

**Status of western yellow-billed cuckoo (*Coccyzus americanus occidentalis*) in
Big Bend National Park, 2016**



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Abstract: Between June 04 and July 10, 2016, a total of twelve surveys in four different locations were conducted to provide a survey of the presence and status of yellow-billed cuckoo in Big Bend National Park. Additionally, three locations surveyed in 2015 were revisited to determine site fidelity. Adult cuckoos were documented in all four locations, a dependent juvenile bird was observed at one location on the park's east side, and one active nest was located at one site on the park's west side. All three revisited sites again held adult cuckoos, including one pair building a nest at one location on the park's west side. Initial results in 2015 suggested that yellow-billed cuckoos on the park's east side utilize different habitat and appear to be on a different schedule with regard to nesting (earlier) than those on the west side. 2016 results support this premise in part. The time frame of nesting on the park's east side is ahead of that on the west-side by 10-14 days. Contrary to the premise, cuckoos on both sides of the park utilized mesquite dominated habitat containing stands of mature trees. In locations containing only small areas of mesquite dominated habitat, cuckoos exhibited flexibility in habitat/ nesting substrate selection.

Background: Effective November 3, 2014, a final rule determination by the US Fish & Wildlife Service recognized the western race of yellow-billed cuckoo (*Coccyzus americanus occidentalis*) and provided threatened species status under the Endangered Species Act of 1973. Distinction between the two races is based on differences in morphology, breeding range and behavior, food habits, habitat use and, significantly, the timing of migration and nesting. The geographical dividing line between the two races' breeding range is, over most of the United States and Mexico, widely separated, except for an area of west Texas along the Rio Grande in the vicinity of Big Bend National Park. The dividing line falls approximately midway through Big Bend National Park, implying that cuckoos on the park's east side (downstream of Mariscal Canyon) belong to the eastern race (*C. a. americanus*), and those on the west (upstream of Mariscal Canyon) are members of the western race (*C. a. occidentalis*).

Sample Areas: In 2015, surveys were directed to areas with assumed preferred habitat for the western subspecies; riparian habitat containing mature cottonwood/willow associations. 2015 survey results however suggested that, on the park's west side at least, the presence of mesquite dominated riparian habitat with continuous stands of mature trees was a better predictor for the occurrence of yellow-billed cuckoo, and that the presence of cottonwood and/or willow was not a limiting factor.

The one east-side location surveyed in 2015 did not include extensive mature mesquite dominated habitat, thus raising a question of whether or not east-side cuckoos utilize other available habitat in the absence of mature mesquite stands. In 2016 a site containing both mesquite dominated and cottonwood/willow association riparian habitat was selected: Boquillas, between the historic Barker House and a deep drainage upstream (west) of the Boquillas Port of Entry (POE).

In 2016 three west-side locations with extensive mesquite dominated riparian habitat were selected: Santa Elena, along the old Santa Elena crossing road; La Coyota, along the junction of Alamo Creek and the Rio Grande; Grand Canyon Farm, site of the historic Sublette & Dorgan operation.

These four locations were surveyed three times each over a period of approximately one month (June to July). Because 2015 survey results suggested that east-side cuckoos are on a slightly different nesting schedule (earlier) than those on the west side, the Boquillas surveys started on an earlier date: June 04, nine days ahead of the first west-side survey on June 13 at Santa Elena.

Additionally, three 2015 survey sites were revisited one time each to determine site fidelity of returning cuckoos: Rio Grande Village on the park's east side; Cottonwood/Blue Creek and Mesquite 1 on the park's west side.

Survey Procedures: Surveys began approximately ½ hour prior to official sunrise and were performed until heat precluded further observer and bird activity (0630 to 1130). One observer walked the entire survey area, listening and looking for activity, and at times recorded cuckoo calls were utilized as lures in areas where there was no apparent activity. Time, location, plant associations, approximate age-class, vocalizations and behavior of each individual were recorded; photographs were taken when possible of individual birds. Located nests were documented with geo-locations, photographed, and nest status (adults sitting, downy young visible, fledglings present) recorded. Initial visits served to establish presence of cuckoos, while second and third visits served to focus in on potential breeding pairs or potential nest sites.

Results:

Boquillas: Survey dates: June 04, June 17, and July 03.

1) Individual survey results are tabulated in worksheet 1: Yellow-Billed Cuckoo Survey – Boquillas.

2) At least 5 adult yellow-billed cuckoos were present in the survey area as follows:

- One pair of adult cuckoos was active in the second drainage east of the Boquillas POE. The drainage bottom contains dense honey mesquite/huisache (*Acacia*) thicket with areas of mature mesquite trees in its north and center portions, intergrading with willow and willow/ giant cane (*Arundo*) at its junction with the river. The cuckoos were detected in both mesquite-dominated and willow-dominated habitat.
- One pair of adult cuckoos was active in the area immediately east and south of the Boquillas POE. The area of detection is predominately cottonwood and willow with adjacent thickets of young honey mesquite, huisache and giant cane.
- At least one adult cuckoo was observed at the southern terminus of a large drainage immediately west (upstream) of the Boquillas POE in mature willow dominated thicket.

3) One dependent juvenile attended by at least one, possibly two, adults was observed on July 03 in the same location referenced above in mature willow.

- The juvenile bird was fully feathered, but a few downy feathers remained on its breast. The rectrices were very short. The lower bill was still grayish with no obvious yellow. It remained quietly perched until approached by an adult with cicada prey, when it actively scampered along the branch to the adult.
- An adult bird brought cicada prey three times in the 11 minute long observation (It is possible a second adult was involved in the feeding but this could not be confirmed). Adult vocalizations during the feeding sessions included low “knocker” calls and low creaking sounds.

Results - continued:

Santa Elena: Survey dates: June 13, June 24, and July 08.

1) Individual survey results are tabulated in worksheet 2: Yellow-Billed Cuckoo Survey – Santa Elena. The survey area can be divided into three distinct mesquite dominated segments, separated by open, sparsely vegetated floodplain: East, West and South. Both East and West contain large areas of mesquite dominated habitat with extensive groves of large mature trees. The South segment also contains mesquite dominated habitat and stands of mature trees, but the segment is narrower and contains more tamarisk in the understory, particularly on the north end.

2) At least 6 adult yellow-billed cuckoos were present in the survey area as follows:

- One pair of adult cuckoos was active in the mesquite dominated habitat in the southeast portion of the East segment. The pair was observed building a nest on June 24 in a large mature mesquite just west of the old Crossing Road gate. The pair was still sitting/tending the nest at the time of the last visit on July 08. No nestlings observed.

