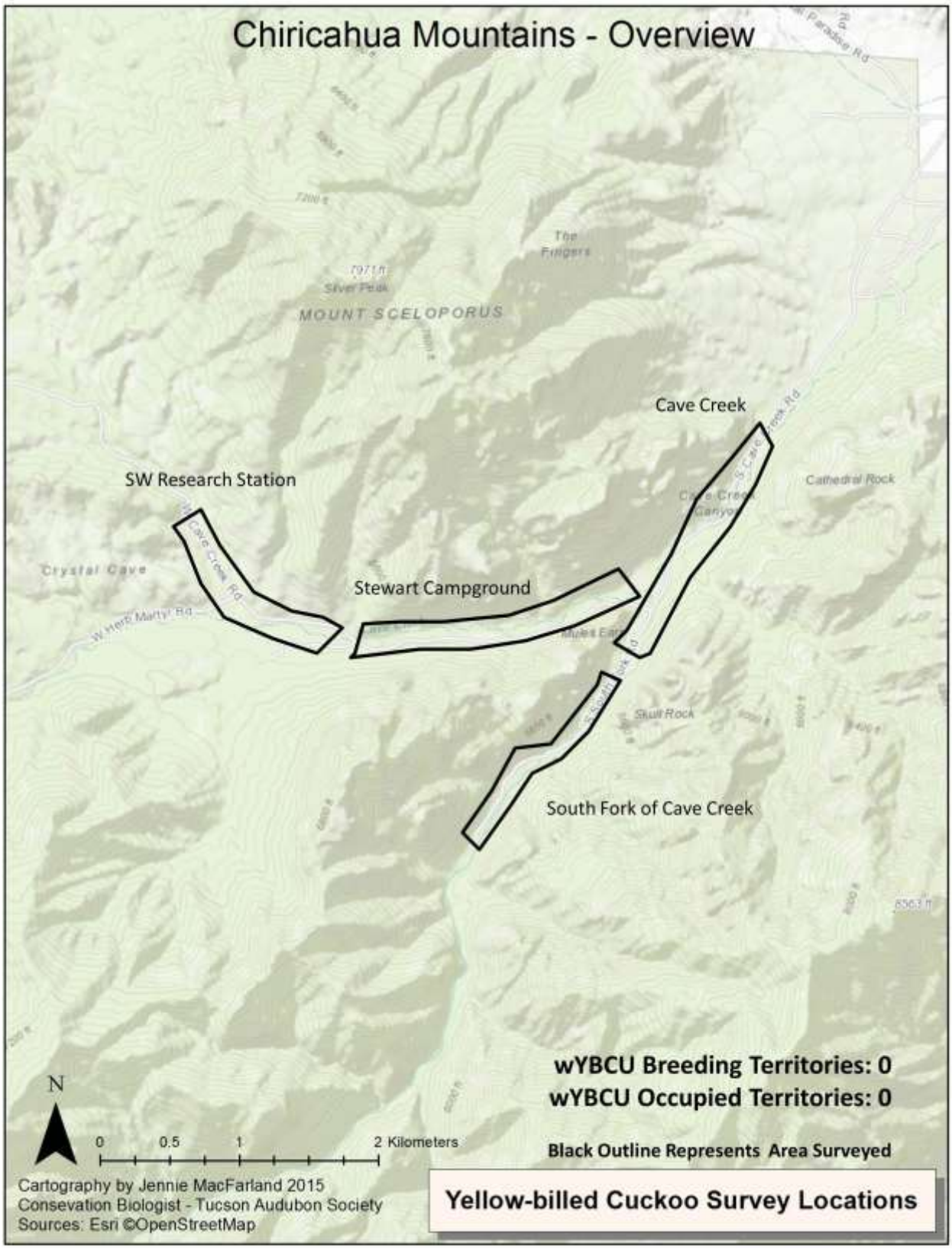
Date	# YBCU	A/V/B	Vocal	Behavior	Note	Elevation Ft.
08/03/2015	none					


Santa Catalina Mountains - Ventana Canyon
Ventana Canyon
N
0 0.15 0.3 0.6 Kilometers
wYBCU Breeding Territories: 0
wYBCU Occupied Territories: 0
Black Outline Represents Area Surveyed
Cartography by Jennie MacFarland 2015
Consevation Biologist - Tucson Audubon Society
Sources: Esri ©OpenStreetMap
Yellow-billed Cuckoo Survey Locations

Chiricahua Mountains

No Detections in Survey Areas

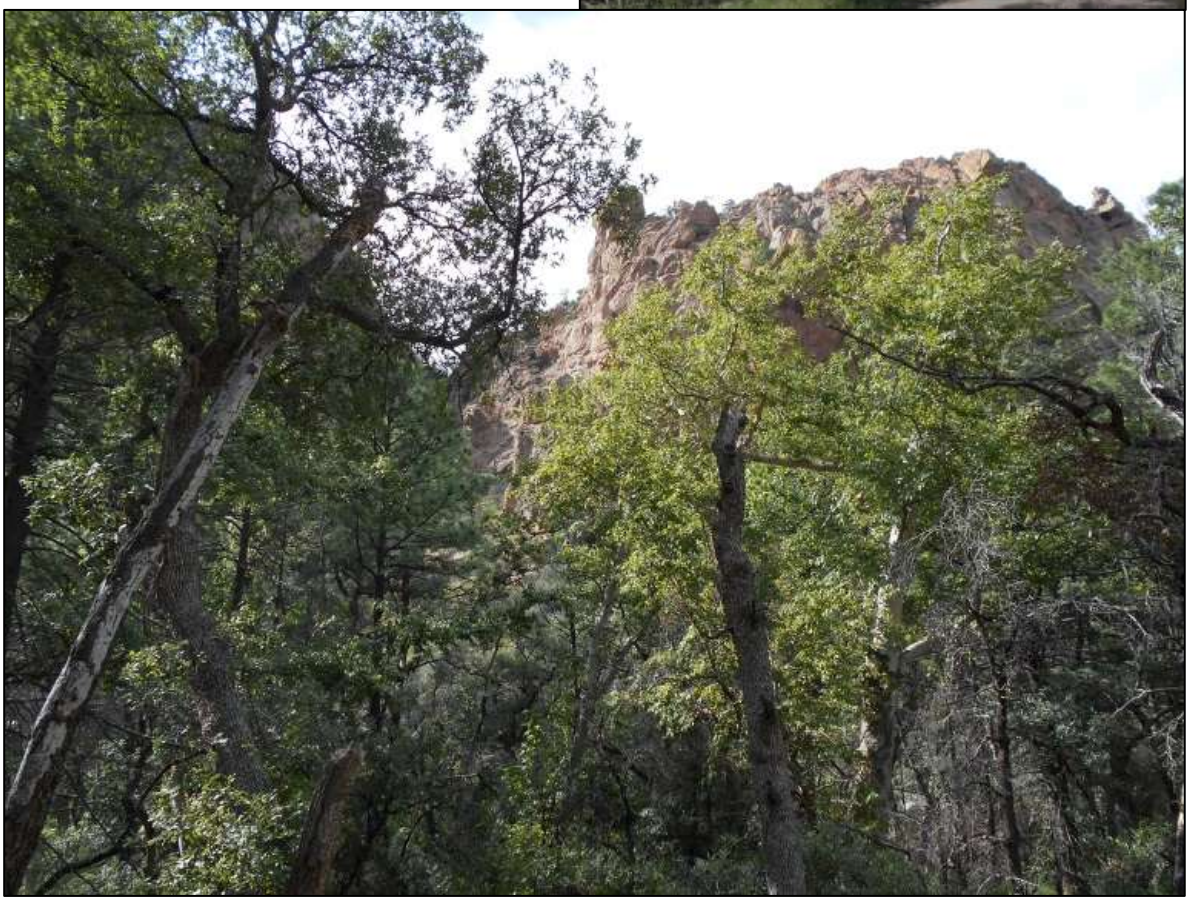
This mountain range is famed for its tremendous biodiversity and richness of bird species. For this project the only portion of the range that was surveyed on the east side and centered on the Cave Creek complex, including the often birded South Fork of Cave Creek. There were no detections of wYBCU anywhere in this range despite diligent surveying. A wYBCU was detected several times througout the breeding season in the nearby town of Portal but never in the Coronado National Forest. One birder not associated with this project did report a wYBCU in White-tail Canyon but only detected it once despite active searching later in the season. Given study results elsewhere, if the Chiricahuas were to be surveyed again for wYBCU a very different strategy would be used that would include drainages on the west side of the range and areas with a decreased prevalence of Arizona sycamore.


Chiricahua Mountains - Overview
MOUNT SCELOPORUS
Cave Creek
SW Research Station
Stewart Campground
South Fork of Cave Creek
Cathedral Rock
Crystal Cave
Skull Rock
wYBCU Breeding Territories: 0
wYBCU Occupied Territories: 0
Black Outline Represents Area Surveyed
N
0
0.5
1
2 Kilometers
Cartography by Jennie MacFarland 2015
Consevation Biologist - Tucson Audubon Society
Sources: Esri ©OpenStreetMap
Yellow-billed Cuckoo Survey Locations

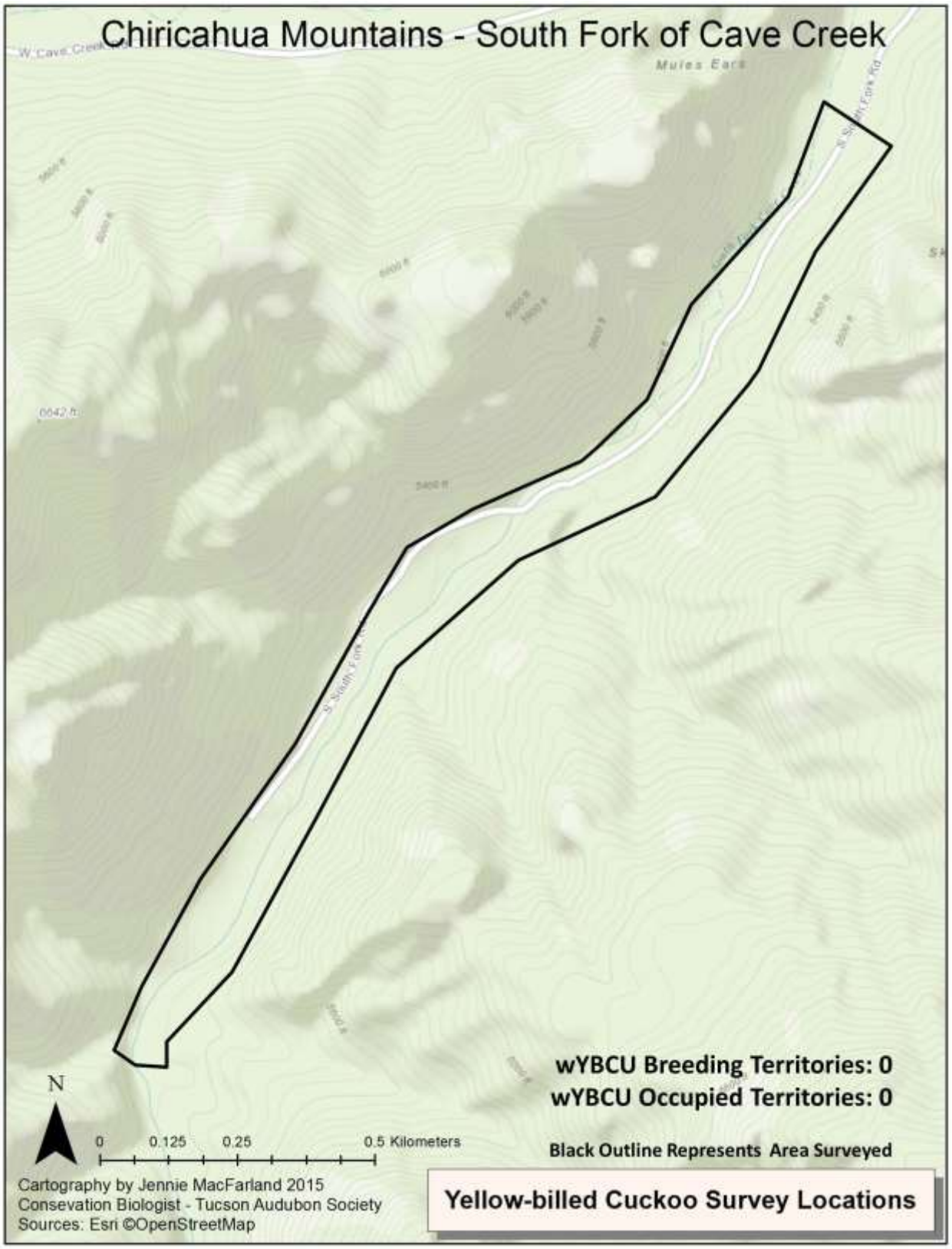
South Fork of Cave Creek

No Detections

This road was washed out during the flooding of 2014 and can no longer be driven so surveyors had to walk this route. Notably this entire Cave Creek complex has been excellent for Elegant Trogons, especially before the Horsehoe II fire and their numbers have been slowly increasing in recent years.



Date	# YBCU	A/V/B	Vocal	Behavior	Note	Elevation Ft.
07/13/2015	none					
07/25/2015	none					
07/28/2015	none					
08/10/2015	none					
08/23/2015	none					
09/11/2015	none					


Chiricahua Mountains - South Fork of Cave Creek
Mules Ears
S South Fork Rd
6642 ft
5400 ft
wYBCU Breeding Territories: 0
wYBCU Occupied Territories: 0
N
0 0.125 0.25 0.5 Kilometers
Black Outline Represents Area Surveyed
Cartography by Jennie MacFarland 2015
Consevation Biologist - Tucson Audubon Society
Sources: Esri ©OpenStreetMap
Yellow-billed Cuckoo Survey Locations

Cave Creek at Stewart Campground

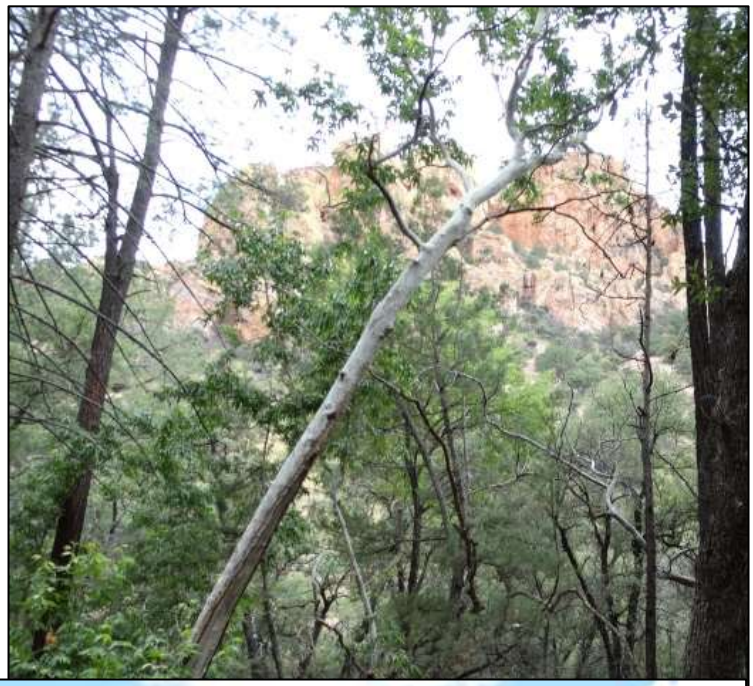
No Detections

This area of the Chiricahuas is very well vegetated with tall large trees and parallels south fork of Cave Creek with the road traveling on either side of the drainage. This is another area with excellent riparian habitat that is excellent for Elegant Trogons and many other bird species.