- One pair was active in mesquite dominated habitat of the West segment, mainly to the southern half, and overlapping somewhat on the west side of the East segment. Interactions between West and East pairs in the overlap area involved vocal and visual displays: “Coo” and “Kawlp” calls, high perch.

- One pair was active in the southern end of the South segment, where there are dense mesquite thickets and several stands of large mature trees.

La Coyota: Survey dates: June 14, June 25, and July 09.

1) Individual survey results are tabulated in worksheet 3: Yellow-Billed Cuckoo Survey – La Coyota. The survey area can be divided into three distinct segments, separated by open, sparsely vegetated floodplain and Alamo Creek: East, West and South. The East segment is to the south of Rte 16 and east of Alamo Creek. It contains some mature mesquite, but also significant tamarisk intrusions. The area has been treated with prescription burns in the past. The South segment is to the west of Alamo Creek and directly borders the river. It contains mature mesquite stands but has significant tamarisk understory. The West segment is directly south of the historic La Coyota village site is smaller in area than the previous two but contains largely pure mature mesquite stands.

2) At least 2 adult yellow-billed cuckoos were present in the survey area as follows:

- One pair of adult cuckoos was active (calling, displaying, foraging) in mesquite dominated habitat of the West segment on two days of survey – June 14, July 09. No cuckoos were detected on the June 25 survey. It was noted on that date that the site had signs of very recent trespass livestock. On that same survey, two adult cuckoos were heard calling from mesquite bosque on the Mexican side – locations approximated.

3) No cuckoos were detected in either the East or South segments.

Results-continued:

Grand Canyon Farm: Survey dated: June 16, June 29, July 10.

1) Individual survey results are tabulated in worksheet 4: Yellow-Billed Cuckoo Survey – Grand Canyon Farm. The survey area is a long east-west running swath of mesquite dominated habitat interspersed with open floodplain, giant cane and young mesquite thicket.

2) At least 6 adult yellow-billed cuckoos were present in the survey area as follows:

- One pair of adult cuckoos was active (displaying, calling foraging) in the east end of the area, immediately south of the Sublette hilltop site, centered on a large mulberry tree surrounded by mature mesquite and cane thickets.
- One pair of adult cuckoos was active (displaying, calling) in the center of the area, southeast of the Sublette hilltop site. A possible nest-site, based on pair behavior and vocalizations, was located deep in a stand of very large mesquite.
- One pair of adults was active (displaying, calling foraging) in mesquite dominated habitat in the west end of the area. A probable nest site, based on pair behavior (repeated food carry), was located in a stand of mature mesquite.

Rio Grande Village site fidelity revisit: Survey date: June 22.

1) Individual survey results are tabulated in worksheet 5: Yellow-Billed Cuckoo Survey – site fidelity.

2) At least 8 adult yellow-billed cuckoos were present in the survey area as follows:

- One adult cuckoo repeated carrying food to a probable nest in *Robinia* sp. in the NPS campground – north side.
- One adult displaying and foraging in the NPS campground- south side.
- One adult displaying in the NPS campground – southwest corner.
- One pair of adults displaying at a possible nest site in AZ ash in Group campground
- One pair of adults displaying at a possible nest site in the old Overflow area.
- One adult “Coo” calling from approximate location in Daniel’s Ranch.

2) At least 3 adult yellow-billed cuckoos were present in the survey area as follows:

Results-continued:

Mesquite 1 site fidelity revisit: Survey date: June 23. 0630 -0800

1) Individual survey results are tabulated in worksheet 5: Yellow-Billed Cuckoo Survey – site fidelity.

- One pair of adults calling from mature mesquite stand south of Castalon bluff. Location approximated. Very near the nest site located in 2015.

- One adult active (calling) on the extreme northwest edge of the survey area, very near the boundary with the Santa Elena survey area.

Cottonwood/Blue Creek site fidelity revisit: Survey date: June 23. 0815 -1130

1) Individual survey results are tabulated in worksheet 5: Yellow-Billed Cuckoo Survey – site fidelity.

2) One pair of yellow-billed cuckoos was present in the survey area as follows:

- One pair of cuckoos building a nest in a cottonwood in the campground, between campsites 3 & 5.

3) 2015 nest site in mature mesquite is now within 20 meters of a drainage canal cut into the thicket to control flooding on Park Rte 16. No cuckoos detected this year.

Discussion:

2015 results suggested two premises: 1) Cuckoos on the east side of the park arrive and initiate nesting earlier than their counterparts on the west. 2) Cuckoos on the east side of the park utilize different habitat for nesting than their counterparts on the west. These points will be readdressed along with additional themes suggested by this year's results.

1) Cuckoos on the east side of the park utilize different habitat for nesting than cuckoos on the west.

2016 results **do not** support the premise.

Of the possibly three pairs of cuckoos encountered in the Boquillas survey area, one pair utilized an area that included both mature mesquite and willow. While it could not be ascertained where this pair was nesting, both birds were documented calling ("Knocker") from and probably foraging in the mesquite stands on June 17. The same birds were also documented calling ("Coo") from the willow stand on July 03.

The other Boquillas pairs were documented in cottonwood/ willow and willow thicket with individual mature trees, but never in mesquite. The areas these pairs occupied lacked extensive mature mesquite stands.

Mackey and Coffey (pers. comm.) in a 2016 study detected "numerous" cuckoos in mesquite dominated habitat at locations downstream of Mariscal Canyon in presumptive eastern race range: Gravel Pit, La Clocha, Casa Piedra, Rooney's and Solis. These locations lack extensive cottonwood/willow habitat.

A pair of cuckoos at Cottonwood campground was documented building a nest in a mature cottonwood, about 10 meters above ground level. In 2015 the Cottonwood/Blue Creek survey area documented *Status of western yellow-billed cuckoo (Coccyzus americanus occidentalis) in Big Bend National Park, 2016*

only one cuckoo foraging in cottonwood canopy. All other documented activity and the one located nest were in mesquite dominated habitat.

Conclusions: Cuckoos on both sides of the park utilize mature mesquite dominated habitat. The presence of mesquite dominated habitat with continuous stands of mature trees is a likely predictor for the occurrence of yellow-billed cuckoo, regardless of geographic location. Individual cuckoos however are flexible in selecting nesting substrate, and will utilize other suitable substrate when available, including cottonwood, willow or non-native plantings, particularly in the absence or paucity of extensive mesquite dominated habitat.

2) Cuckoos on the east side of the park arrive and initiate nesting earlier than cuckoos on the west.