Date	# YBCU	A/V/B	Vocal	Behavior	Note	Elevation Ft.
07/12/2015	none					
07/28/2015	none					
08/11/2015	none					
08/24/2015	none					
09/11/2015	none					


Chiricahua Mountains - Stewart CG
Cave Creek Can
W Cave Creek Rd
Mules Ears
Skull Rock
wYBCU Breeding Territories: 0
wYBCU Occupied Territories: 0
N
0 0.125 0.25 0.5 Kilometers
Black Outline Represents Area Surveyed
Cartography by Jennie MacFarland 2015
Conservation Biologist - Tucson Audubon Society
Sources: Esri ©OpenStreetMap
Yellow-billed Cuckoo Survey Locations

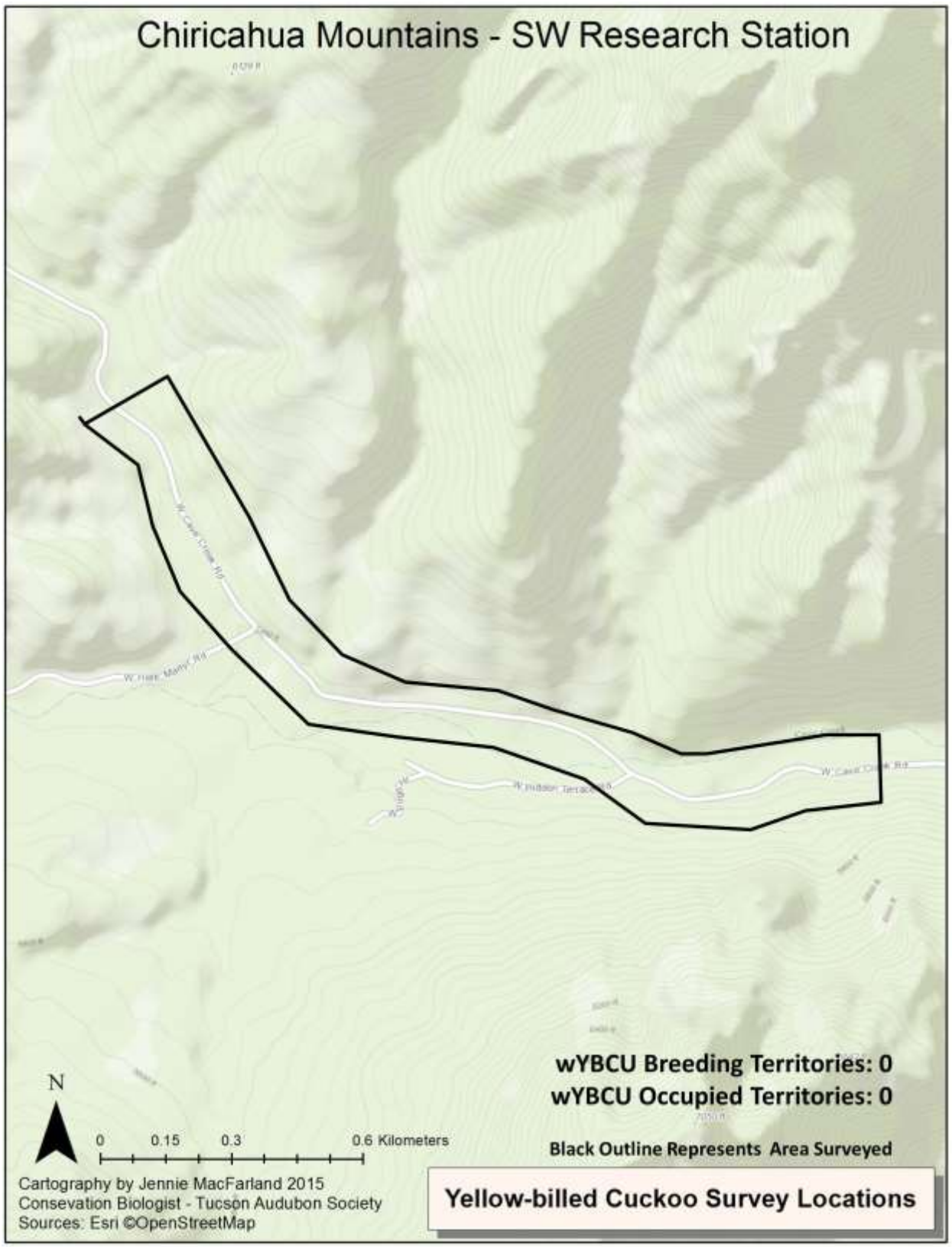
Cave Creek at SW Research Station



No Detections

This area is a classic destination for birders in southeast Arizona and has yielded many rare bird species over the years including a Green Kingfisher in 2015 and Slate-throated Redstart in 2014. There is a side drainage that flows behind the SW Research Station and regularly flows after rain event and in the spring that is very attractive to birds. The lush vegetaion in the area creates very good habitat for Elegant Trogons.

Date	# YBCU	A/V/B	Vocal	Behavior	Note	Elevation Ft.
07/13/2015	none					
08/12/2015	none					
08/25/2015	none					
09/11/2015	none					

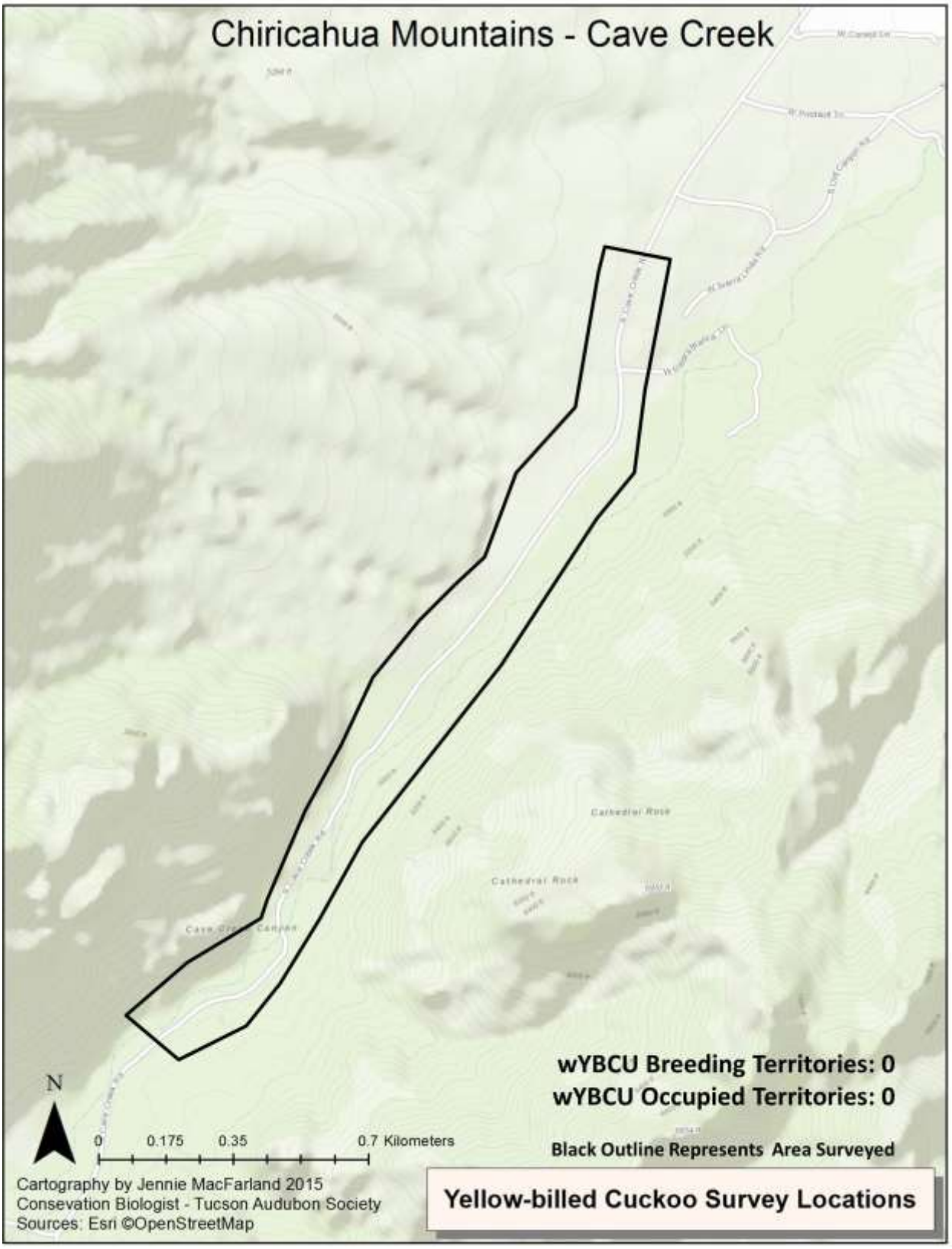

Chiricahua Mountains - SW Research Station
N
0 0.15 0.3 0.6 Kilometers
wYBCU Breeding Territories: 0
wYBCU Occupied Territories: 0
Black Outline Represents Area Surveyed
Cartography by Jennie MacFarland 2015
Consevation Biologist - Tucson Audubon Society
Sources: Esri ©OpenStreetMap
Yellow-billed Cuckoo Survey Locations

Lower Cave Creek

No Detections

This is the surveyed route closest to the confirmed supplemental observations of a pair of wYBCU nesting in the town of Portal outside of the study area. This is an excellent area for native birds and a reliable area to find Elegant Trogons in the late spring.

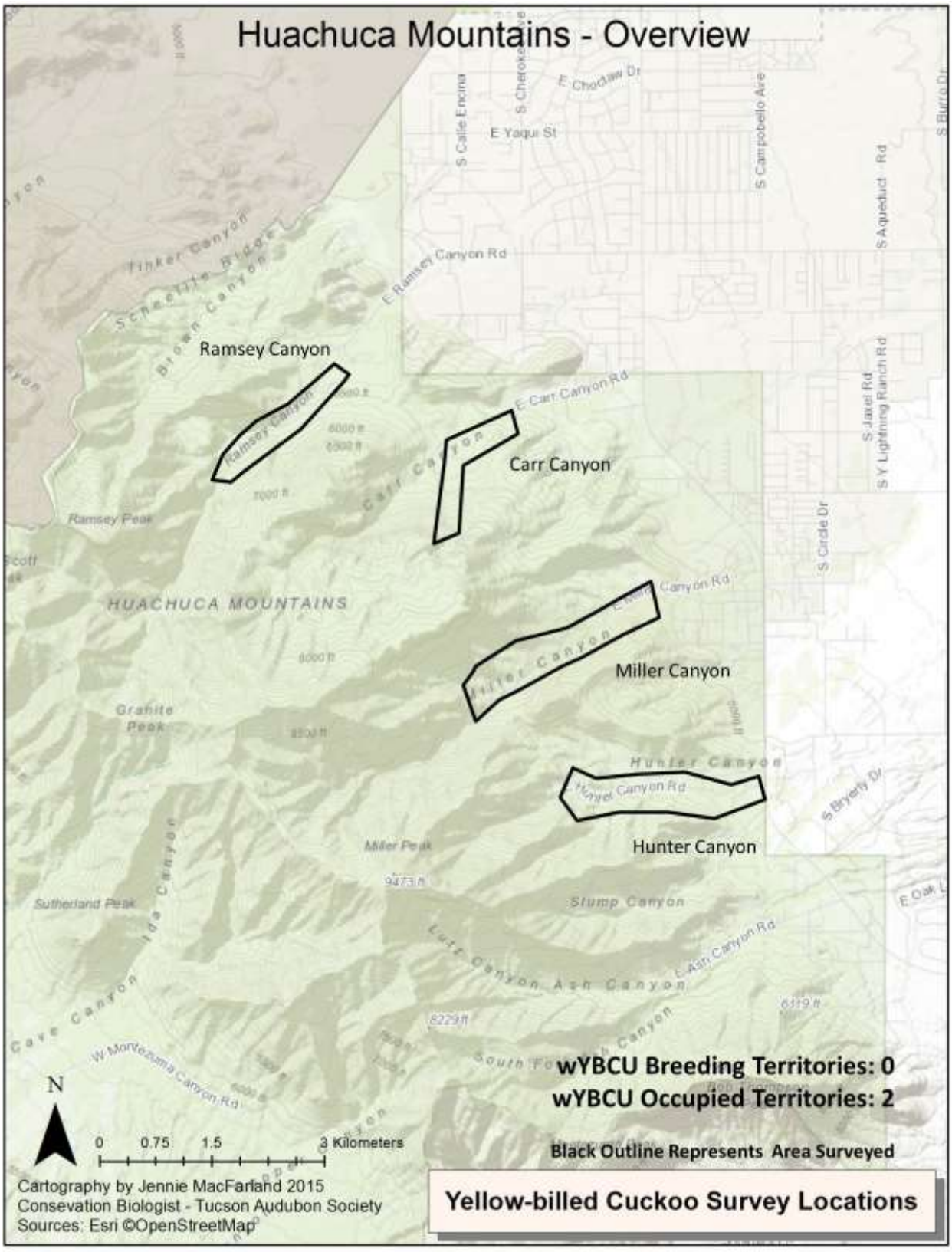
Date	# YBCU	A/V/B	Vocal	Behavior	Note	Elevation Ft.
07/14/2015	none					
07/29/2015	none					
09/11/2015	none					


Chiricahua Mountains - Cave Creek
Cathedral Rock
Cathedral Rock
N
0
0.175
0.35
0.7 Kilometers
wYBCU Breeding Territories: 0
wYBCU Occupied Territories: 0
Black Outline Represents Area Surveyed
Cartography by Jennie MacFarland 2015
Consevation Biologist - Tucson Audubon Society
Sources: Esri ©OpenStreetMap
Yellow-billed Cuckoo Survey Locations

Huachuca Mountains

Occupied Territories: 2

This mountain range is a famous birding destination and was surveyed out of Sierra Vista. Two of the drainages surveyed did not have any wYBCU detections on any of the surveys despite initial thoughts that this range would be excellent for this species. Notably, this mountain range is excellent for Elegant Trogons and is often times contains the most trogons of any range during the annual Elegant Trogon census every May. Carr Canyon's lack of detections in particular came as a surprise as the portion of this canyon surveyed contains excellent oak lined riparian habitat. Two canyons did have positive wYBCU detections, and in Miller Canyon they were detected more than once. Interestingly, this canyon did not have any Elegant Trogons present this past May.

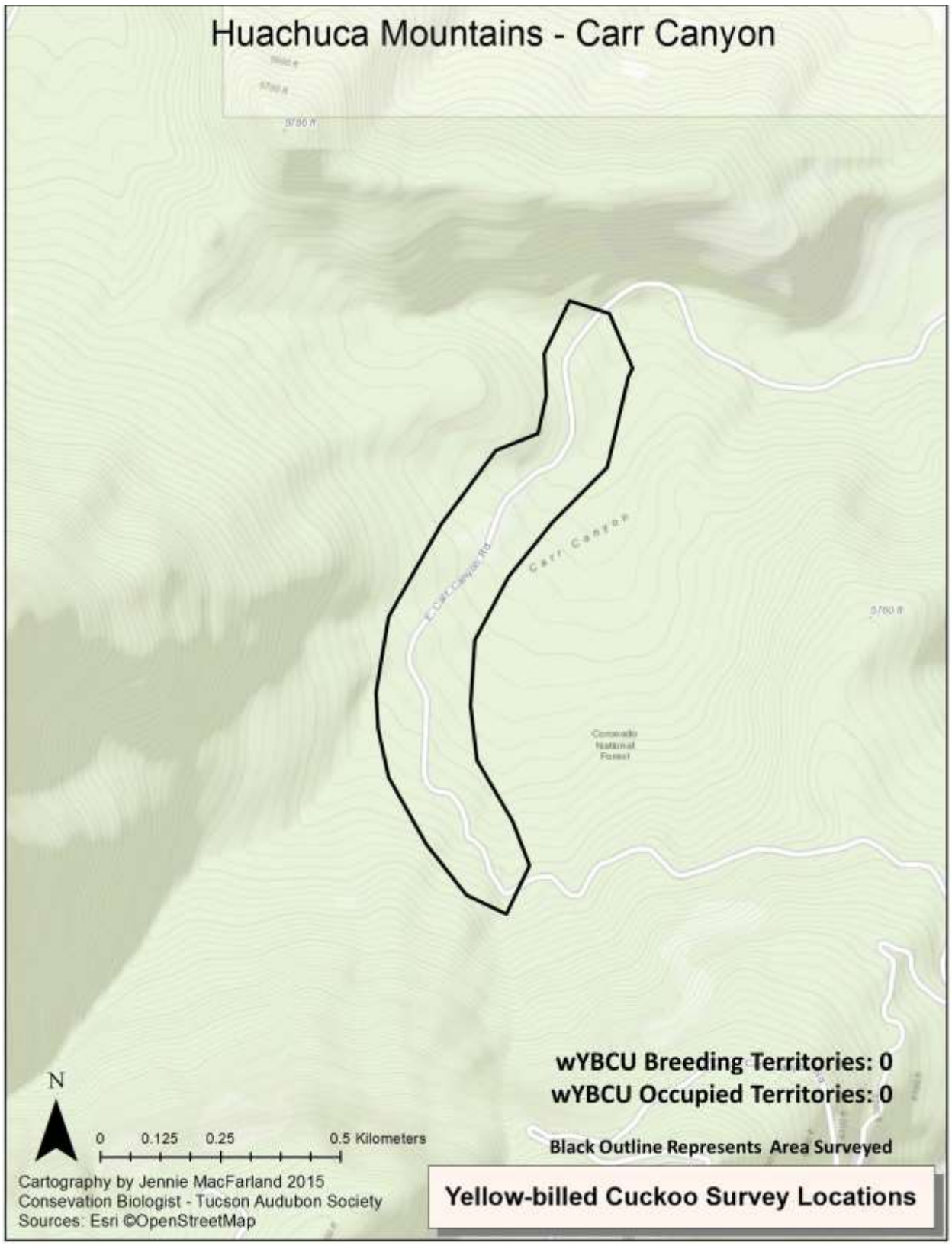

Huachuca Mountains - Overview
Ramsey Canyon
Carr Canyon
Miller Canyon
Hunter Canyon
HUACHUCA MOUNTAINS
Ramsey Peak
Miller Peak
Sutherland Peak
Stump Canyon
E Ramsey Canyon Rd
E Carr Canyon Rd
E Miller Canyon Rd
E Hunter Canyon Rd
E Ash Canyon Rd
W Montezuma Canyon Rd
S Calle Encina
S Cherokee Ave
E Choctaw Dr
E Yaqui St
S Campobello Ave
S Aqueduct Rd
S Jaxel Rd
S Y Lightning Ranch Rd
S Circle Dr
S Bryerly Dr
E Oak
N
0 0.75 1.5 3 Kilometers
wYBCU Breeding Territories: 0
wYBCU Occupied Territories: 2
Black Outline Represents Area Surveyed
Cartography by Jennie MacFarland 2015
Consevation Biologist - Tucson Audubon Society
Sources: Esri ©OpenStreetMap
Yellow-billed Cuckoo Survey Locations

Carr Canyon

No Detections

This canyon is well known as a site for birding and would seem to contain excellent habitat for wYBCU though none were detected on the four surveys throughout July and August. There were many other species of birds detected here including: Wild Turkey, Rufous Hummingbird, Dusky-capped Flycatcher, Acorn Woodpecker, Mexican Jay, Bridled Titmouse, Bushtit, Sulphur-bellied Flycatcher and Hutton's Vireo.

Date	# YBCU	A/V/B	Vocal	Behavior	Note	Elevation Ft.
07/07/2015	none					
07/21/2015	none					
08/04/2015	none					
09/10/2015	none					

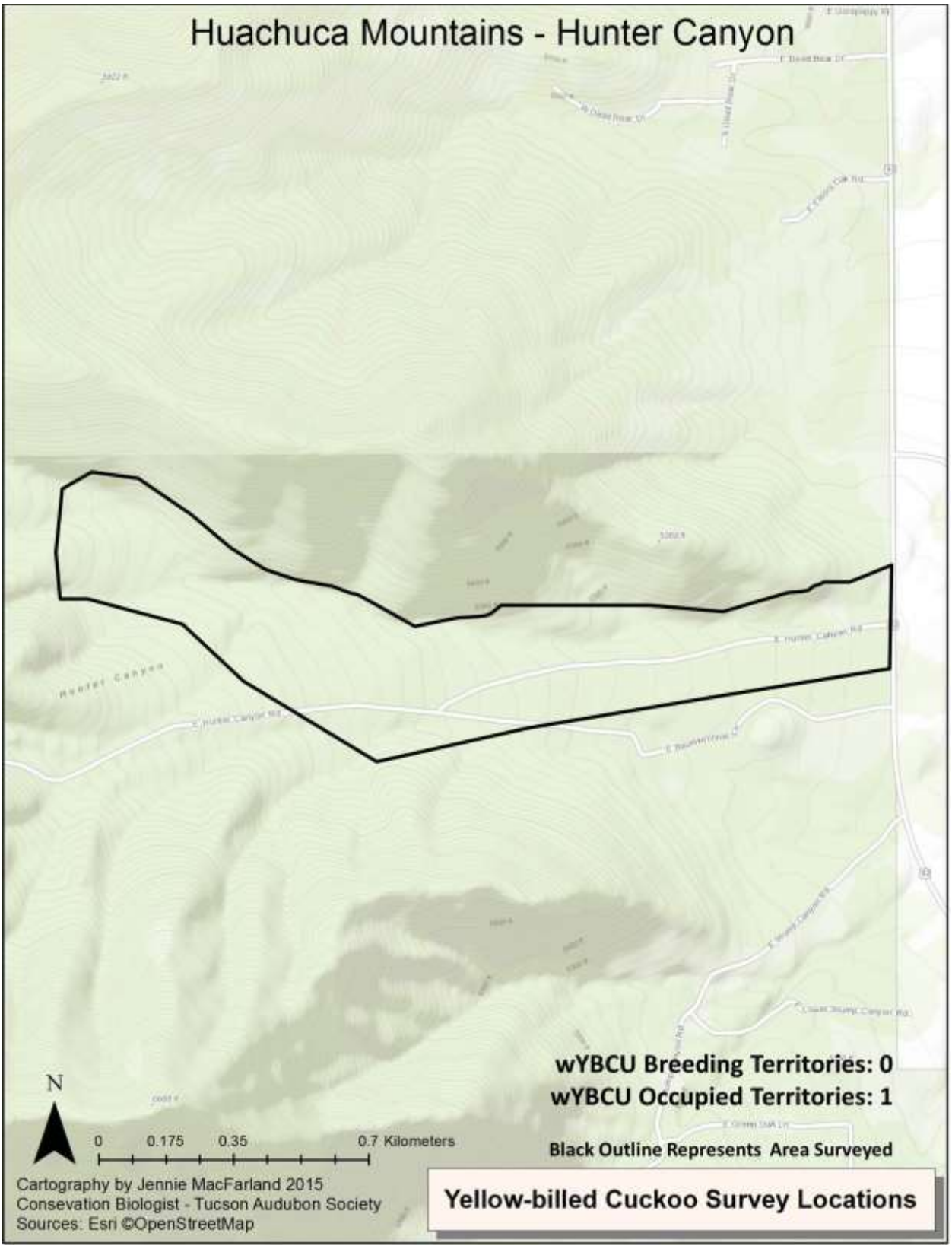

Huachuca Mountains - Carr Canyon
Carr Canyon
wYBCU Breeding Territories: 0
wYBCU Occupied Territories: 0
Black Outline Represents Area Surveyed
N
0 0.125 0.25 0.5 Kilometers
Cartography by Jennie MacFarland 2015
Consevation Biologist - Tucson Audubon Society
Sources: Esri ©OpenStreetMap
Yellow-billed Cuckoo Survey Locations

Hunter Canyon

Occupied Territories: 1

There was one positive wYBCU habitat in the best habitat within this drainage. The bird was an adult and seen in late August in a part of the creek not surveyed every time earlier in the season. It is possible this territory was occupied earlier in the season as well and not detected by surveyors.

Date	# YBCU	A/V/B	Vocal	Behavior	Note	Elevation Ft.
07/07/2015	none					
07/21/2015	none					
08/04/2015	none					
08/18/2015	1	B	COO CON	ST FLY	Called repeatedly and moved around. Vegetation older and taller here with 90% oak, 5% Juniper and 5% Sycamore.	5071
09/10/2015	none					

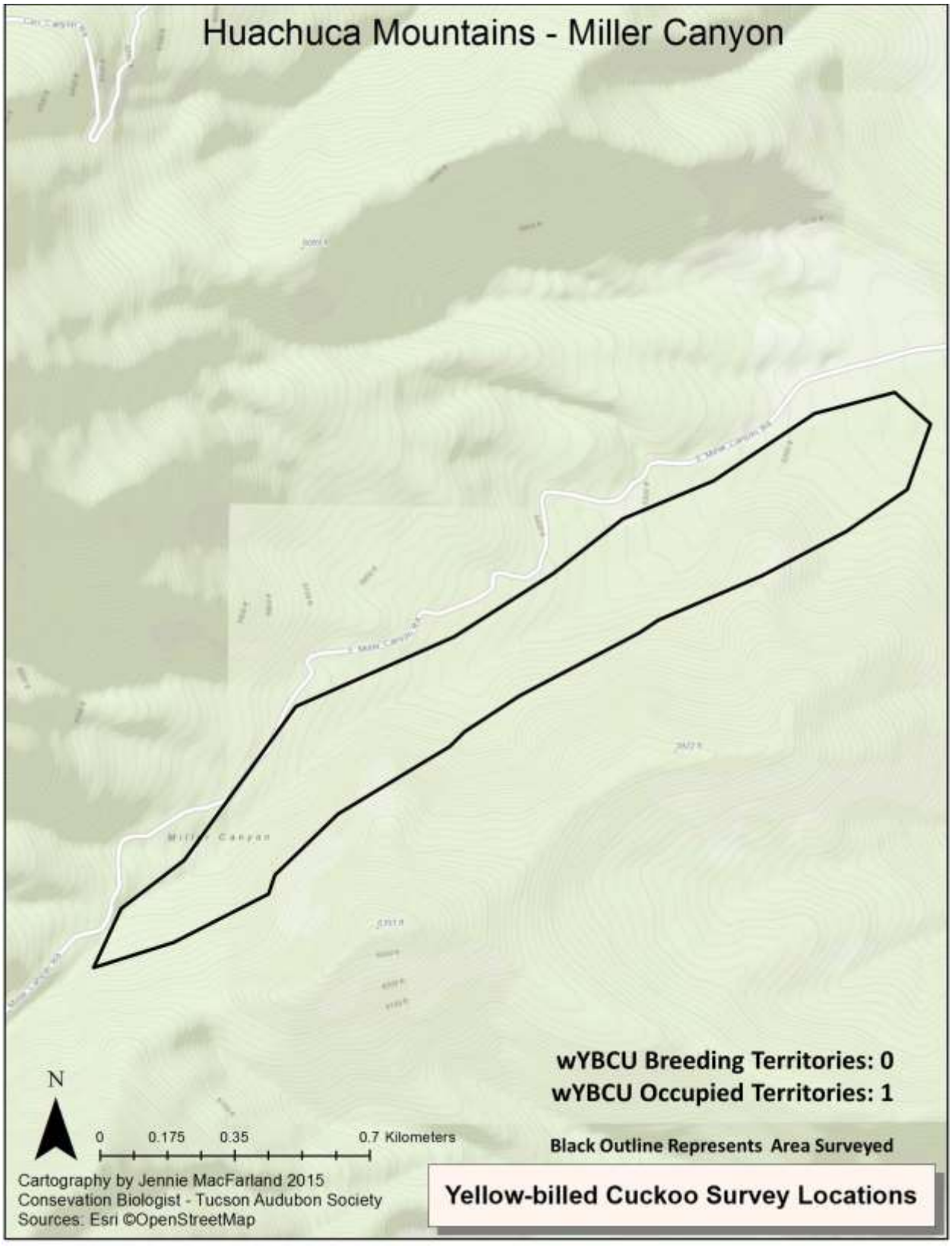

Huachuca Mountains - Hunter Canyon
Hunter Canyon
wYBCU Breeding Territories: 0
wYBCU Occupied Territories: 1
Black Outline Represents Area Surveyed
N
0 0.175 0.35 0.7 Kilometers
Cartography by Jennie MacFarland 2015
Consevation Biologist - Tucson Audubon Society
Sources: Esri ©OpenStreetMap
Yellow-billed Cuckoo Survey Locations

Miller Canyon

Occupied Territories: 1

wYBCU were detected twice in this canyon, once in July and again in late August. This drainage contains excellent oak lined riparian habitat along its lower portion that was largely unharmed during the major fire in this mountain range several years ago. Notably, no Elegant Trogons were detected in the last three years of the trogon census that occurs in May and this lack of apparent competitors could be why wYBCU were found to be using this canyon.

Date	# YBCU	A/V/B	Vocal	Behavior	Note	Elevation Ft.
07/10/2015	1	B	CON	FLY, ST	Flew in to 5th playback and contact call given twice while perched in oak; then flew off.	5309
07/24/2015	none					
08/07/2015	none					
08/19/2015	1	A	COO		Bird cooing in distance in response to playback; not seen.	5177
09/10/2105	none					

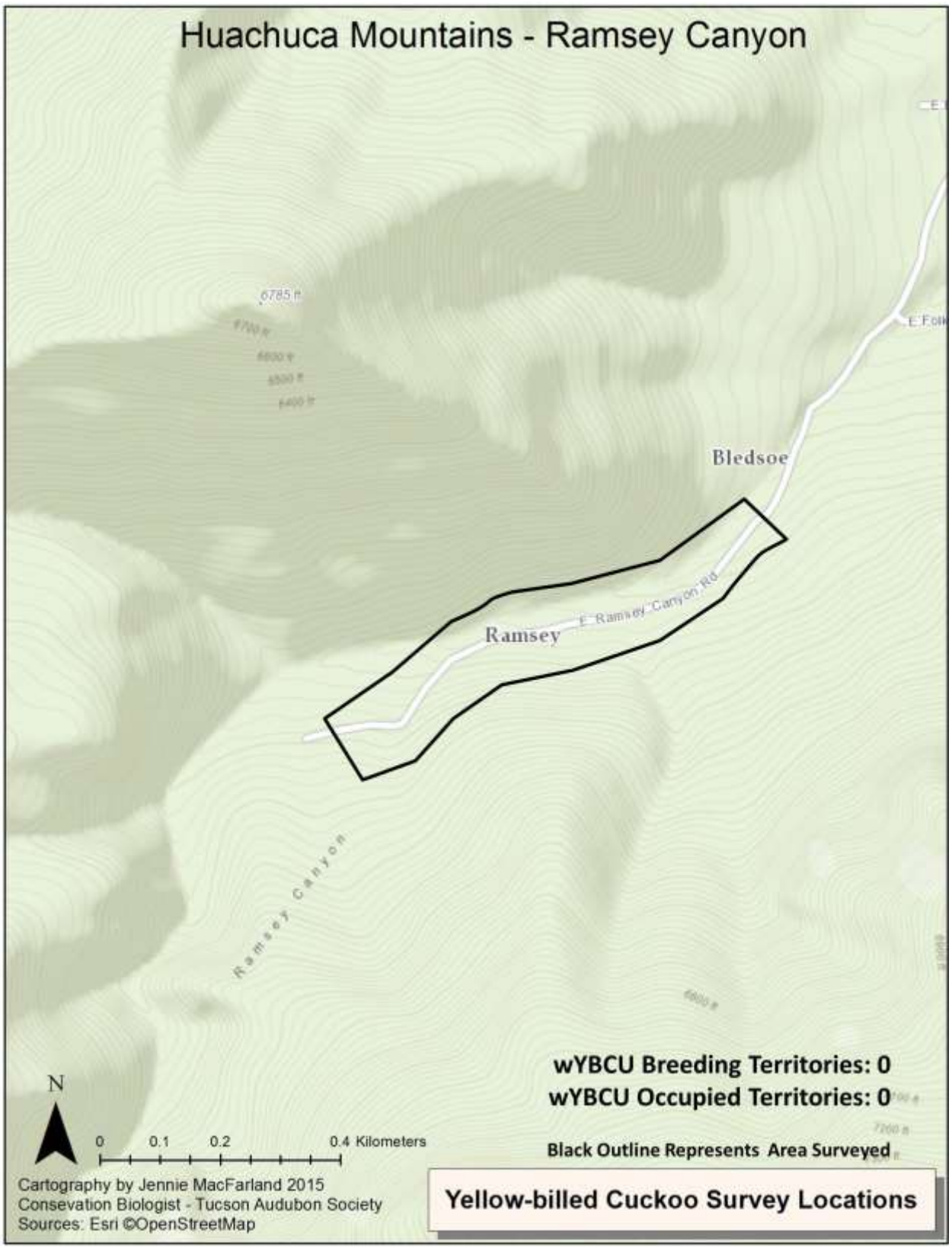

Huachuca Mountains - Miller Canyon
wYBCU Breeding Territories: 0
wYBCU Occupied Territories: 1
Black Outline Represents Area Surveyed
N
0 0.175 0.35 0.7 Kilometers
Cartography by Jennie MacFarland 2015
Consevation Biologist - Tucson Audubon Society
Sources: Esri ©OpenStreetMap
Yellow-billed Cuckoo Survey Locations

Ramsey Canyon

No Detections

A well known hot spot for birding, this canyon contains excellent riparian habitat lined with large sycamore trees. No wYBCU were detected here though, notably Elegant Trogons were detected on multiple occasions. Other bird species detected by surveyors include: Violet-crowned Hummingbird, Sulphur-bellied Flycatcher, Hepatic Tanager, Mexican Jay, Bridled Titmouse and Bewick's Wren. There were also two rare birds seen in this canyon on survey days: the Flame-colored Tanager and Tufted Flycatcher pair that built a nest in upper Ramsey Canyon this summer.

Date	#YBCU	A/V/B	Vocal	Behavior	Note	Elevation Ft.
07/10/2015	none					
07/24/2015	none					
08/07/2015	None					
08/21/2015	none					

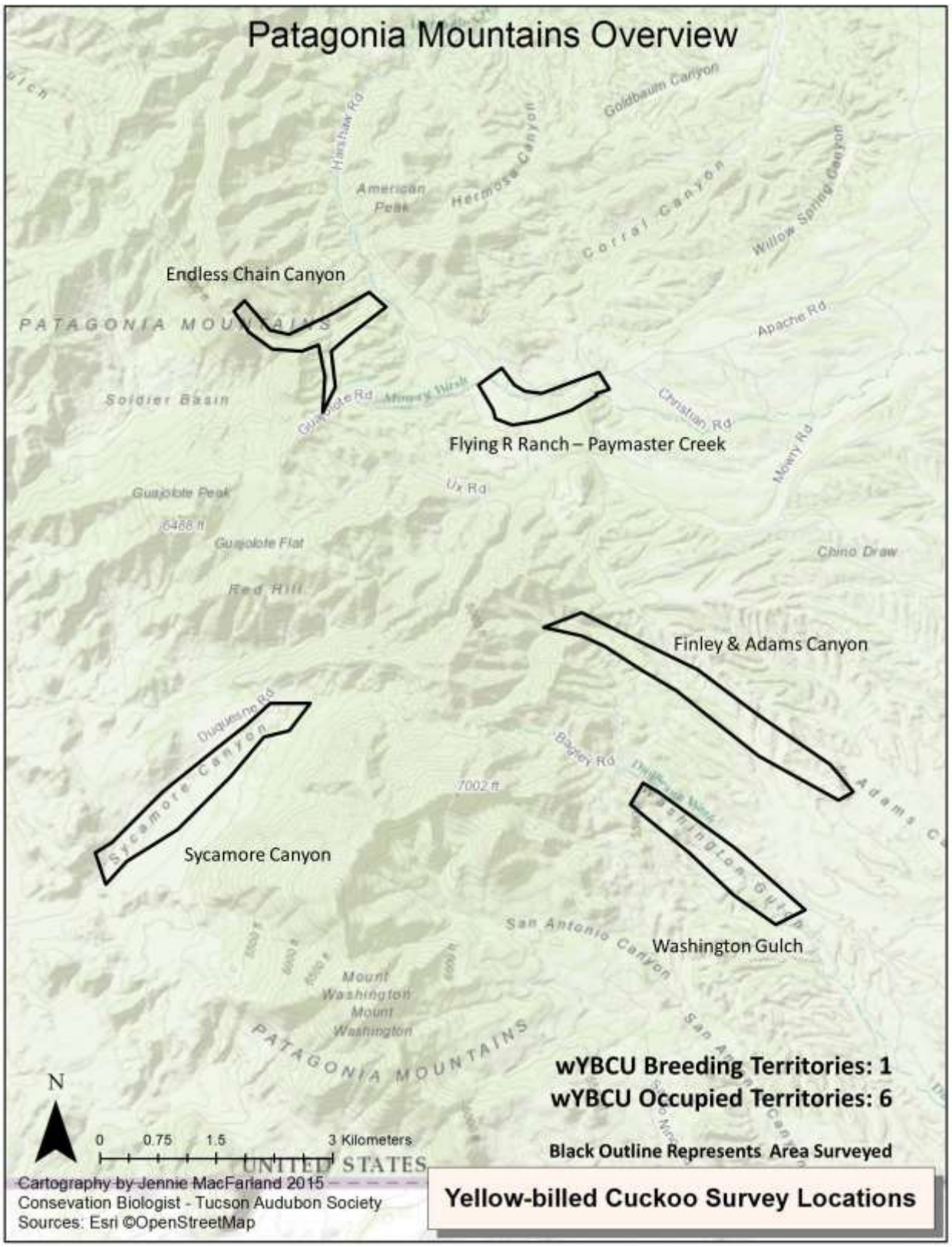

Huachuca Mountains - Ramsey Canyon
6785 ft
Bledsoe
Ramsey
E Ramsey Canyon Rd
Ramsey Canyon
N
0
0.1
0.2
0.4 Kilometers
wYBCU Breeding Territories: 0
wYBCU Occupied Territories: 0
Black Outline Represents Area Surveyed
Cartography by Jennie MacFarland 2015
Consevation Biologist - Tucson Audubon Society
Sources: Esri ©OpenStreetMap
Yellow-billed Cuckoo Survey Locations

Patagonia Mountains

Total Breeding Territories: 1

Total Occupied Territories: 6

This mountain range is an under-birded gem of a mountain range near the town of Patagonia. This lush Sky Island is shorter elevationally than many of the other mountain ranges in southeast Arizona and contains extensive Madrean oak habitat. This is an excellent mountain range for many species including Elegant Trogons, Eastern “Azure” Bluebirds, Montezuma Quail and Arizona Woodpeckers. wYBCU were found in four of the five routes surveyed and the only route where they were not detected, Endless Chain, Elegant Trogons were documented during each survey. Elegant Trogons were detected on all routes in this mountain range.