Results in 2016 continue to support this premise:

Dates of first detection of yellow-billed cuckoos this year were May 12 on the east at La Clocha and May 22 on the west at Santa Elena Canyon (pers. comm. Mackey & Coffey), a ten day difference. This does not indicate actual arrival dates, but does provide a point of reference for establishment of territories and nest building.

On the park's east side at Rio Grande Village, an adult cuckoo was observed repeatedly carrying cicada and other insect prey to a probable nest on June 22. An adult cuckoo (possibly two adults) was observed feeding a fledged but still dependent juvenile at Boquillas on July 03. The dates are consistent with those of appearance of juveniles on the east side in the 2015 survey (June 26 – July 6).

On the park's west side, no fledglings or juvenile birds were detected at any time. Two pairs of cuckoos in separate locations were found engaged in nest-building (June 23 at Cottonwood Campground, June 24 at Santa Elena).

Return visits to the Cottonwood nest found the pair was still sitting/tending the nest on June 29, but was absent from the nest by July 08 and subsequent visits through July 10. Either this nest was successful and the young fledged and dispersed or the nest failed. Given the rapid pace of documented cuckoo incubation – fledge times (16-20 days Hughes 2015)), and assuming the shortest duration of 16 days, the former is possible. Within one day after fledging, adults and young will leave the nest vicinity (Potter 1983), so it is possible that, in spite of a search of the area around the nest, the cuckoos went undetected. More likely the nest failed. By contrast, the Santa Elena pair was still sitting/tending the nest through July 08. At Grand Canyon Farm a pair of adults remained focused on one site and gave calls consistent with a possible nest site on June 29 and a second pair was observed food carrying to a probable nest site on July 10. The dates are consistent with those of nesting/hatching on the west side in the 2015 survey (July 7 – 9).

Probable feeding of nestlings is documented June 22 on the east at Rio Grande Village. The plumage and stage of development of the fledged but still dependent juvenile on July 3 at Boquillas indicates an age of 7-9 days from hatching (Hughes – 2015), suggesting a hatch date around June 25-27 for the Boquillas bird. Incubation for yellow-billed cuckoo takes 9 - 11 days (Hughes 2015), suggesting that nest building and egg laying initiated at Boquillas around June 10 – 15.

West side cuckoos are documented nest building and egg-laying June 23-24 at Cottonwood and Santa Elena. Apparent hatching/feeding of nestlings isn't documented until July 10 at Grand Canyon Farm.

In summary, west side cuckoos are anywhere from 9 days to two weeks behind their east side counterparts with regard the nesting cycle.

3) Is the difference in timing of arrival and initiation of nesting significant?

Distinction between eastern and western yellow-billed cuckoos is based on a variety of parameters including morphology (western birds larger than eastern), breeding range (west of the Rockies, west of the Pecos River drainage, upstream of the Big Bend), habitat use (broad-leaf forest in the eastern range, riparian corridor in the west).

The most significant factor for researchers and the USF&WS, is a difference in the timing of migration and nesting, with members of the western distinct population arriving later than their eastern counterparts. Hughes presented an argument for an evolutionary (genetic) basis for this difference:

"I don't believe this difference has anything to do with environmental constraints on the system. These behaviors must have evolved independently for some time. Hence, eastern and western cuckoos are, by definition, different taxa; probably subspecies" (Hughes in Laymon 2000).

Other researchers have attempted to quantify the difference in time frame:

"Western cuckoos arrive on breeding grounds starting mid to late May, 4-8 weeks later than eastern cuckoos occurring at the same latitude" (Franzreb and Laymon 1993).

"all eastern states egg laying starts in the south in late March (Texas) to late April (Florida) and the breeding season is well underway by early May" (Laymon 2000)

In Big Bend National Park there does appear to be a difference in timing: In 2016 earliest dates of detection are 10 days apart (May 12 – east, May 22 – west) and west side cuckoos are nine days to two weeks behind their east side counterparts with regard the nesting cycle. This is consistent with the current designation of boundary between the distinct populations, but the dates of detection and the onset of breeding here do not coincide with the identified range of dates for eastern yellow-billed cuckoos. In fact they coincide better with the parameters established for the western race.

Looking back through personal birding records from 1995 to 2016, I have a range of first detection dates for yellow-billed cuckoo in the park (again, these do not indicate actual arrival dates, but do provide a point of reference for establishment of territories and nest building). There are more dates for the east side than the west, indicating that cuckoos were first detected for the year more often on the east than the west.

On the park's west side, four recorded dates range from May 08 to May 22, all at Cottonwood Campground. Interestingly, Ro Wauer (1996) reports an earliest ever spring date of April 15, 1990 at Cottonwood Campground. This possibly represents an early arriving passage migrant.

On the park's east side, dates range from April 19 (Glenn Springs) to May 27 (Rio Grande Village). Of the fourteen recorded east side dates, twelve (86%) are May dates ranging from May 07 to May 27, and two (14%) are April dates (4/19 & 4/30). Again, the early April date at Glenn Spring may represent a passage migrant.

On average then, yellow-billed cuckoo arrives to the Big Bend in May, more often arriving to the east side before the west. While it appears that there is a difference in timing of about 10 days to two weeks between the east side and the west side populations, this is far less than the 4-8 week timeframe referred to in establishing the boundary between the distinct populations

Four interpretations present themselves:

- All cuckoos in the park are eastern, with migrants reaching the east side first, and then reaching the west side slightly later.
- All cuckoos in the park are western race birds. There is some thought that western cuckoos migrate along greening riparian corridors following monsoon precipitation. Drought or late onset monsoon would alter such migratory routes and create a more haphazard arrival pattern here.
- Both western and eastern birds are here, either segregating in subtle ways not yet obvious to observers, or mixing in an overlap zone.
- Cuckoos in the Big Bend are intermediates, a clinal population between the eastern and western distinct populations.

Hughes states that the separation between east and west populations is not clinal with regard size or timing, that the change is abrupt in the vicinity of the Rio Grande in West Texas. This may be true with regard size (although the measurements of the 19 Big Bend specimens collected by Van Tyne and Sutton in 1937 actually overlap with east and west size parameters), but the parameter of timing does not seem to stand up to inspection here. Further, cuckoos on both sides of the park will utilize mesquite dominated riparian habitat - a characteristic not associated with typical eastern populations – as well as other nesting substrates, demonstrating an adaptive flexibility in the absence of preferred habitat. It may be that there **is** a clinal change between typical eastern and western races embodied in Big Bend cuckoos and that size, habitat utilization and timing of arrival and onset of breeding is intermediate between the east and west populations.