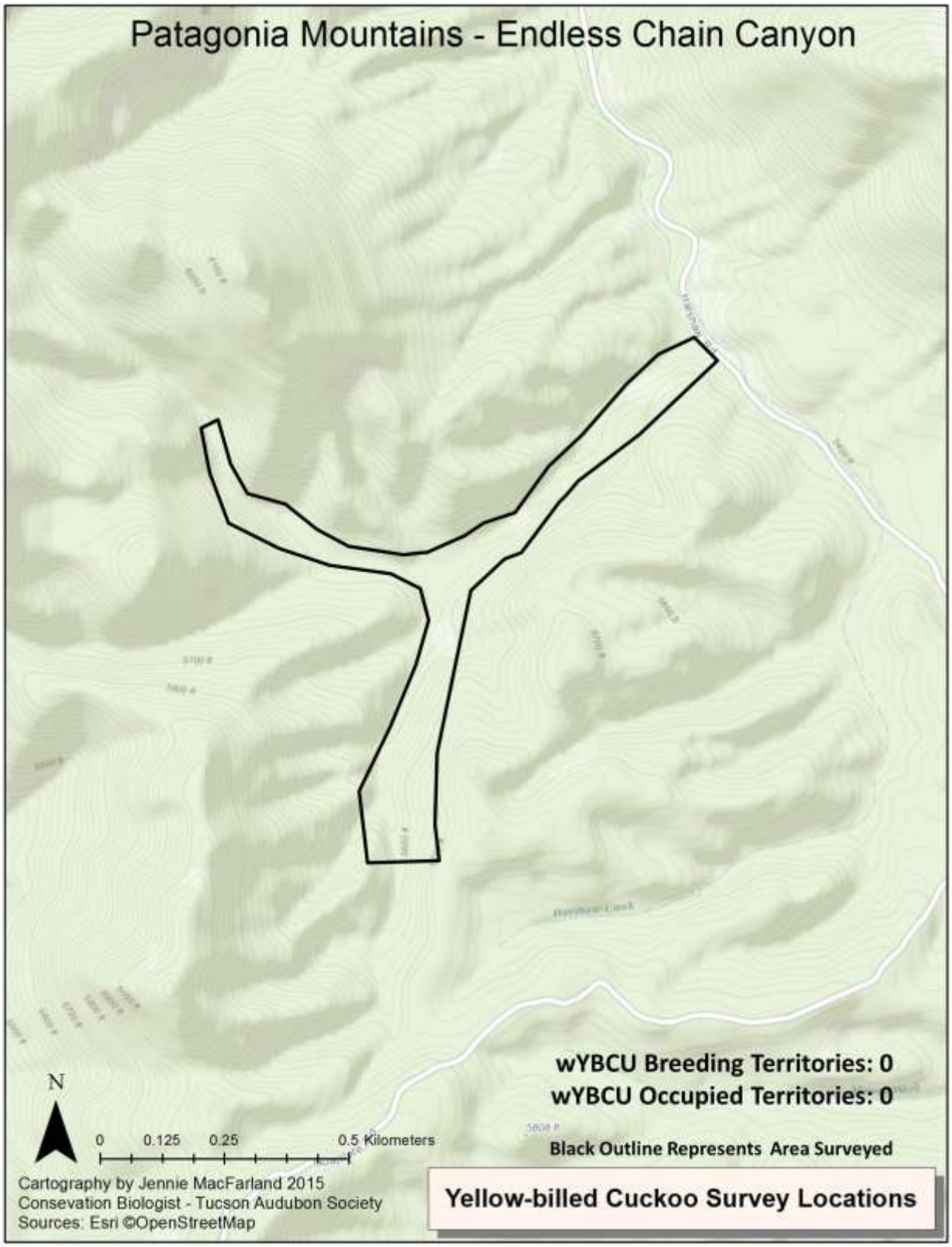

Patagonia Mountains Overview
Endless Chain Canyon
Flying R Ranch – Paymaster Creek
Finley & Adams Canyon
Sycamore Canyon
Washington Gulch
PATAGONIA MOUNTAINS
Soldier Basin
Guajolote Peak
6488 ft
Guajolote Flat
Red Hill
American Peak
Hermosa Canyon
Corral Canyon
Goldbaum Canyon
Willow Spring Canyon
Apache Rd
Christian Rd
Mowry Rd
Ux Rd
Chino Draw
Duquesne Rd
Sycamore Canyon
Bagley Rd
7002 ft
Adams Canyon
Washington Gulch
San Antonio Canyon
Mount Washington
Mount Washington
PATAGONIA MOUNTAINS
N
0 0.75 1.5 3 Kilometers
UNITED STATES
wYBCU Breeding Territories: 1
wYBCU Occupied Territories: 6
Black Outline Represents Area Surveyed
Yellow-billed Cuckoo Survey Locations
Cartography by Jennie MacFarland 2015
Consevation Biologist - Tucson Audubon Society
Sources: Esri ©OpenStreetMap

Endless Chain Canyon

No Detections

This canyon was surveyed four times and no wYBCUs were detected. Notably, this is an excellent area for Elegant Trogons and this species as observed on every survey. There were several instances when surveyors reported Elegant Trogons suddenly flying in while the wYBCU call was being played as part of the survey protocol or the trogons would vocalize in reponse to the wYBCU call. This canyon is also narrow in places with relatively high walls and the lack foraging habitat adjacent to the riparian zone could have also contributed to negative detections of wYBCU.

Date	# YBCU	A/V/B	Vocal	Behavior	Note	Elevation Ft.
07/07/2015	none					
07/22/2015	none					
08/04/2015	none					
08/18/2015	none					

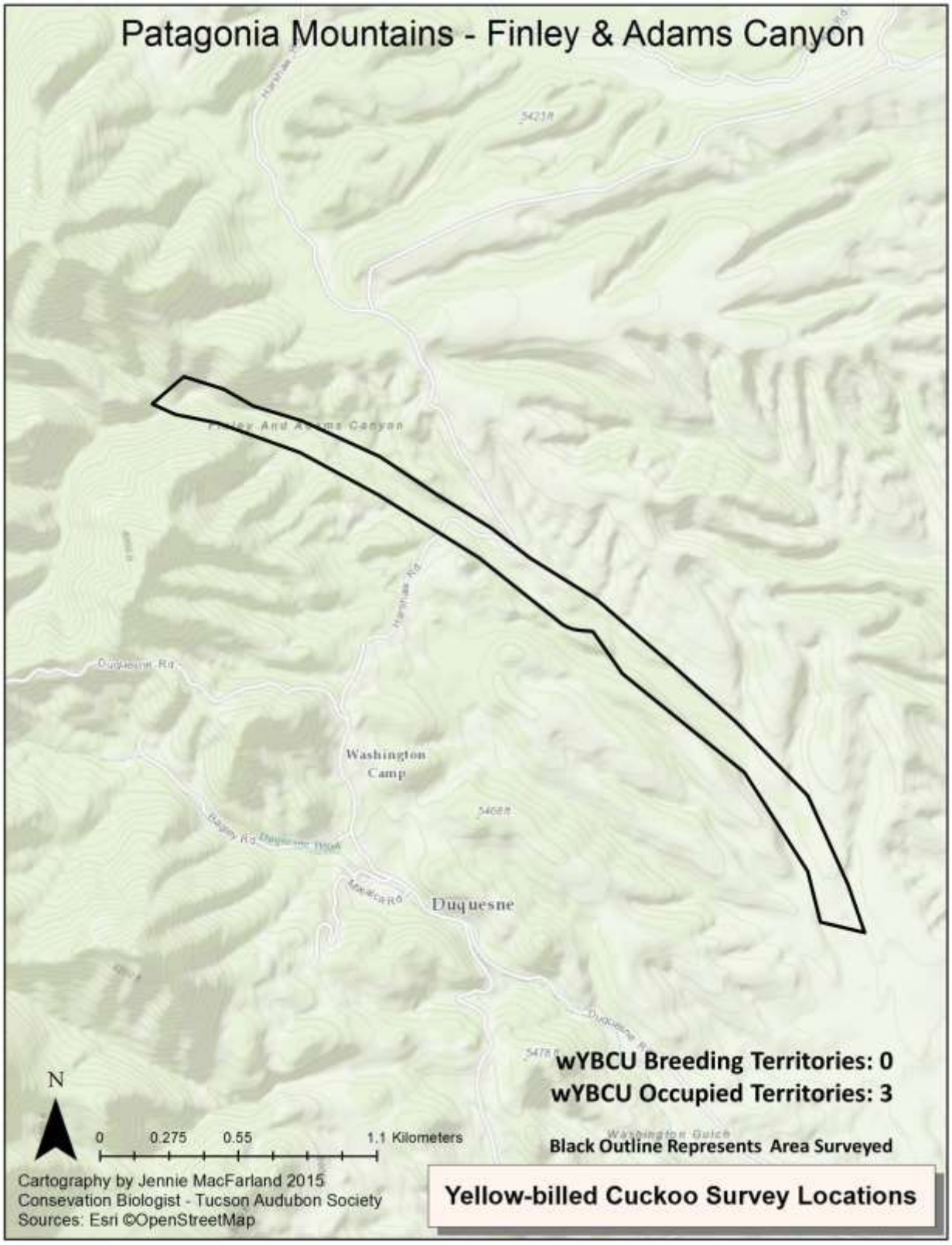

Patagonia Mountains - Endless Chain Canyon
wYBCU Breeding Territories: 0
wYBCU Occupied Territories: 0
N
0 0.125 0.25 0.5 Kilometers
Black Outline Represents Area Surveyed
Cartography by Jennie MacFarland 2015
Consevation Biologist - Tucson Audubon Society
Sources: Esri ©OpenStreetMap
Yellow-billed Cuckoo Survey Locations

Finley and Adams Canyon

Breeding Territories: 0
Occupied Territories: 3

This canyon only had positive wYBCU detections in July and then no detections in August. Several Elegant Trogon territories were documented in this canyon and one male trogon even aggressively swooped at the head of a surveyor.

Date	# YBCU	A/V/B	Vocal	Behavior	Note	Elevation ft.
07/08/2015	1	A	VO			5320
07/08/2015	1	A	COO ALA	NV	Very definite numerous CACO call, sitting in oak + kept calling for 10minutes (But couldn't see him).	5201
07/08/2015	1	A	COO	NV	Ahead of last detection, called right after 1st playback call (we quit) sitting in oak, Tent Caterpillars present.	5172
07/22/2015	1	B	CON	FLY		5116
08/04/2015	none					
08/18/2015	none					
09/03/2015	none					

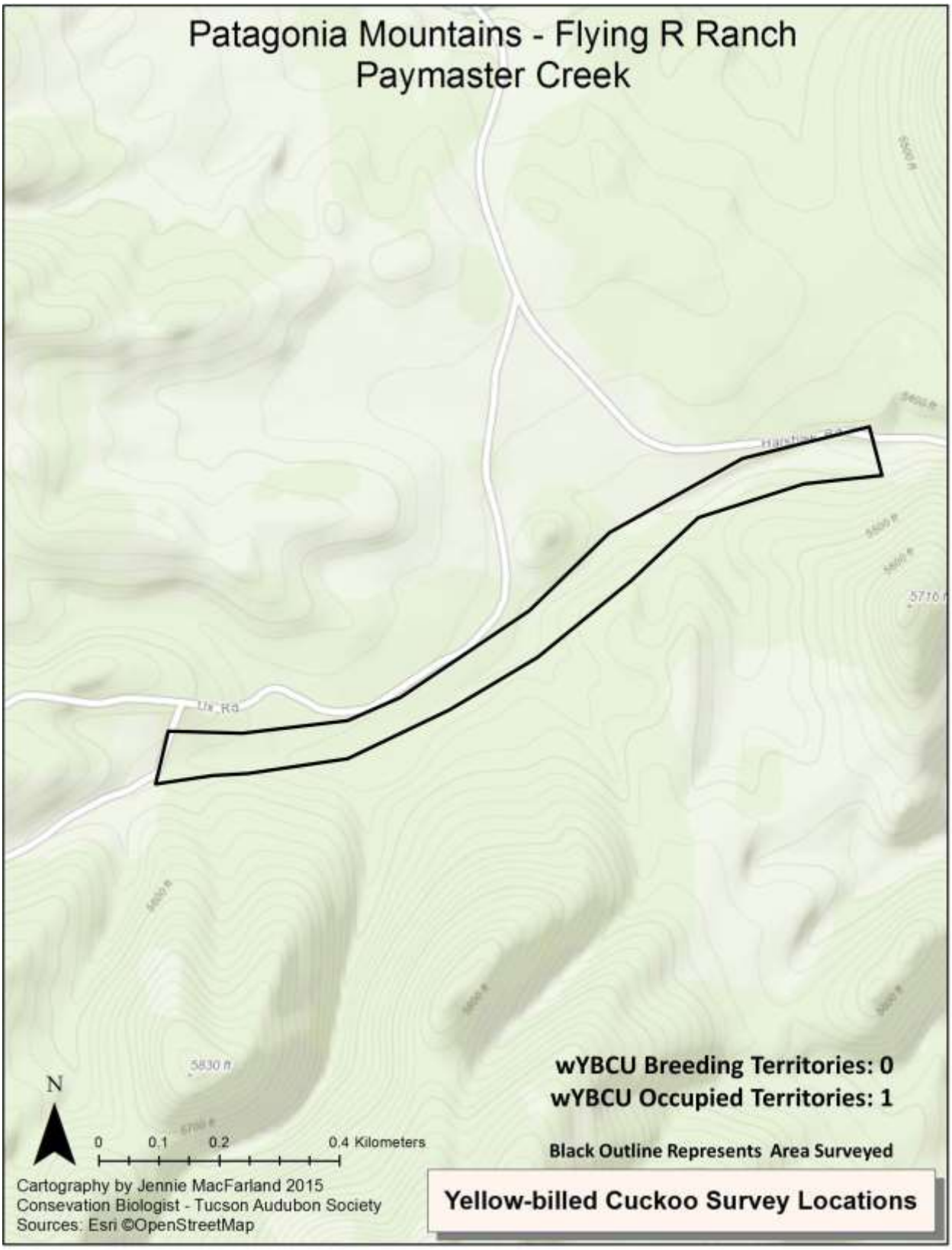

Patagonia Mountains - Finley & Adams Canyon
Washington Camp
Duquesne
N
0
0.275
0.55
1.1 Kilometers
wYBCU Breeding Territories: 0
wYBCU Occupied Territories: 3
Black Outline Represents Area Surveyed
Cartography by Jennie MacFarland 2015
Consevation Biologist - Tucson Audubon Society
Sources: Esri ©OpenStreetMap
Yellow-billed Cuckoo Survey Locations

Flying R Ranch and Paymaster Creek

Breeding Territories: 0
Occupied Territories: 1

This drainage also had a occupied territoriy where the wYBCUs were detected in July but then not in August. Elegant Trogons were detected on this route and in August a trogon was even seen at the exact site where the wYBCU had been observed in July.

Date	# YBCU	A/V/B	Vocal	Behavior	Note	Elevation ft.
07/07/2015	1	B	ALA	ST FLY		5418
07/22/2015	1	V		PER FLY		5414
08/04/2015	NONE					
08/18/2015	NONE					
09/03/2015	NONE					

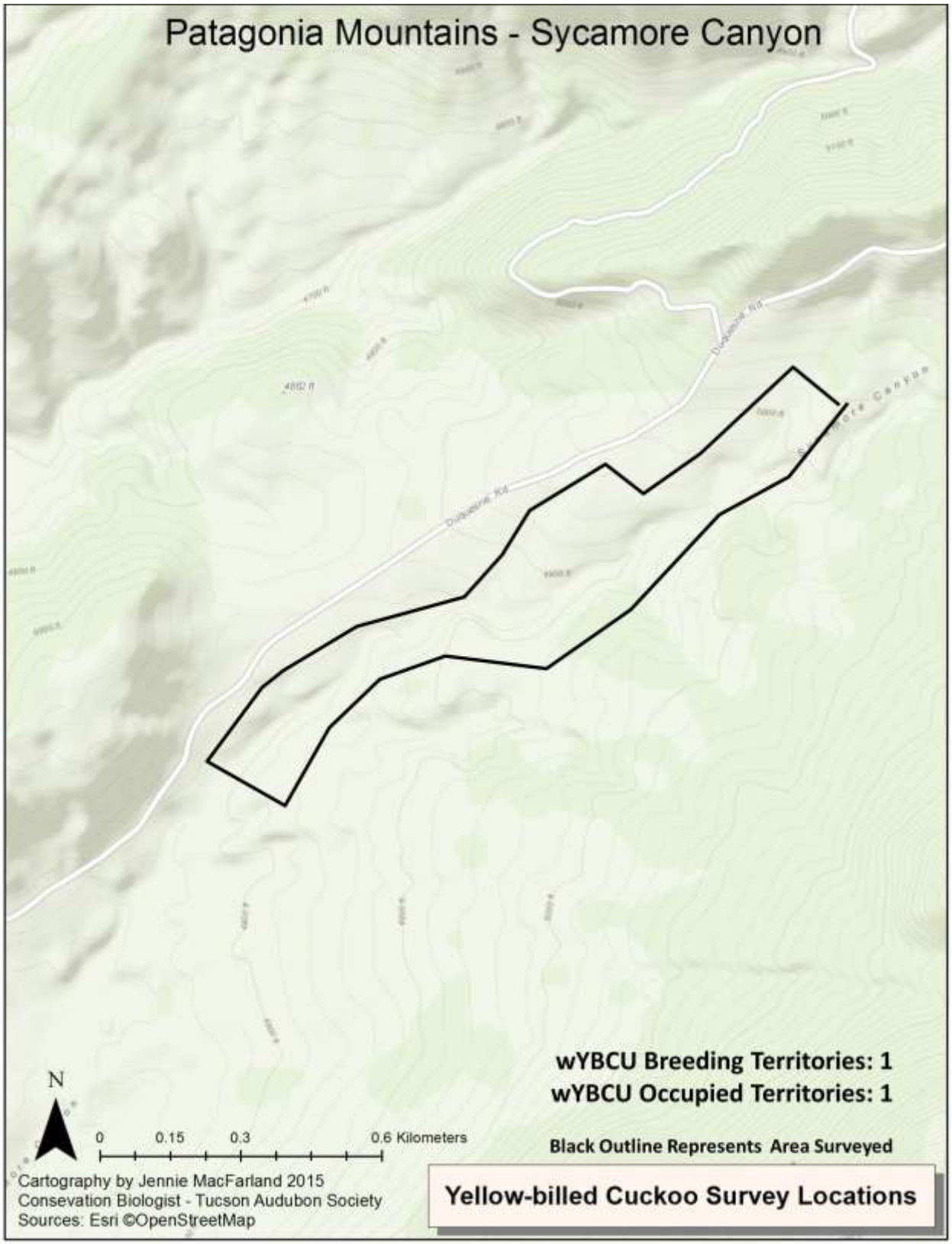

Patagonia Mountains - Flying R Ranch
Paymaster Creek
Harshaw Rd
Ute Rd
5830 ft
N
0 0.1 0.2 0.4 Kilometers
wYBCU Breeding Territories: 0
wYBCU Occupied Territories: 1
Black Outline Represents Area Surveyed
Cartography by Jennie MacFarland 2015
Consevation Biologist - Tucson Audubon Society
Sources: Esri ©OpenStreetMap
Yellow-billed Cuckoo Survey Locations

Sycamore Canyon

Breeding Territories: 1 Occupied Territories: 1

This canyon has a lush riparian corridor lined with large oaks, ash and cottonwoods. One breeding territory of wYBCU was documented here on the edge of a small meadow along the creek and was observed copulating and carrying food.

Date	# YBCU	A/V/B	Vocal	Behavior	Note	Elevation Ft.
08/04/2015	2	B	CON	FLY CS CO	Male first called from larger oak, flew to female carrying food. Engaged in copulation. Female silently sitting in ash tree, male flew back to original location.	4877
08/18/2015	1	A	CON		Calling from oaks on hill side.	4989
08/18/2015	1	B	CON		Same bird as previous detection, followed up to this spot, large oaks	4998

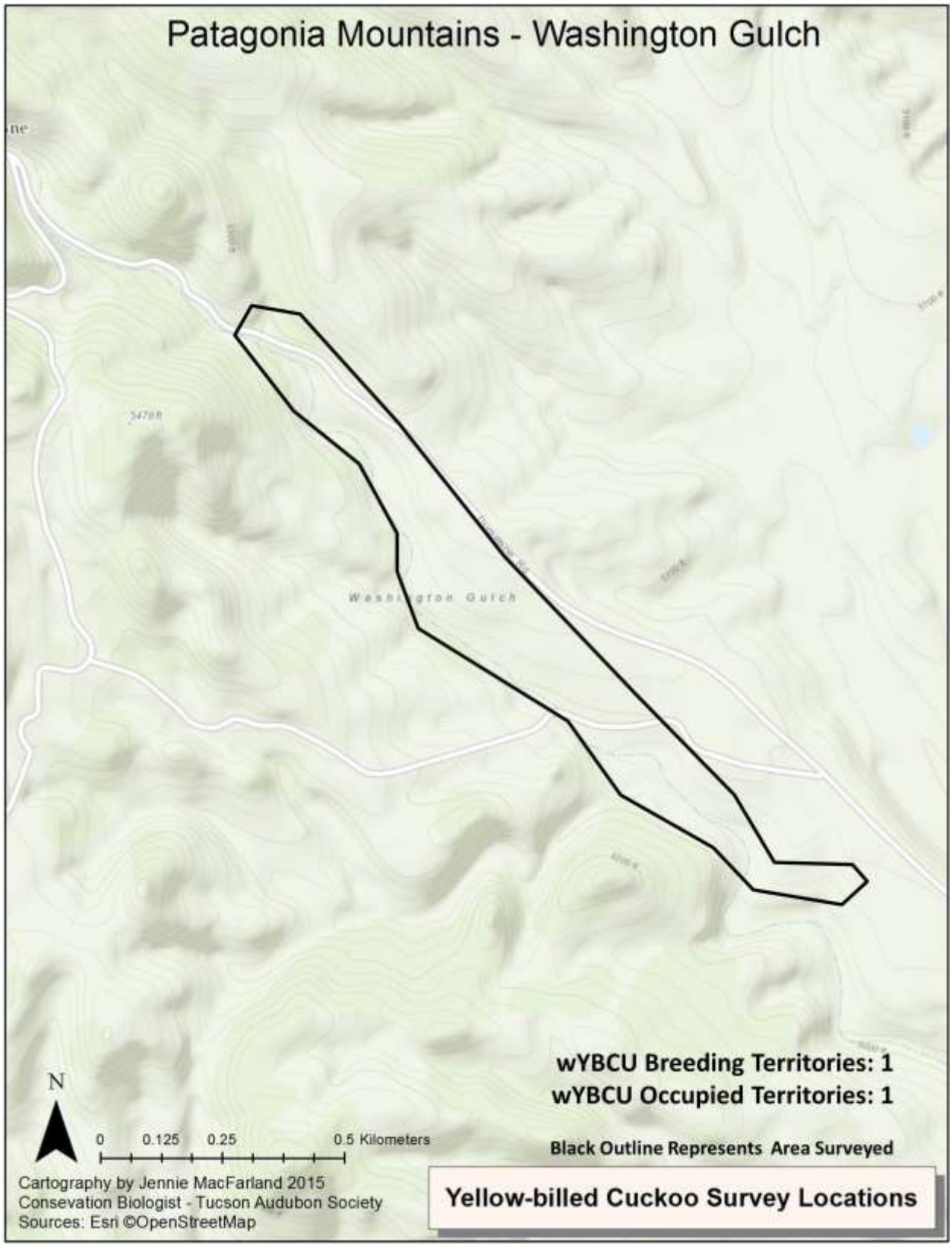

Patagonia Mountains - Sycamore Canyon
Duquesne Rd
Sycamore Canyon
wYBCU Breeding Territories: 1
wYBCU Occupied Territories: 1
Black Outline Represents Area Surveyed
N
0
0.15
0.3
0.6 Kilometers
Cartography by Jennie MacFarland 2015
Consevation Biologist - Tucson Audubon Society
Sources: Esri ©OpenStreetMap
Yellow-billed Cuckoo Survey Locations

Washington Gulch

Breeding Territories: 1
Occupied Territories: 1

This drainage contains large oak trees and had one occupied territory where the wYBCU was detected twice. Other birds seen on this route include: Arizona Woodpecker, Hutton's Vireo, Dusky-capped Flycatcher, Mexican Jay and Bridled Titmouse.

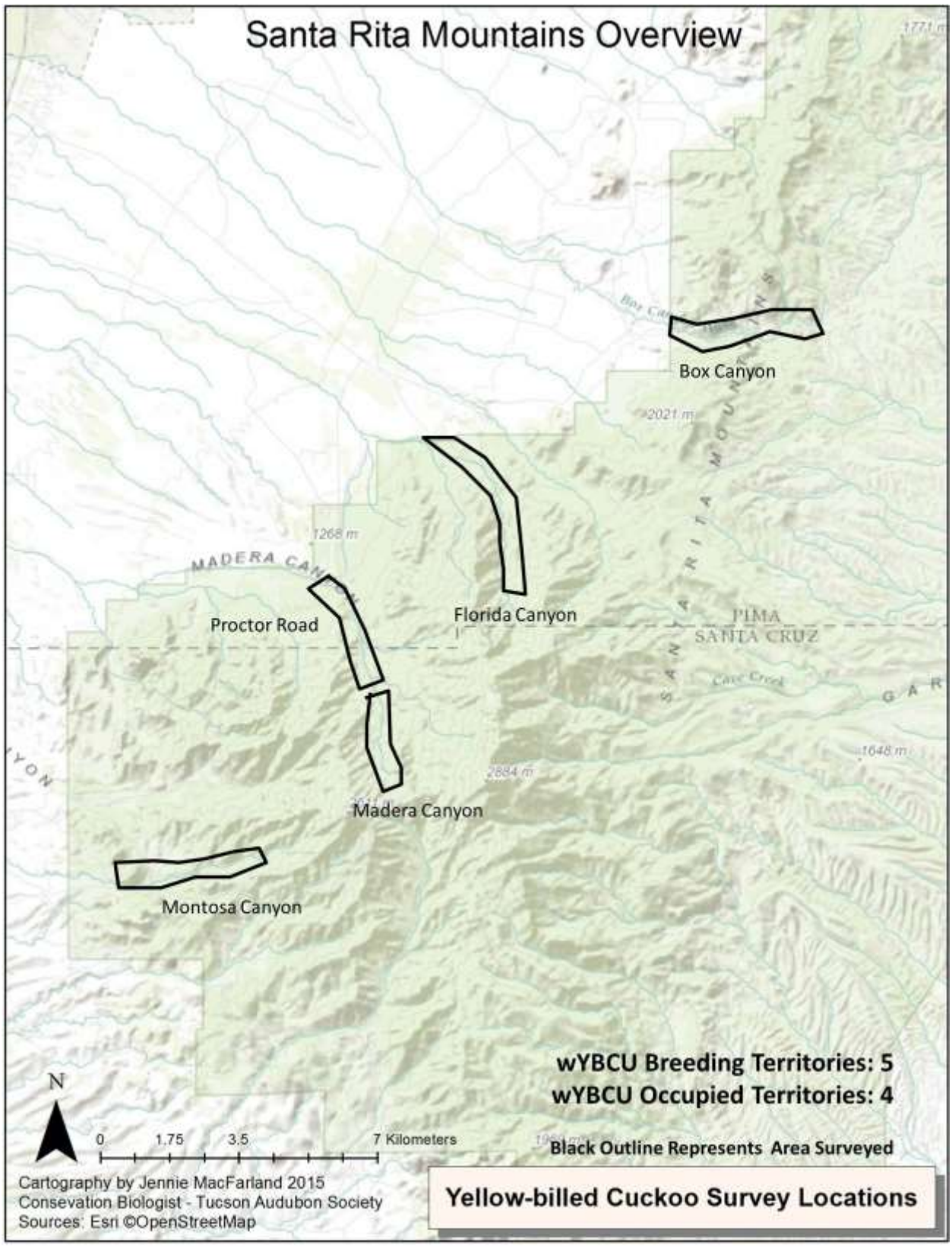
Date	# YBCU	A/V/B	Vocal	Behavior	Note	Elevation ft.
07/22/2015	1	V			Seen flying into huge oak. At time not sure was a cuckoo, later decided it was a cuckoo sighting.	5073
08/04/2015	NONE					
08/18/2015	1	A	CON		Open canopy, river bend, lake is dry.	5035


Patagonia Mountains - Washington Gulch
Washington Gulch
N
0 0.125 0.25 0.5 Kilometers
wYBCU Breeding Territories: 1
wYBCU Occupied Territories: 1
Black Outline Represents Area Surveyed
Cartography by Jennie MacFarland 2015
Consevation Biologist - Tucson Audubon Society
Sources: Esri ©OpenStreetMap
Yellow-billed Cuckoo Survey Locations

Santa Rita Mountains

Total Breeding Territories: 5 Total Occupied Territories: 4

The Santa Rita Mountains are a recreation destination for many residents of Tucson and Green Valley and is a favorite among birders of southeast Arizona. The range has many drainages that support lush native vegetation and many of the higher elevation drainages are excellent habitat for Elegant Trogon. As an excellent example of a Sky Island with madrean oak habitat there is a thriving community of native birds in this mountain range and was excellent for wYBCU in the drainages that we surveyed.

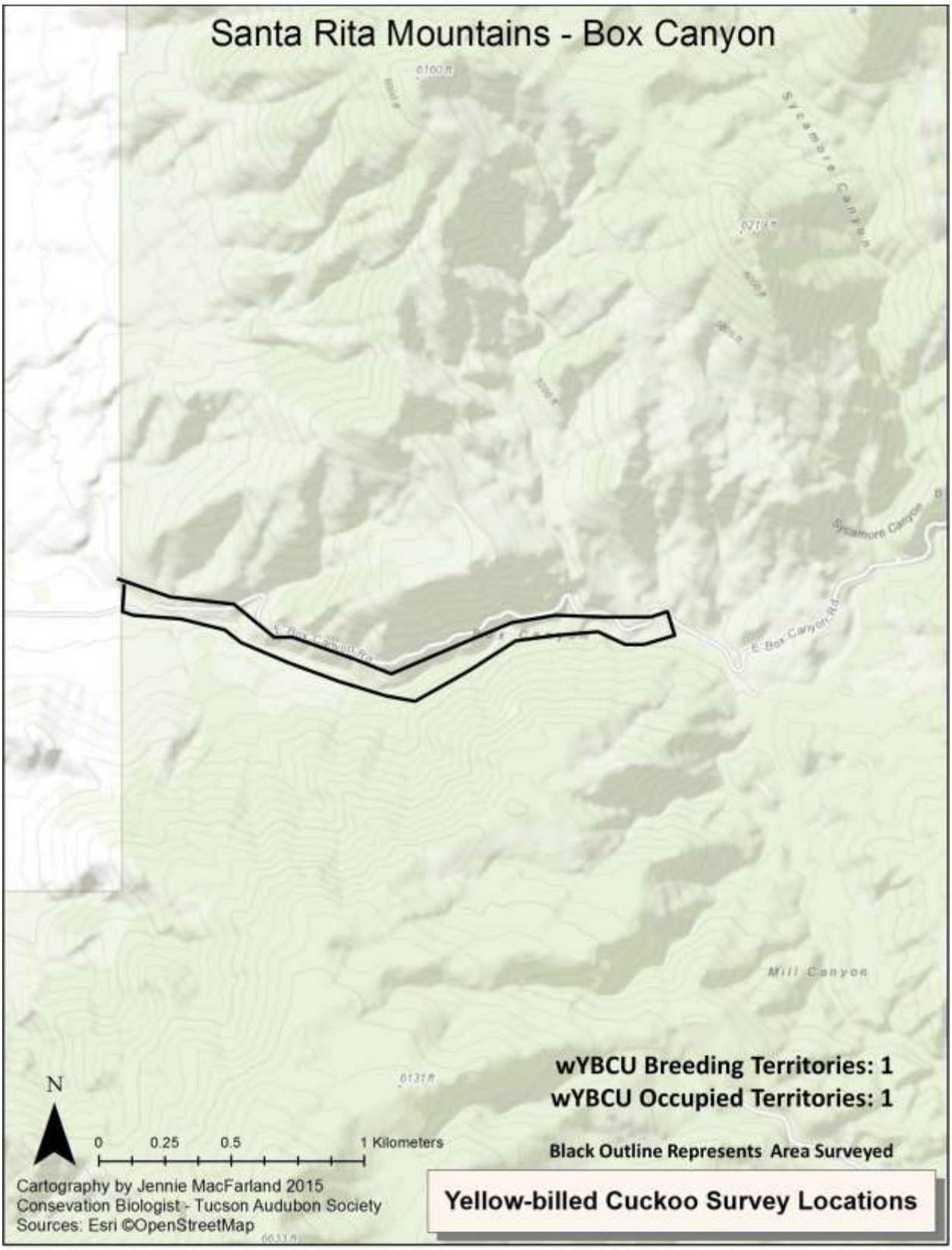

Santa Rita Mountains Overview
Box Canyon
Florida Canyon
Proctor Road
Madera Canyon
Montosa Canyon
PIMA
SANTA CRUZ
wYBCU Breeding Territories: 5
wYBCU Occupied Territories: 4
N
0
1.75
3.5
7 Kilometers
Black Outline Represents Area Surveyed
Cartography by Jennie MacFarland 2015
Consevation Biologist - Tucson Audubon Society
Sources: Esri ©OpenStreetMap
Yellow-billed Cuckoo Survey Locations

Box Canyon

Breeding Territories: 1
Occupied Territories: 1

This drainage has robust patches of riparian habitat with large sycamore trees and canyon hackberry. The breeding territory of wYBCU detected in this route was located at the bridge and these cuckoos were observed foraging and carrying food into a densly vegetated area.