Recommendation: If the determination of whether cuckoos in the Big Bend are eastern or western or both or something else is a priority, future study will require trapping, measuring, blood sampling for genetic analysis and banding cuckoos on both sides of the park. Monitoring to better establish arrival dates in the spring and departure dates in the fall should continue. A thorough search of the park's past wildlife observation database may reveal patterns of migration and breeding.

4) Site Fidelity

Little information is available on cuckoo site fidelity. In California the absence of pairs on known breeding sites in some years, and presence of breeding birds on previously vacant sites suggests that breeding may not occur in same location every year (Gaines and Laymon 1984). In Arizona studies, some breeding site fidelity was documented after nesting success the previous year and in Arizona and California, some males returned to the same breeding area for three consecutive seasons (Halterman 2009).

Yellow-billed cuckoos were again present in all three revisited 2015 survey areas. Some of these birds were detected near or at locations found in 2015, while others were in new locations.

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At Rio Grande Village a brief survey on June 22 revealed a total of 8 cuckoos.

- Three cuckoos were active around the west end of the NPS campground, an area where cuckoos were present in 2015. No cuckoos were detected in the no-generator area of the NPS campground or near campsite #22 as occurred in 2015. A pair of cuckoos was active around the west end of the group campground area near campsite #A, but none near campsite #C where a pair was active in 2015. No cuckoos were detected near the SW corner of the store parking lot or near the black-hawk nest site, areas of activity in 2015. A pair of cuckoos was active at the west end of the old overflow area, but not at the southeast end as in 2015. One cuckoo was detected in the vicinity of the Daniels Ranch, consistent with one located there in 2015.

A very brief survey at the Mesquite 1 site revealed a total of three cuckoos.

- A pair was calling from a location near the 2015 nest site. A single cuckoo was calling from the extreme northwest corner of the survey area along an old service road, a location not recorded in 2015.

A brief survey at the Cottonwood/Blue Creek site revealed only two cuckoos.

- A pair was observed nest building in a mature cottonwood in the campground between campsites #3 and 4 on June 23. The pair was still sitting and tending the nest on June 29, but were absent by July 08. In 2015, only one cuckoo was observed in the campground cottonwoods, a bird that was foraging and moving through the area back into mesquite dominated habitat. No cuckoos were detected in the 2015 nest site or surrounding area all the way to Blue Creek.

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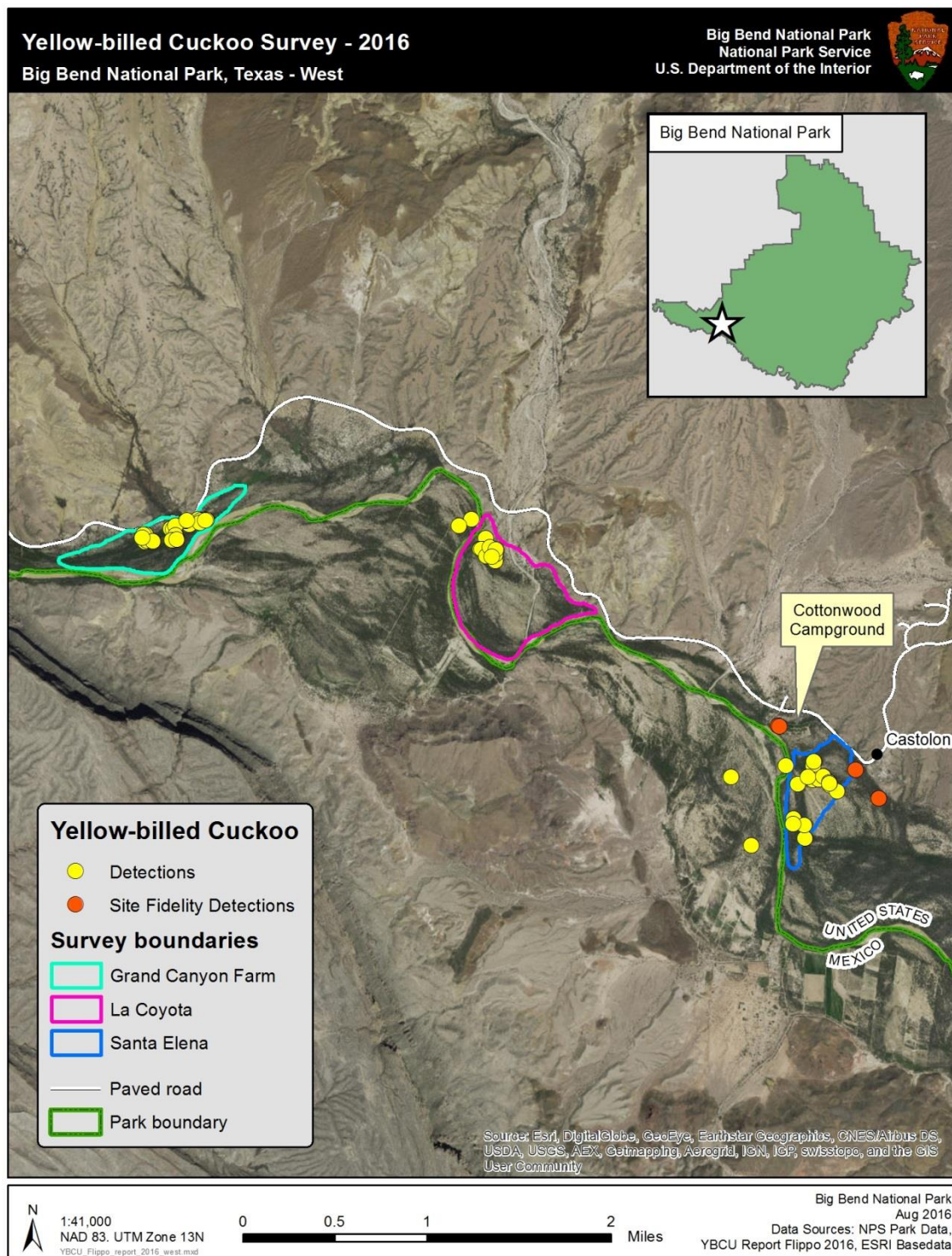
Table: Key to worksheets 1 -5

Location: Start/End	May include a physical description (CG = campground). If 2 or more UTM coordinates provided, bird was observed in a range of locations from first coordinate to last coordinate.
Time: Start/End	Duration of observation.
Observation	S = Seen H = Heard
Age Class	A = Adult J-d = Juvenile dependent: Out of nest, but tended by adults. Tail feathers still emerging. No yellow on lower mandible. J-I = Juvenile independent: Out of nest, foraging on own. Tail feathers nearly fully emerged, beginning to show some yellow at base of lower mandible. U = Unknown: Bird heard only. No visual confirmation of age class but, because of the type of vocalizations, these are assumed to be adult birds.
Habitat	C = Cottonwood Canopy: Manicured environment with even-aged stands of mature cottonwood trees 50-80 feet CW = Cottonwood/Willow: groves of cottonwood and willow trees . 20-30' in height. D = Deciduous understory: Manicured environment with orchard – like stands of non-native Arizona ash, locust sp. trees 20-30 feet in height. W= Willow dominated: thickets of willow with individual mature trees, often surrounded by giant cane (<i>Arundo</i>) M = Mesquite dominated: Continuous dense stands of mature honey mesquite trees 20-30 feet in height with full canopy and strong horizontal limb development. T = Thicket: Dense mixed thickets of brushy honey mesquite, acacia sp. tamarisk, giant cane, other woody shrubs.

Table continued

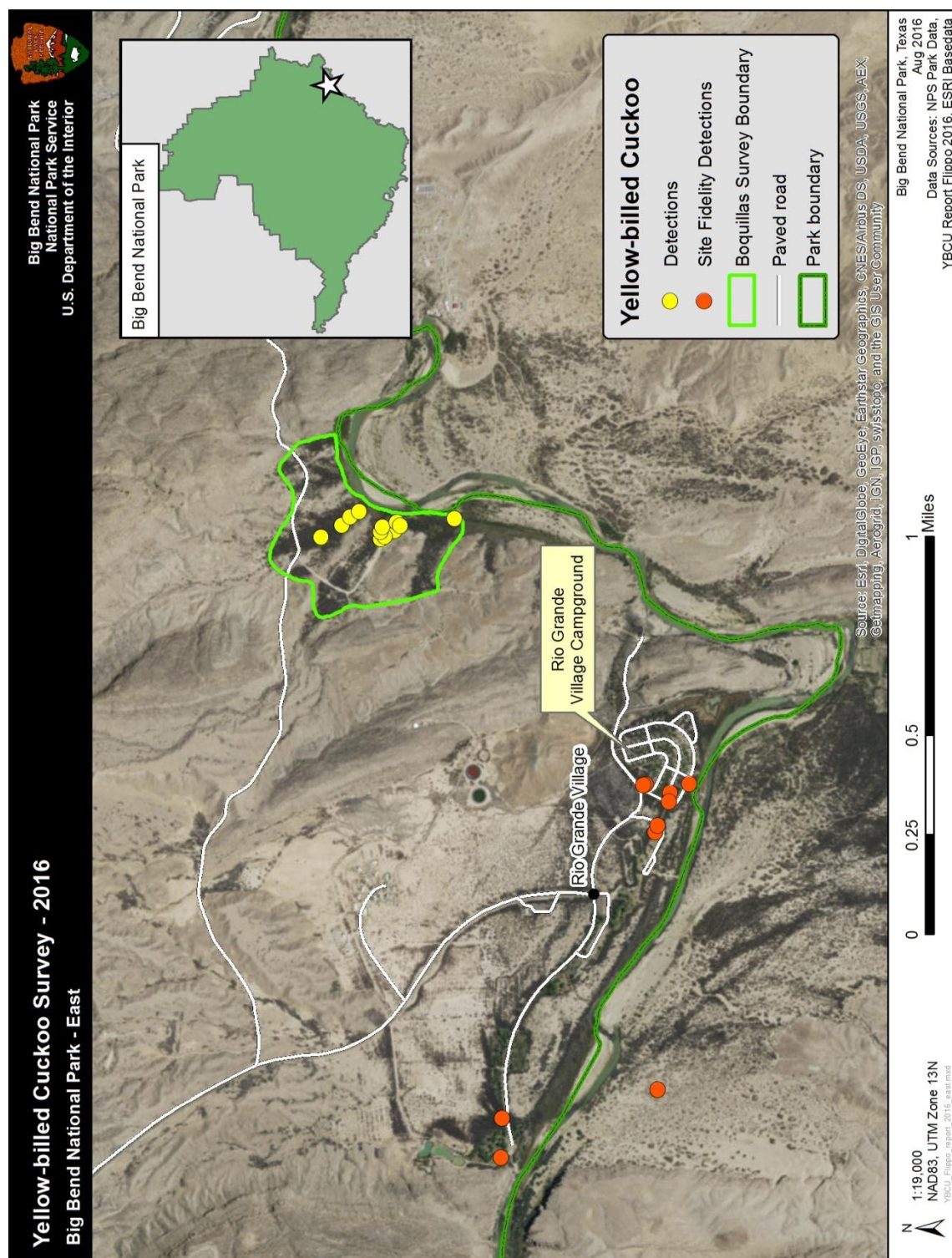
Vocals	1 = Kawlp: “kuk kuk kuk kaw kaw kawlp kawlp kawlp” most common call 2 = Coo: “koop koop koop....” Tinny monotone cooing repeated at varying length. Performed from a high perch, often in open, as part of territory/attraction display. 3 = Knocker: “kuk kuk kuk kuk...” often involving tail cocking or pumping, especially near nest or when approaching another cuckoo. 4 = Other: Nest calls, low quiet knocks, quiet gulps, coos, etc.
Activity	B = Begging: Dependent juvenile begging and feeding from adult. DH = Display – High: on high perch, performing call #2 (coo) DL = Display – Low: performing call #3 (knock) with tail cocking / pumping when approaching mate or nest. F = Foraging: Squirrel – like movement through foliage, gleaning or searching for prey FC = Food Carry: Adults carrying prey repeatedly to same location or direction. Fd = Feeding: Adult feeding juvenile or nestling. N = Nesting: Adult sitting on nest. NM = Nesting material: Adult observed carrying nest material. P = Perched: Adult or juvenile at perch Pr = Preening

Map: Survey Results - Big Bend National Park – West Side



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Map: Survey Results - Big Bend National Park – East Side



Status of western yellow-billed cuckoo (*Coccyzus americanus occidentalis*) in Big Bend National Park, 2016