Date	# YBCU	A/V/B	Vocal	Behavior	Note	Elevation Ft.
07/15/2015	none					
07/27/2015	1	A	CON	NV		4338
07/27/2015	1	A	CON	NV	Possible audio detection at next point as well - faint and far away. Makes this a possible pair.	4761
08/10/2015	1	B	ALA	FLY P FO	Seen from bridge to west appeared to be foraging. Silent until 3 min after 1 playback.	4349
08/24/2015	none					

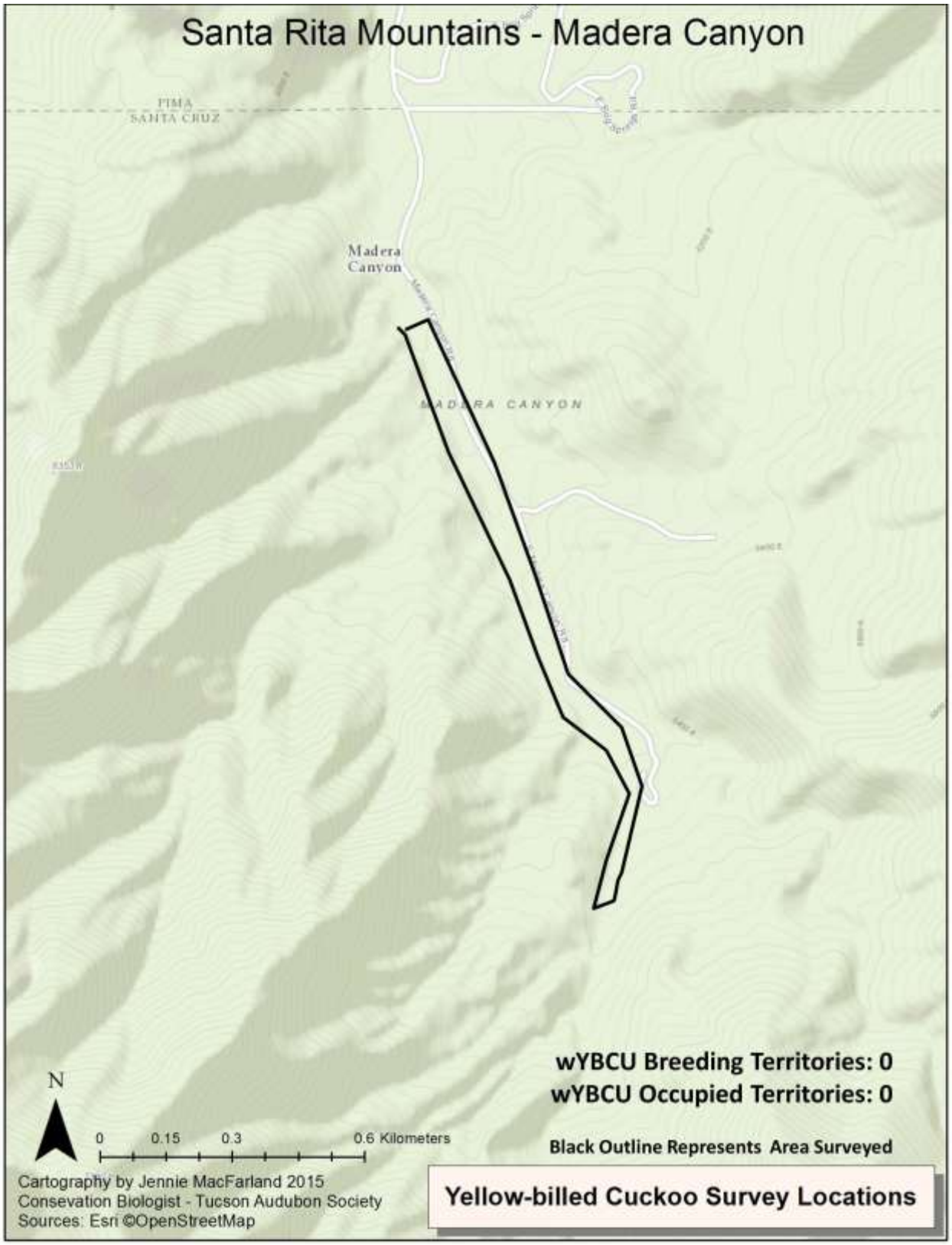

Santa Rita Mountains - Box Canyon
Sycamore Canyon
Sycamore Canyon
E Box Canyon Rd
Mill Canyon
N
0
0.25
0.5
1 Kilometers
wYBCU Breeding Territories: 1
wYBCU Occupied Territories: 1
Black Outline Represents Area Surveyed
Cartography by Jennie MacFarland 2015
Consevation Biologist - Tucson Audubon Society
Sources: Esri ©OpenStreetMap
Yellow-billed Cuckoo Survey Locations

Madera Canyon and Carrie Nation Trail

No Detections

This higher elevation portion of Madera Canyon had no wYBCU detections and had a dedicated survey team on the first survey. It was revisted on the other three survey periods as part of the nearby Protor Road route. This area has lush riparian habitat with large oak and sycamores. It is also notably an excellent site for Elegant Trogons.

Date	# YBCU	A/V/B	Vocal	Behavior	Note	Elevation Ft.
07/15/2015	none					

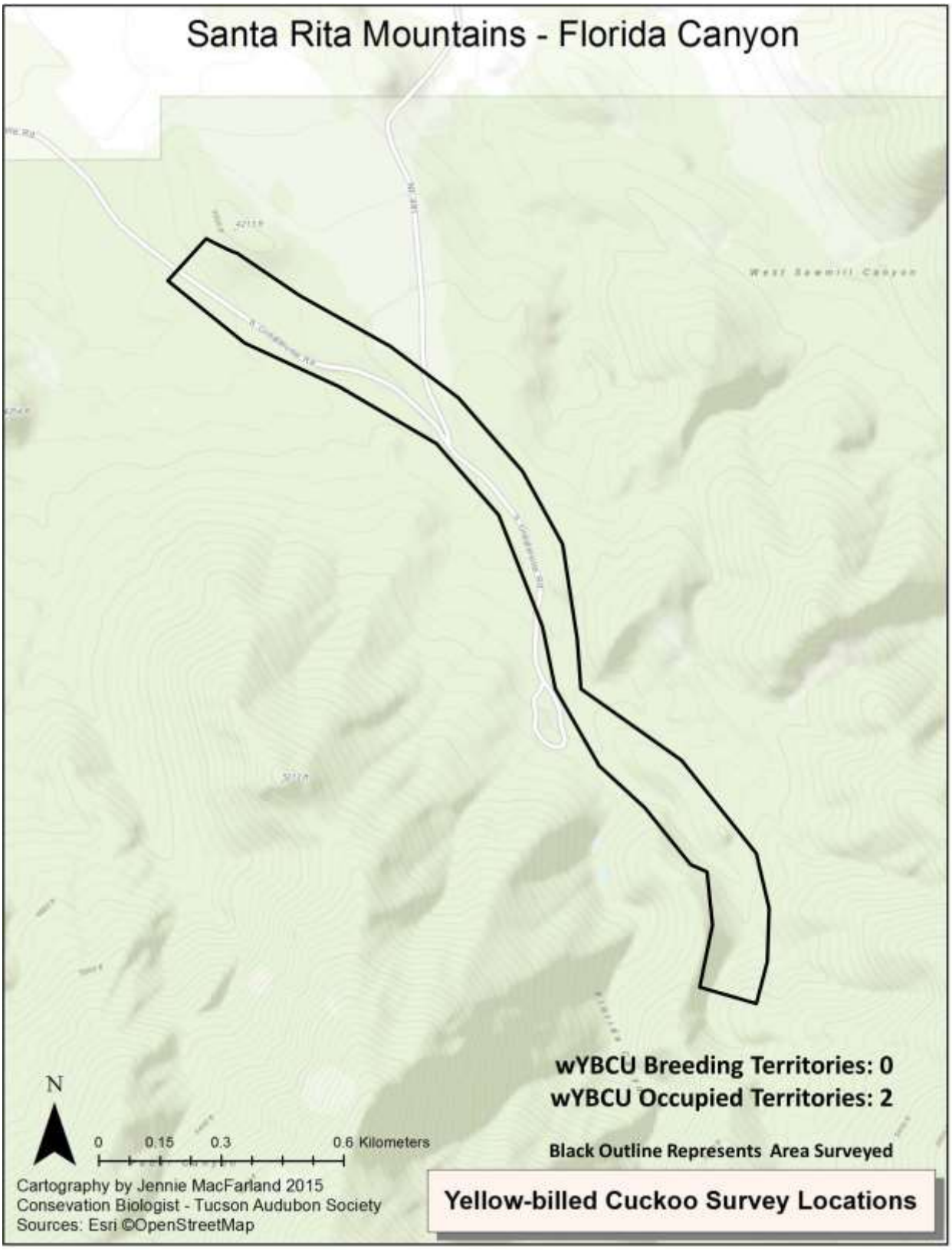

Santa Rita Mountains - Madera Canyon
PIMA
SANTA CRUZ
Madera
Canyon
MADERA CANYON
N
0
0.15
0.3
0.6 Kilometers
wYBCU Breeding Territories: 0
wYBCU Occupied Territories: 0
Black Outline Represents Area Surveyed
Cartography by Jennie MacFarland 2015
Consevation Biologist - Tucson Audubon Society
Sources: Esri ©OpenStreetMap
Yellow-billed Cuckoo Survey Locations

Florida Canyon

Breeding Territories: 0 Occupied Territories: 2

Both occupied territories of wYBCU in this canyon were found in the lower portion where the habitat adjacent to the riparian zone is widest. The habitat further up where the canyon becomes more narrow and the walls higher, no wYBCU were ever detected. This canyon is also well known to birders as the site where Rufous-capped Warblers can be seen regularly along with Black-capped Gnatcatchers.

Date	# YBCU	A/V/B	Vocal	Behavior	Note	Elevation ft.
07/15/2015	1	A	ALA	ST, FLY		4449
07/27/2015	1	B	ALA	ST FLY	Heard after 1st playback 60 m away then visual after 5th playback in large oak.	4191
07/27/2015	1	A	ALA		Heard on way back, very quiet knocking.	4424
08/10/2015	1	B	ALA	ST FLY	Observed sitting quietly in large oak; heard quiet knocks.	4146
08/10/2015	1	B	COO	FLY	Played multiple times before heard; cooed; bill clatter like roadrunner; 10 m down trail observed flying overhead.	4431
08/24/2015	1	B	CON	ST FO FLY	Quiet knock, then visual, then loud contact call twice, then coo call	4192
08/24/2015	1	A	COO		Quiet cooing heard 3 x	4428

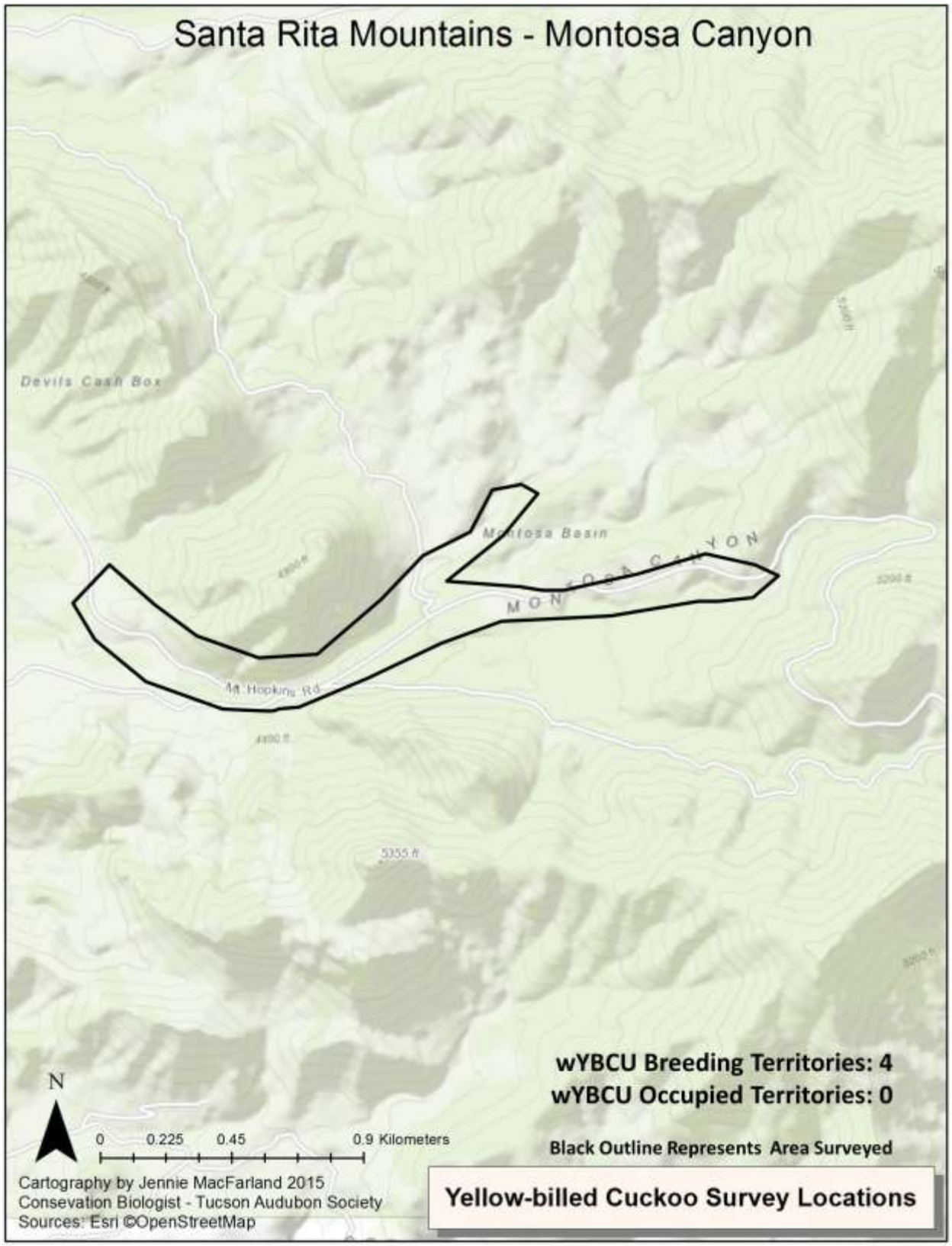

Santa Rita Mountains - Florida Canyon
N
0 0.15 0.3 0.6 Kilometers
wYBCU Breeding Territories: 0
wYBCU Occupied Territories: 2
Black Outline Represents Area Surveyed
Cartography by Jennie MacFarland 2015
Consevation Biologist - Tucson Audubon Society
Sources: Esri ©OpenStreetMap
Yellow-billed Cuckoo Survey Locations

Montosa Canyon

Breeding Territories: 4 Occupied Territories: 0

This canyon is remarkable in how many breeding territories of wYBCU were documented during this study. This canyon does contain dense vegetation along the creek that flows through the bottom of the canyon and the sloping canyon walls do provide additional foraging opportunities which could explain why so many wYBCU were found in this drainage. wYBCU were observed carrying food and copulating. One of the wYBCU seen carrying food is in the top right photo.