Appendix A: Survey Data

Yellow-Billed Cuckoo Survey -Boquillas										
Worksheet 1										
Survey 1 - 6/04/2016 - 06:30 -11:30										
Bird	Location: Start/End	Time: Start/End	Observed	Age Class	Habitat	Vocalization	Activity	Notes		
#1	Mature cottonwood east of POE E.699659.35 N.3230821.71	8:50 - 8:58	H	U	CW,	1, 3		Probable adult		
#2	E.6999693.5 N.3230764.10	11:19	H	U	CW,W	1		Probable adult		
Survey 2 - 6/17/2016 - 06:30 -11:30										
Bird	Location: Start/End	Time: Start/End	Observed	Age Cla:	Habitat	Vocalization	Activity	Notes		
#1	E.6999668.38 N.323062.33	6:50 - 6:57	H	U	M	3		Probable adult. Paired with bird #2?		
#2	E.699714.70 N.3230978.00	6:50 - 6:57	H	U	M	3		Probable adult. Paired with bird #1?		
#3	E.699669.17 N.3230805.36	7:37 - 8:14	S,H	A	CW	3	F,P			
	E.699689.91 N.3230821.02									
#4	E.699742.99 N.3230522.77	9:54 - 10:15	S	A	W		F,Fd,P	capturing and eating cicadas. Photo		
Survey 3 - 7/3/2016 - 06:30 - 12:40										
Bird	Location: Start/End	Time: Start/End	Observed	Age Cla:	Habitat	Vocalization	Activity	Notes		
#1	E.699750.29 N.3230945.47	6:45 - 7:25	H	U	W	3,2,4		4 = low creaking "kidiup" calls. Probable adult		
#2	E.699771.28 N.3230907.92									
	E.699707.65 N.3230813.79	7:22 - 7:25	H	U	W	2	DH	Probable adult		
#3	E.699742.99 N.3230522.77	11:07 - 11:18	S	A	W	3,4	F,Fc,Fd	Feeding bird #4 cicadas. 3 visits. Possibly 2 adults?		
#4	E.699742.99 N.3230522.77	11:07 - 11:18	S	J-d	W		Fd			
#5	E.699728.81 N.3230756.58	11:30 - 12:04	S,H	A	CW	3	F,P	Paired with bird #6?		
#6	E.699712.37 N.3230742.37	12:00 - 12:40	H	A	CW	2	DH	Paired with bird #5?		

Status of western yellow-billed cuckoo (*Coccyzus americanus occidentalis*) in Big Bend National Park, 2016

Yellow-Billed Cuckoo Survey - Santa Elena									
Worksheet 2									
Survey 1 - 6/13/2016 - 06:30 - 11:30									
Bird	Location: Start/End	Time: Start/End	Observed	Age Class	Habitat	Vocalization	Activity	Notes	
#1	E.643921.88 N.3223763.52	6:40	H	U	M	3		Probable adult.	
#2	E.643200.84 N.3223664.18	6:50: - 6:52	H	U	M	3		Probable adult.	
	E.643914.99 N.3223637.68								
#3	E.643914.99 N.3223637.68	7:18	H	U	M	3		Probable adult.	
#3 & 4	E.643787.19 N.322601.79	7:24 - 7:35	H	U	M	1,3		2 birds vocalizing. Probable adults.	
#3/4?	E.643968.38 N.3223642.93	8:10	S	A	M		P	Flies to NW toward "coo" call from 2nd ybcu in distance	
								Probable adult. Location approximated. Very near #1's location.	
#5/1?	E.643928.16 N.3223797.84	8:11	H	U	M	2		Probable adult.	
#6	E.643876.22 N.3223662.31	8:37	H	U	M	3		Probable adult.	
#7 & 8	E.644067.63 N.3223591.03	10:41 - 11:10	S,H	A	M	1,3	P,DL	2 birds vocalizing, photos of one	
Survey 2 - 6/24/2016 - 06:30 - 11:30									
Bird	Location: Start/End	Time: Start/End	Observed	Age CI	Habitat	Vocalization	Activity	Notes	
#1	E.644128.30 N.322356.47	6:50	H	U	M	3		Probable adult.	
#1?	E.64009.95 N.3223670.17	7:11 - 7:15	H	U	M	1,3		Probable adult.	
#2	E.643680.57 N.3223764.08	7:11 - 7:18	H	U	M	1,2		Probable adult. Location approximate.	
#1	E.644060.69 N.3223616.69	7:18 - 7:28	H	U	M	2,3		Probable adult.	
#1/3	E.644063.17 N.3223605.83	7:33 - 8:15	S,H	A	M	3,4	N,NM	2 adults nest building/sitting on nest. 4 = low, quiet knocker calls. Photos.	
#4	E.643747.12 N.3223298.49	9:35	H	U	M	3		Probable adult.	
#5	E.643846.85 N.3223126.52	10:09	H	U	M	3		Probable adult.	

Yellow-Billed Cuckoo Survey - Santa Elena									
Survey 3 - 7/8/2016 - 06:30 -11:30									
Bird	Location: Start/End	Time: Start/End	Observed	Age	CI	Habitat	Vocalization	Activity	Notes
#1/2	E.644063.17 N.3223605.83	6:55 - 8:50	S,H	A		M	1,3,4	N,NM	Bird #1 assumed to be male. Female replaces male on nest at 0800. Photos.
#3	E.643378.00 N.3223064.81	9:00	H	U		M	1		Probable adult
#4	E.643844.07 N.3223241.64	10:00	H	U		M	1		Probable adult
#4?	E.643744.51 N.3223250.36	10:10	H	U		M	3		Probable adult

Yellow-Billed Cuckoo Survey - La Coyota									
Worksheet 3									
Survey 1 - 6/14/2016 - 06:30 - 11:30									
Bird	Location: Start/End	Time: Start/End	Observed	Age Class	Habitat	Vocalization	Activity	Notes	
#1/2	E.641053.78 N.3225752.67	7:06	H	U	M	3		2 ybcu calling from below bluff. Probable adults.	
#1/2?	E.641018.14 N.3225661.18	7:29	H	U	M	1		Probable adult.	
#1/2?	E.641010.41 N.3225661.18	7:38 - 7:45	S,H	A	M	3	flying, P		
#1/2?	E.641018.14 N.3225661.18	7:55	H	U	M	3		Same 7:29 location - Same bird?	
#1/2?	E.641139.87 N.3225556.80	8:09 - 8:15	H	U	M	3		Probable adult.	
Survey 2 - 6/25/2016 - 06:30 - 11:30									
Bird	Location: Start/End	Time: Start/End	Observed	Age Cla	Habitat	Vocalization	Activity	Notes	
#1	E.640929.61 N.3225921.48	10:00	H	U	M	2		Probable adult. coo call from Mexico. Location approximate.	
#2	E.640822.82 N.3225864.09	10:00	H	U	M	1		Probable adult. kawlp call from Mexico. Location approximate.	
Survey 3 - 7/9/2016 - 06:30 - 11:30									
Bird	Location: Start/End	Time: Start/End	Observed	Age Cla	Habitat	Vocalization	Activity	Notes	
#1	E.641139.87 N.3225612.42	7:42	H	U	M	3		Probable adult	
#2	E.641060.22 N.3225594.48	7:45	S,H	A	M	3	P,F		
#1 & 2?	E.641089.51 N.3225672.76	8:09 - 10:30	H	U	M	1,3		2 ybcu. Probable adults.	
#1/2?	E.641143.74 N.3225653.66	10:40 - 10:50	H	U	M	1,3		probable adult	
#1/2?	E.641106.94 N.3225592.40	11:00	S,H	A	M	1,3	F	cicada prey	

Yellow-Billed Cuckoo Survey- Grand Canyon Farm									
Worksheet 4									
Survey 1 - 6/16/2016 - 06:30 - 11:30									
Bird	Location: Start/End	Time: Start/End	Observed	Age Class	Habitat	Vocalization	Activity	Notes	
#1	E.638538.03 N.3225921.25	8:42	S,H	A	M	1,2,3,4	DH,flight	4="low "kulp,kulp,kulp"	
	E.638432.44 N.3225903.13	8:48	H	A	M	1,2			
	E.638458.58 N.3225874.87	8:57	H	A	M	2			
	E.638559.72 N.3225908.23	9:11	S,H	A	M	1	DL,flight		
	E.638553.20 N.3225889.86	9:20-9:30	S,H	A	M	1	F,P	photos	
#1/2?	E.638609.90 N.3225915.78	10:38	H	U	M,T	1		near large mulberry. Probable adult.	
#1/2?	E.638609.90 N.3225915.78	10:55-10:58	H	U	M,T	1		Probable adult. Paired with bird #3?	
#2/3?	E.638600.28 N.3225907.20	10:55-10:58	H	U	M,T	1		Probable adult. Paired with bird #2?	
Survey 2 - 6/29/2016 - 06:30 - 11:30									
#1	E.638428.48 N.3225906.78	8:15-8:20	S,H	A	M	2	DH,flight		
	E.638327.40 N.3225826.32	8:23	H	A	M	2	DH, flight		
	E.638297.01 N.3225834.82	8:41	H	A	M	1			
	E.638322.47 N.3225831.25	8:49	H	A	M	1			
	E.638343.11 N.322586.42	9:02	H	A	M	3			
	E.638343.11 N.322586.42	9:16	H	A	M	3			
	E.638310.72 N.322574.00	9:26	H	A	M	1,3			
#1/2	E.638351.33 N.322574.00	9:42-9:45	S,H	A	M	4	F,	4=low creaks. 2 birds. Possible nest.	
#3	E.638124.30 N.322573.04	10:40	S,H	A	M	1,2	DH,DL		
#1?	E.638186.69 N.322575.37	10:40	S,H	A	M	1,4	DH,DL	4="kidiup,kidiup" boundary display?	
#3	E.638079.07 N.3225782.20	11:07 -11:19	S,H	A	M	1,2,3,4	DH,DL,F	4="kulp" actively moving from E to W.	

#3 & #4	E.638073.09 N.3225721.57	11:21	S,H	A	M	3		Multiple moves E to W, 2 follows 1. photos
Yellow-Billed Cuckoo Survey- Grand Canyon Farm								
Survey 3 - 7/10/2016 - 06:30 - 11:30								
#1	E.638091.96 N.3225734.48	7:00-7:10	H	U	M	1,3		Probable adult
#1?	E.638057.23 N.3225782.71	7:39	S,H	A	M	1	DL	
#2	E.638143.22 N.3225729.76	8:30	H	U	M	1,2		calls from other territory to east
#1?	E.638048.79 N.3225761.00	8:40-9:05	S	A	M		P,Pr	
#1		9:10-9:18	S,H	A	M	4		4=low quiet cooing. Probable nest.
#3		9:12	S	A	M		P,F,FC	Paired with #1
#3		9:18	H	A	M	3		
#1		9:25	S,H	A	M	1,3	P,Pr	responds to distant cooing from east
#4	E.638438.10 N.322591028	10:46-11:30	H	U	M	1		2 adult grha = 1 juv. grha present

Yellow-Billed Cuckoo Survey - site fidelity revisits									
Worksheet 5									
Survey 1 - Rio Grande Village 6/22/2016 - 06:30 -11:30									
Bird	Location: Start/End	Time: Start/End	Observed	Age Class	Habitat	Vocalization	Activity	Notes	
#1	CG: E.698665.51 N.3229748.15 E.698664.14 N.3229757.20	7:10 - 7:30	S, H	A	D	3,	F,FC,P	Prey = cicadas, D=Robinia sp. Probable nest	
#2	CG: E.698632.91 N.3229649.77 E.698668.84 N.3229572.33	8:20 - 8:32	S, H	A	C,T	2,	F,DH	photos	
#3	CG: E.698595.44 N.3229653.59	8:35 - 8:40	S, H	A	C	2	F, DH,	responding coo calls from bird#1 & from group CG	
#4	Group CG: E.698472.49 N.3229708.50	8:45 - 9:10	S, H	A	D	1,2,3	DH,DL,P	Photos D=Robinia sp.	
	E.698500.36 N.3229699.83		S, H	A	D	1,2,3	DL	D = AZ ash Paired with bird #5. Photos	
#5	E.698500.36 N.3229699.83	8:53 - 9:10	S, H	A	D		P	D= AZ ash. Paired with bird #4.	
#6	Overflow:E.697430.30 N.3229699.83	9:50 - 10:00	S, H	A	C,T,D	1,2,3	DH,DL,P	D= Robinia sp. Paired with bird #7?	
	E.697313.73 N.3230328.71	10:00	S, H	A	M			Responds to coo calls from Daniels - moves.	
	E.697313.73 N.3230328.71	10:10 -10:15	S, H	A	C	1	P, flight		
#7	Overflow:E.697430.30 N.3229699.83	9:50 - 10:15	S, H	A	D	1	P,DL	D=Robinia sp. Paired with bird #6. Poss. nest.	
#8	Daniels:E.697154.47 N.3230334.28	10:00	H	U		2		Location approximate. Bird #6 responds to this bird.	