Date	# YBCU	A/V/B	Vocal	Behavior	Note	Elevation Ft.
07/15/2015	1	B	CON	FLY	Flew from up canyon and then down canyon.	4361
07/15/2015	1	B	CON	FLY	Spontaneous Call, no playback. Directly north in drainage of sweat lodge. Giant hackberry, seep willow, desert broom, acacia and small sycamores.	4399
07/15/2015	2	B	COO CON	FLY	Second cuckoo at 98 degrees, 15 m away. Up drainage away from culvert.	4322
07/27/2015	1	V			Seen by birding tour just after we left site. Flying. Great look.	4273
07/27/2015	1	A	CON		On third play @ small drainage low campsite.	4350
07/27/2015	2	B	CON ALA	CF COP	At old home site in mesquites, pair, both carrying food. Possible copulation - both holding food. Tent caterpillars nearby. M and F quiet knocking, F called after copulation w/ tail wagging and quiet knock.	4378
08/10/2015	2	B	ALA	CF	Flew to campsite on other side of culvert where seen before/Soft knock	4328
08/10/2015	1	A	ALA		Soft knock	4396
08/10/2015	2	B	ALA		Soft knock	4480
08/10/2015	2	B	CON			4597
08/24/2015	1	V	NO	FLY	Cuckoo flew across road at 20 mph speed sign, fly to hillside.	4314
08/24/2015	2	A	CON		Called as we left.	4438
08/24/2015	1	V	ALA	FLY PERCH	Heard second cuckoo at least 100 m away from us at 280 degrees. Possibly previous	4545

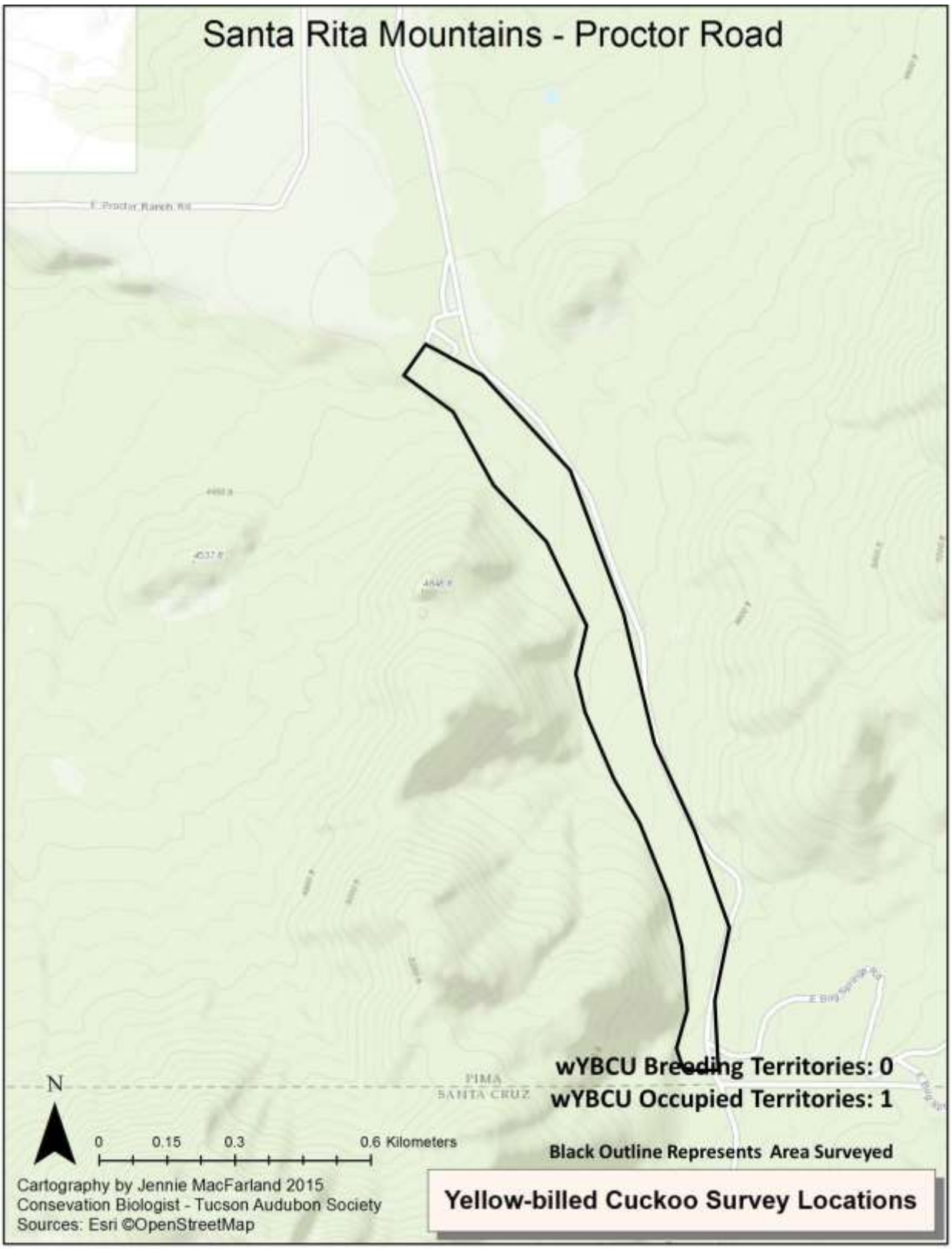

Santa Rita Mountains - Montosa Canyon
Devils Cash Box
Montosa Basin
MONTOSA CANYON
Mt Hopkins Rd
5355 ft
N
0 0.225 0.45 0.9 Kilometers
wYBCU Breeding Territories: 4
wYBCU Occupied Territories: 0
Black Outline Represents Area Surveyed
Cartography by Jennie MacFarland 2015
Consevation Biologist - Tucson Audubon Society
Sources: Esri ©OpenStreetMap
Yellow-billed Cuckoo Survey Locations

Proctor Road

Breeding Territories: 0 Occupied Territories: 1

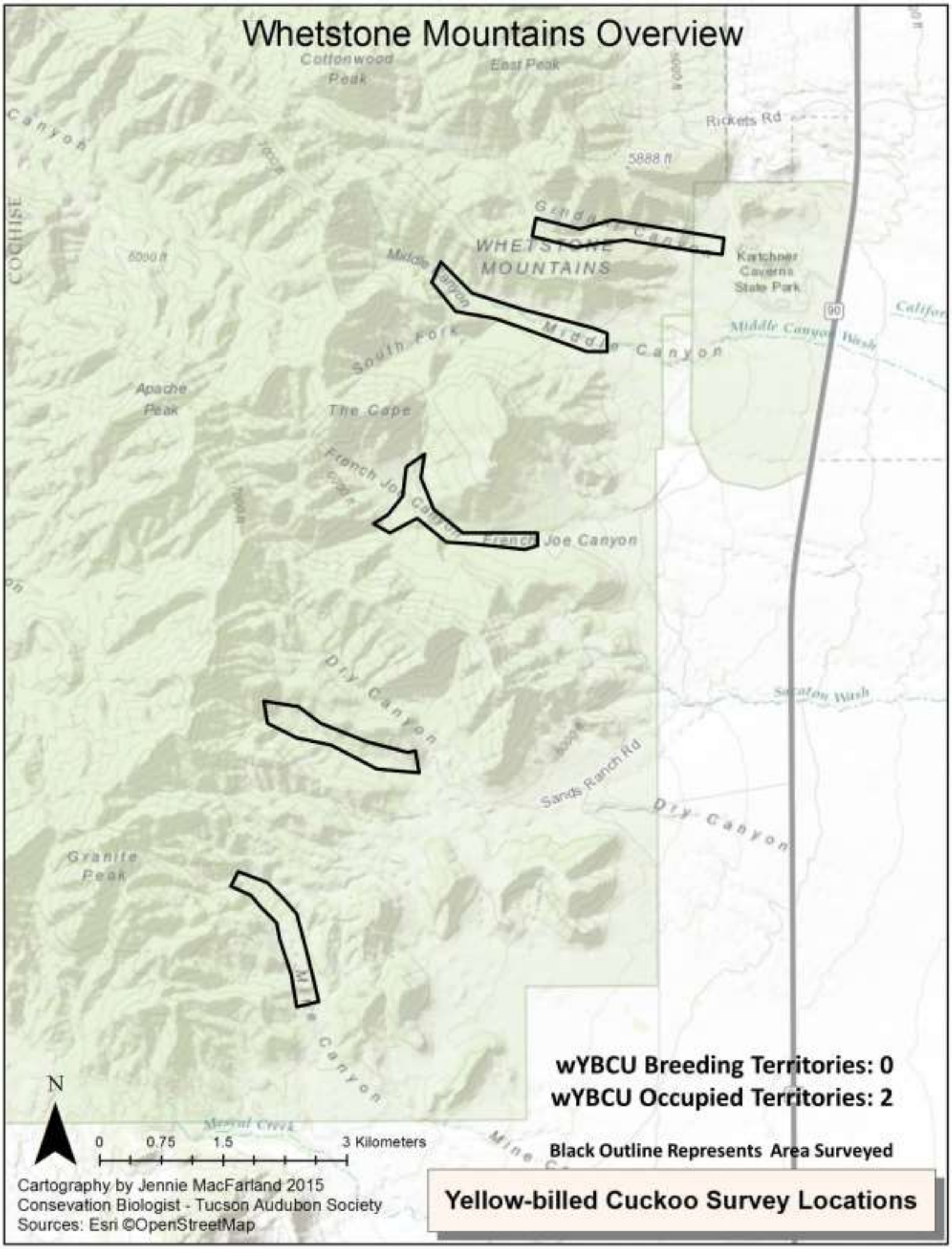
This area at the mouth of Madera Canyon is an area that birders often encounter wYBCU as they cross the bridge to walk the nature trail. There was one occupied territory of wYBCU found consistently in this drainage with large cottonwood, oak and sycamore trees.

Date	# YBCU	A/V/B	Vocal	Behavior	Note	Elevation Ft.
07/15/2015	1	A	CON		In large Cottonwoods SW of Ramada called again at 10:15 and 10:25.	4424
07/27/2015	1	A	VO		1: Short Knock, however no other vocalization.	4422
07/27/2015	1	A	CON		2: Contact call w/no visual only one call.	4461
08/10/2015	1	A	CON			4433
08/10/2015	1	A	CON		Incidental as walking out / same approx. area as #1.	4495
08/24/2015	NONE					


Santa Rita Mountains - Proctor Road
E Proctor Ranch Rd
PIMA
SANTA CRUZ
N
0
0.15
0.3
0.6 Kilometers
wYBCU Breeding Territories: 0
wYBCU Occupied Territories: 1
Black Outline Represents Area Surveyed
Yellow-billed Cuckoo Survey Locations
Cartography by Jennie MacFarland 2015
Consevation Biologist - Tucson Audubon Society
Sources: Esri ©OpenStreetMap

Whetstone Mountains

Total Breeding Territories: 0 Total Occupied Territories: 2


Whetstone Mountains Overview
Cottonwood Peak
East Peak
Rickets Rd
5888 ft
WHETSTONE MOUNTAINS
Kartchner Caverns State Park
Middle Canyon
South Fork
Middle Canyon Wash
Apache Peak
The Cape
French Joe Canyon
Dry Canyon
Sands Ranch Rd
Granite Peak
wYBCU Breeding Territories: 0
wYBCU Occupied Territories: 2
Black Outline Represents Area Surveyed
0 0.75 1.5 3 Kilometers
Cartography by Jennie MacFarland 2015
Conservation Biologist - Tucson Audubon Society
Sources: Esri ©OpenStreetMap
Yellow-billed Cuckoo Survey Locations

Dry Canyon

No Detections

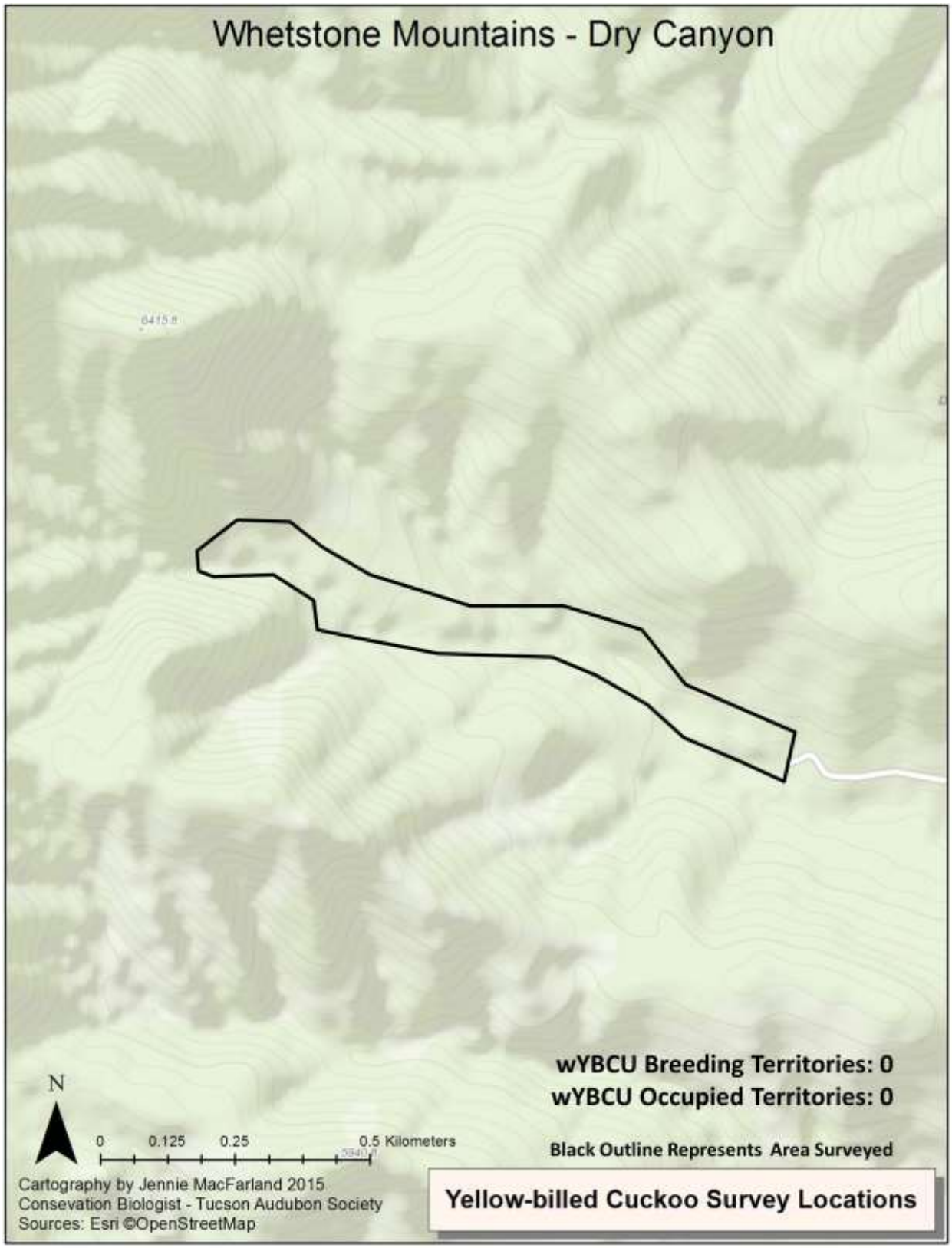
The vegetation in the canyon was a mix of scrubby species: sandpaper bush (*Mortonia scabrella*), whitethorn acacia, evergreen and little leaf sumac (*Rhus choriophylla* and *microphylla*) and some juniper. The slopes were a mix of the above species, with addition of creosote, prickly pear, ocotillo, mimosa, and a number of other shrubs, very occasionally a mesquite. Since veg canopy in the canyon was ~3m or less, we skipped this area to start where we saw the first oaks.

The middle reach (survey points 1-7) has very sparse oaks (mostly blues) ~4-6m tall – very sparse is defined here as 1 or 2 adult trees in 50m. There were a lot of shrubs still; mostly evergreen sumac and whitethorn acacia, occasional sandpaper bush. There were a few pines (*Pinus* sp.) starting (3 needles/bundle). Canyon still very narrow, and the green belt ranged from 3m to 6m wide. Slopes of drainage were the same arid plants as above, just with a higher proportion of sandpaper bush, no creosote, and the addition of yucca.

The last few points (8-9) were pine dominated, 3-5m tall and still lots of evergreen sumac. At point 8 there was 1 oak close by, by point 9 we didn't see any oaks anywhere, nor in between the two points. Slopes were mostly mimosa, sandpaper bush, shin daggers, and evergreen sumac, with the occasional whitethorn acacia, desert spoon, or ocotillo. Green belt was consistently <6m wide, usually 3m.

Very non-birdy area, lots of bare rock in drainage and on slopes from point 6 and beyond.

Date	# YBCU	A/V/B	Vocal	Behavior	Note	Elevation Ft.
07/17/2015	none					

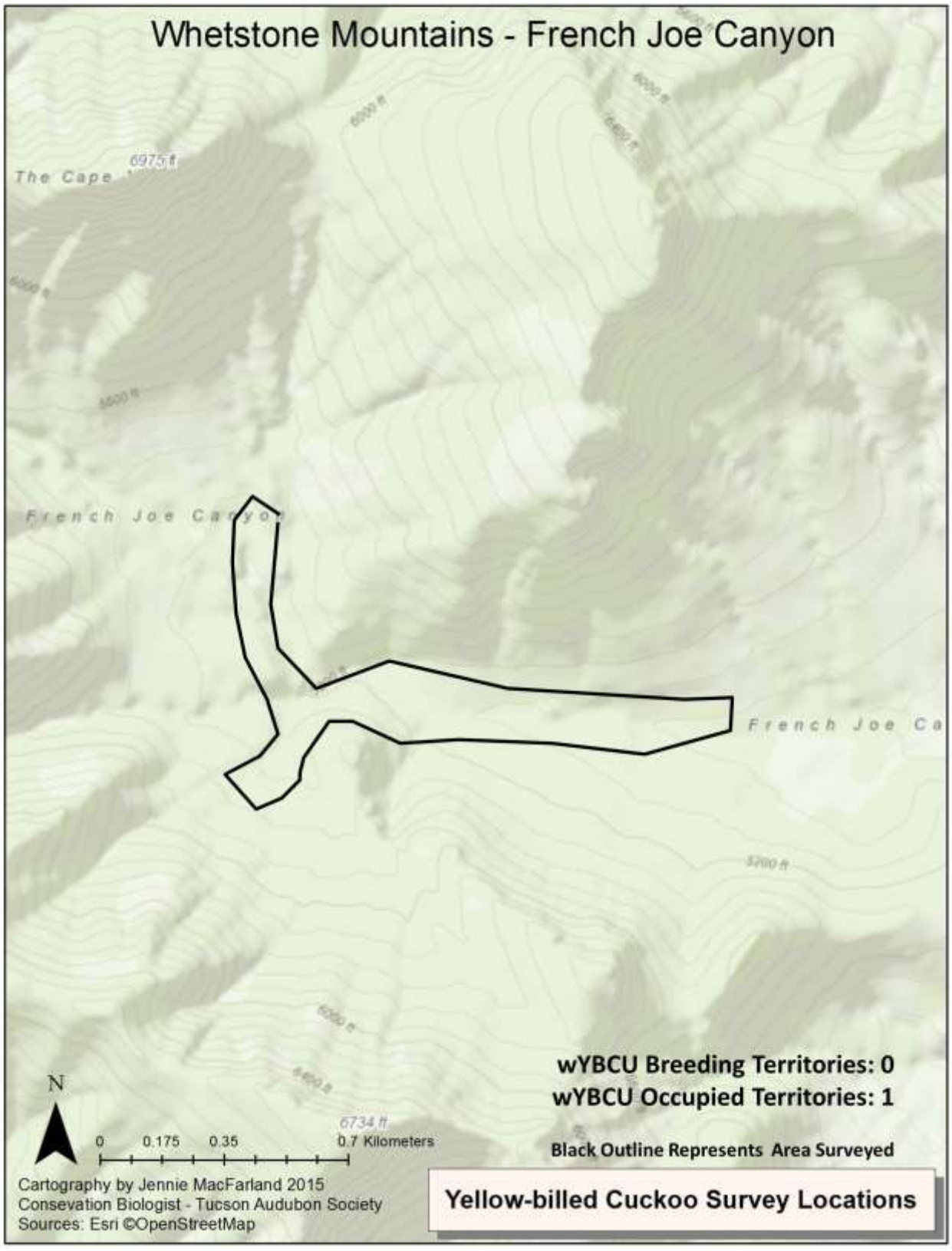

Whetstone Mountains - Dry Canyon
6415 ft
N
0
0.125
0.25
0.5 Kilometers
wYBCU Breeding Territories: 0
wYBCU Occupied Territories: 0
Black Outline Represents Area Surveyed
Cartography by Jennie MacFarland 2015
Consevation Biologist - Tucson Audubon Society
Sources: Esri ©OpenStreetMap
Yellow-billed Cuckoo Survey Locations

French Joe Canyon

Breeding Territories: 0 Occupied Territories: 1

This canyon is a relatively lush drainage with large trees and one occupied territory of wYBCU detected. The lower portion of the canyon is where the riparian zone is widest and with the densest midstory. This portion of the canyon is where the wYBCU detections occurred.