Survey 2 - Mesquite I 6/23/2016 - 06:30 -08:00									
Bird	Location: Start/End	Time: Start/End	Observed	Age	C Habitat	Vocalization	Activity	Notes	
#1	E.644492.40 N.3223476.89	6:40	H	U	M	3		Probable adult.	Location approximate.
#2	E.644492.40 N.3223476.89	6:40	H	U	M	1		Probable adult.	Location approximate.
#3	E.644290.70 N.3223729.11	7:10 - 7:20	H	U	M	3		Probable adult.	
Yellow-Billed Cuckoo Survey - site fidelity revisits									
Survey 3 - Cottonwood-Blue Creek 6/23/2016 - 08:15 - 11:30									
Bird	Location: Start/End	Time: Start/End	Observed	Age	C Habitat	Vocalization	Activity	Notes	
#1	CG: E.643615.07 N.3224110.89	8:25 - 8:35	S,H	A	C	1,2,3	DH,NM	Paired with bird #2.	
#2			S,H	A	C	1,3	NM	Paired with Bird #1	
#1	CG: E.643624.50 N.3224109.01	8:40 - 8:50	S,H	A	C		NM	Paired with bird #2. Nest building Photos.	
#2			S,H	A	C		N	Paired with bird #1. Sitting on nest, building.	

Appendix B: Other Birds Observed

Yellow-Billed Cuckoo Survey - Boquillas Other birds observed.				
Species	Survey 1 - 6/04/2016	Survey 2 - 6/17/2016	Survey 3 - 7/03/2016	Notes
scaled quail	X			
black vulture		X	X	
turkey vulture	X	X	X	
red-tailed hawk	X			
white-winged dove	X	X	X	
mourning dove		X	X	
Inca dove	X	X	X	
common ground-dove	X	X	X	
greater roadrunner		X	X	
lesser night hawk	X	X	X	
black-chinned hum.	X	X	X	
ladder-back woodp.	X	X	X	
peregrine falcon		X		1 adult
Western wood-pewee	X			
black phoebe			X	
vermillion flycatcher		X	X	
ash-throated flycatcher	X	X	X	
brown-crested flycatcher	X			
western kingbird	X			
Bell's vireo	X	X	X	
common raven	X	X	X	
n.rough-winged swallow	X	X	X	
cliff swallow	X	X		
verdin	X	X	X	
Carolina wren	X	X	X	
black-tailed gnatcatcher	X	X	X	
Northern mockingbird	X	X		
common yellowthroat		X		
yellow-breasted chat	X	X	X	
black-throated sparrow	X	X	X	
summer tanager	X	X	X	
Northern cardinal	X	X	X	
pyrrhuloxia	X	X	X	
blue grosbeak	X	X	X	
painted bunting	X	X	X	
brown-headed cowbird	X	X	X	
orchard oriole	X	X		
Bullock's oriole			X	
house finch	X	X	X	

Status of western yellow-billed cuckoo (Coccyzus americanus occidentalis) in Big Bend National Park, 2016

Yellow-Billed Cuckoo Survey - Santa Elena Other birds observed.

Species	Survey 1 - 6/13/2016	Survey 2 - 6/24/2016	Survey 3 - 7/8/2016	Notes
black vulture		X	X	
turkey vulture	X	X	X	
Swanson's hawk		X		
red-tailed hawk	X			
Eurasian collared dove	X	X		
white-winged dove	X	X	X	
mourning dove	X	X	X	
Inca dove	X		X	
common ground-dove	X	X	X	
greater roadrunner	X	X	X	
great horned owl			X	
lesser nighthawk	X	X	X	
black-chinned hum.		X	X	
golden-fronted woodp.			X	
ladder-back woodp.	X	X	X	
vermillion flycatcher		X		
ash-throated flycatcher	X	X	X	
Bell's vireo	X	X	X	
n.rough-winged swallow			X	
verdin	X	X	X	
cactus wren		X		
black-tailed gnatcatcher	X	X	X	
crissal thrasher	X			
Northern mockingbird		X	X	
Lucy's warbler	X	X		
yellow-breasted chat	X	X	X	
black-throated sparrow	X	X	X	
summer tanager	X	X	X	
Northern cardinal	X	X	X	
pyrrhuloxia	X	X	X	
blue grosbeak		X		
painted bunting	X	X	X	
brown-headed cowbird	X	X		
orchard oriole	X		X	
house finch	X	X	X	
lesser goldfinch			X	

Yellow-Billed Cuckoo Survey - La Coyota Other birds observed

Species	Survey 1 - 6/14/2016	Survey 2 - 6/25/2016	Survey 3 - 7/09/2016	Notes
Neotropic cormorant	X			unusual summer record
black vulture		X		
turkey vulture	X	X	X	
Swanson's hawk	X			
Eurasian collared dove	X	X		
white-winged dove	X	X	X	
mourning dove	X	X	X	
Inca dove	X	X	X	
common ground-dove	X	X	X	
greater roadrunner	X	X	X	
lesser nighthawk	X	X	X	
black-chinned hum.	X	X	X	
ladder-back woodp.	X	X	X	
ash-throated flycatcher	X	X	X	
Bell's vireo	X	X	X	
n.rough-winged swallow	X		X	
verdin	X	X	X	
black-tailed gnatcatcher	X	X	X	
Northern mockingbird		X	X	
yellow-breasted chat	X	X	X	
black-throated sparrow	X	X	X	
summer tanager	X	X	X	
Northern cardinal	X	X	X	
pyrrhuloxia	X	X	X	
blue grosbeak	X	X	X	
painted bunting	X	X	X	
bronzed cowbird	X			
brown-headed cowbird	X	X	X	
orchard oriole			X	
house finch	X	X	X	
lesser goldfinch		X	X	

Yellow-Billed Cuckoo Survey - Grand Canyon Farm

Other birds observed.

Species	Survey 1 - 6/16/2016	Survey 2 - 6/29/2016	Survey 3 - 7/10/2016	Notes
great blue heron			X	
black vulture			X	
turkey vulture	X	X	X	
gray hawk			X	2 adults + 1 juvenile
white-winged dove	X	X	X	
mourning dove	X	X	X	
Inca dove	X			
common ground-dove	X	X	X	
greater roadrunner	X	X		
great horned owl	X		X	
lesser nighthawk	X	X	X	
black-chinned hum.	X	X	X	
ladder-back woodp.	X	X	X	
black phoebe	X			
ash-throated flycatcher	X	X	X	
Bell's vireo	X	X	X	
common raven	X		X	
n.rough-winged swallow	X		X	
verdin	X	X	X	
black-tailed gnatcatcher	X	X	X	
Northern mockingbird	X	X	X	
yellow-breasted chat	X	X	X	
Cassin's sparrow			X	
black-throated sparrow	X	X	X	
summer tanager	X	X	X	
Northern cardinal	X	X	X	
pyrrhuloxia	X	X	X	
blue grosbeak	X	X	X	
painted bunting	X	X	X	
brown-headed cowbird	X	X	X	
orchard oriole	X		X	
house finch	X	X	X	
lesser goldfinch	X		X	