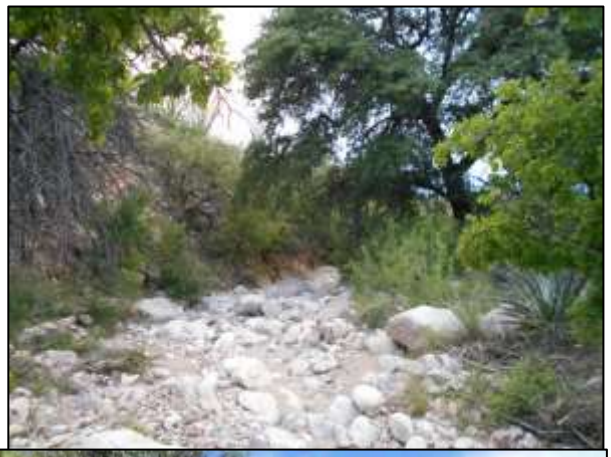
Date	# YBCU	A/V/B	Vocal	Behavior	Note	Elevation Ft.
07/17/2015	none					
07/30/2015	1	V			Cuckoo found in gray oak 5 m from wash 10' off ground. Mostly some oaks and grasses.	5052
08/12/2015	1	A	ALA		Quiet knocking sequence heard once after first playback.	5052
08/26/2015	1	V			Bunch grasses (537), forbs-VF2-538.	5098


Whetstone Mountains - French Joe Canyon
The Cape
6975 ft
French Joe Canyon
French Joe Ca
5200 ft
6734 ft
N
0
0.175
0.35
0.7 Kilometers
wYBCU Breeding Territories: 0
wYBCU Occupied Territories: 1
Black Outline Represents Area Surveyed
Cartography by Jennie MacFarland 2015
Consevation Biologist - Tucson Audubon Society
Sources: Esri ©OpenStreetMap
Yellow-billed Cuckoo Survey Locations

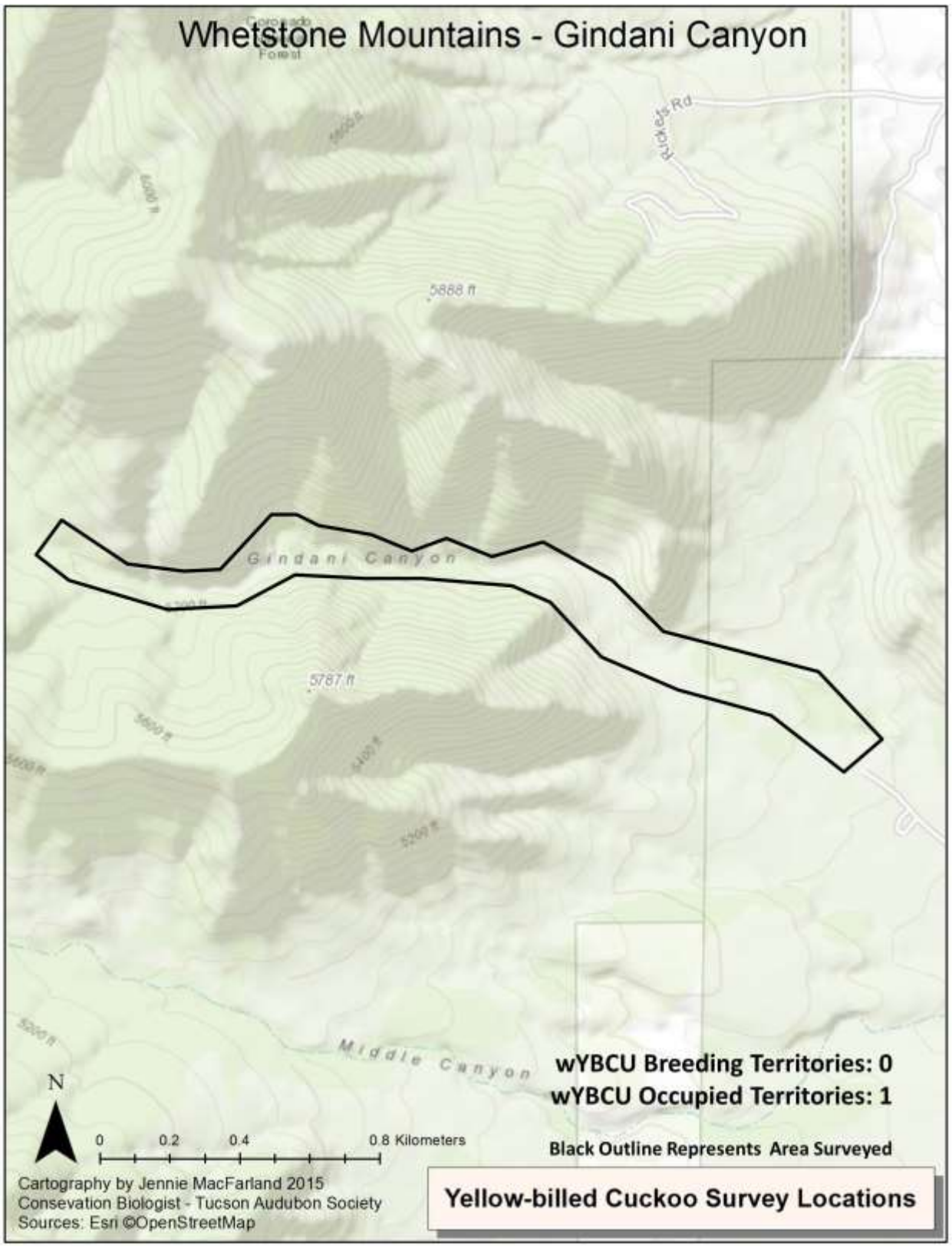
Guindani Canyon

Breeding Territories: 0 Occupied Territories: 1

This canyon had wYBCU detections on every survey visit. These detections were interpreted as one occupied territory that was long and narrow. The wYBCU was detected most often at the mouth of the canyon where the habitat is widest.



Date	# YBCU	A/V/B	Vocal	Behavior	Note	Elevation Ft.
07/17/2015	1	A	CON	NV	First heard at previous point. Played again and heard again (possible second bird?) 50 degrees 120m away near or in large oak, possible pair.	4827
07/17/2015	1	B	ALA	FLY	Heard from direction we came from, seen flying then seen flying back in direction of first sighting. Then heard CON call 100m from direction we first came from.	4860
07/31/2015	NONE					
08/13/2015	1	V		FLY P WS	Went back to last point to sit, bird came in. P - perched; WS - spread wings.	4730
08/26/2015	1	A	CON		Heard right before reaching point and again on reaching survey point.	4732
08/26/2015	1	B	CON		Incidentally heard on way out when played call, flew up and came in.	4833

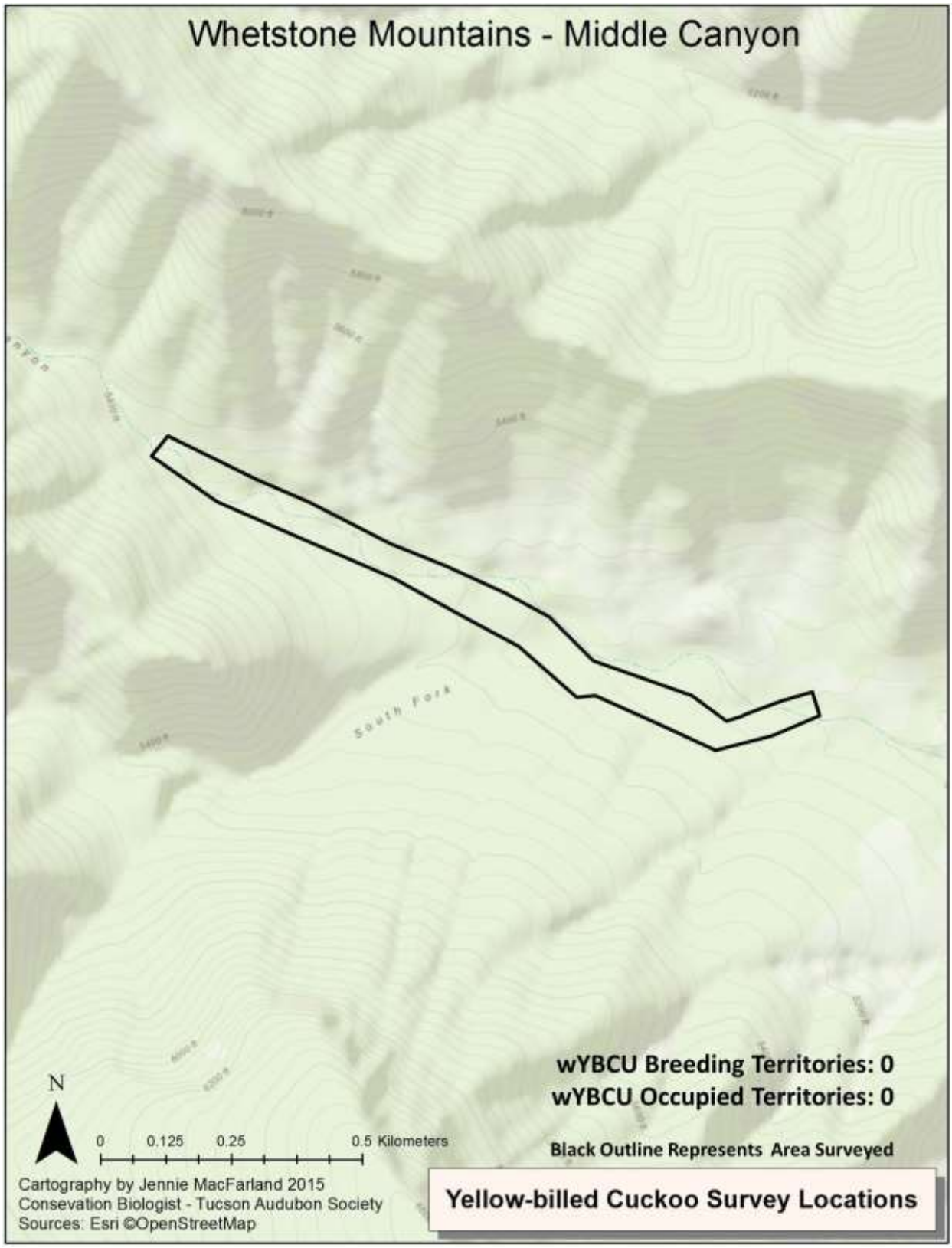

Whetstone Mountains - Gindani Canyon
Coronado Forest
Rickets Rd
5888 ft
Gindani Canyon
5787 ft
Middle Canyon
N
0 0.2 0.4 0.8 Kilometers
wYBCU Breeding Territories: 0
wYBCU Occupied Territories: 1
Black Outline Represents Area Surveyed
Cartography by Jennie MacFarland 2015
Consevation Biologist - Tucson Audubon Society
Sources: Esri ©OpenStreetMap
Yellow-billed Cuckoo Survey Locations

Middle Canyon

No Detections

This canyon had very sparse riparian vegetation with disjointed patches of trees. No wYBCU were detected in this canyon. There was a sound heard by the survey crew that they thought was perhaps a cuckoo but later decided it was not a cuckoo sound after we listened to an audio file from the USFWS of various cuckoo sounds.

Date	# YBCU	A/V/B	Vocal	Behavior	Note	Elevation Ft.
07/17/2015	none					

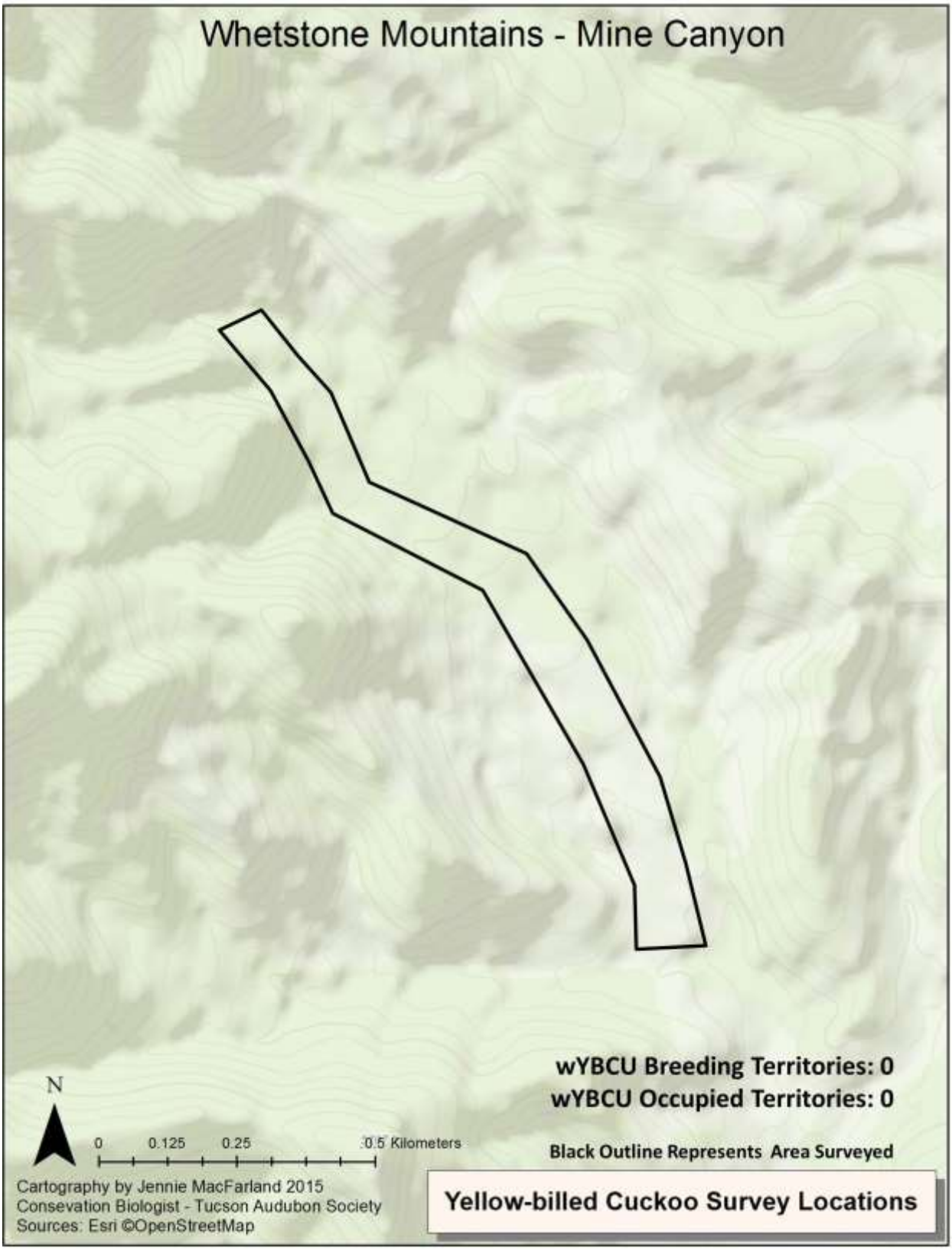

Whetstone Mountains - Middle Canyon
South Fork
N
0 0.125 0.25 0.5 Kilometers
wYBCU Breeding Territories: 0
wYBCU Occupied Territories: 0
Black Outline Represents Area Surveyed
Cartography by Jennie MacFarland 2015
Consevation Biologist - Tucson Audubon Society
Sources: Esri ©OpenStreetMap
Yellow-billed Cuckoo Survey Locations

Mine Canyon

No Detections

This canyon has a small percentage of Arizona walnut, western soapberry, desert willow, and juniper, but altogether these species comprised maybe 5% of the entire cover. Primary cover both on drainage sides and across the wider valley was ocotillo, whitethorn acacia, sumac (desert, mearn's, and three-leaf). Mesquites >3m, scattered oaks up to 4m, and pinyons up to 7m tall made up the primary canopy cover but only occurred directly within drainages until roughly the 5100' elevation mark, at which point they did begin to occur on the surrounding hillsides as well, but at widely-spaced intervals. No sycamore, willow, ash, cottonwood, or cypress were seen.

Date	# YBCU	A/V/B	Vocal	Behavior	Note	Elevation Ft.
07/17/2015	none					


Whetstone Mountains - Mine Canyon
wYBCU Breeding Territories: 0
wYBCU Occupied Territories: 0
Black Outline Represents Area Surveyed
N
0 0.125 0.25 0.5 Kilometers
Cartography by Jennie MacFarland 2015
Consevation Biologist - Tucson Audubon Society
Sources: Esri ©OpenStreetMap
Yellow-billed Cuckoo Survey Locations

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Zilla Copper and Larry Morgan in Paymaster Creek

Jennie MacFarland on Peña Blanca Lake

Jonathan Horst during survey training

Vicente Navarro and Telsa Mittelmeier at Florida Canyon

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