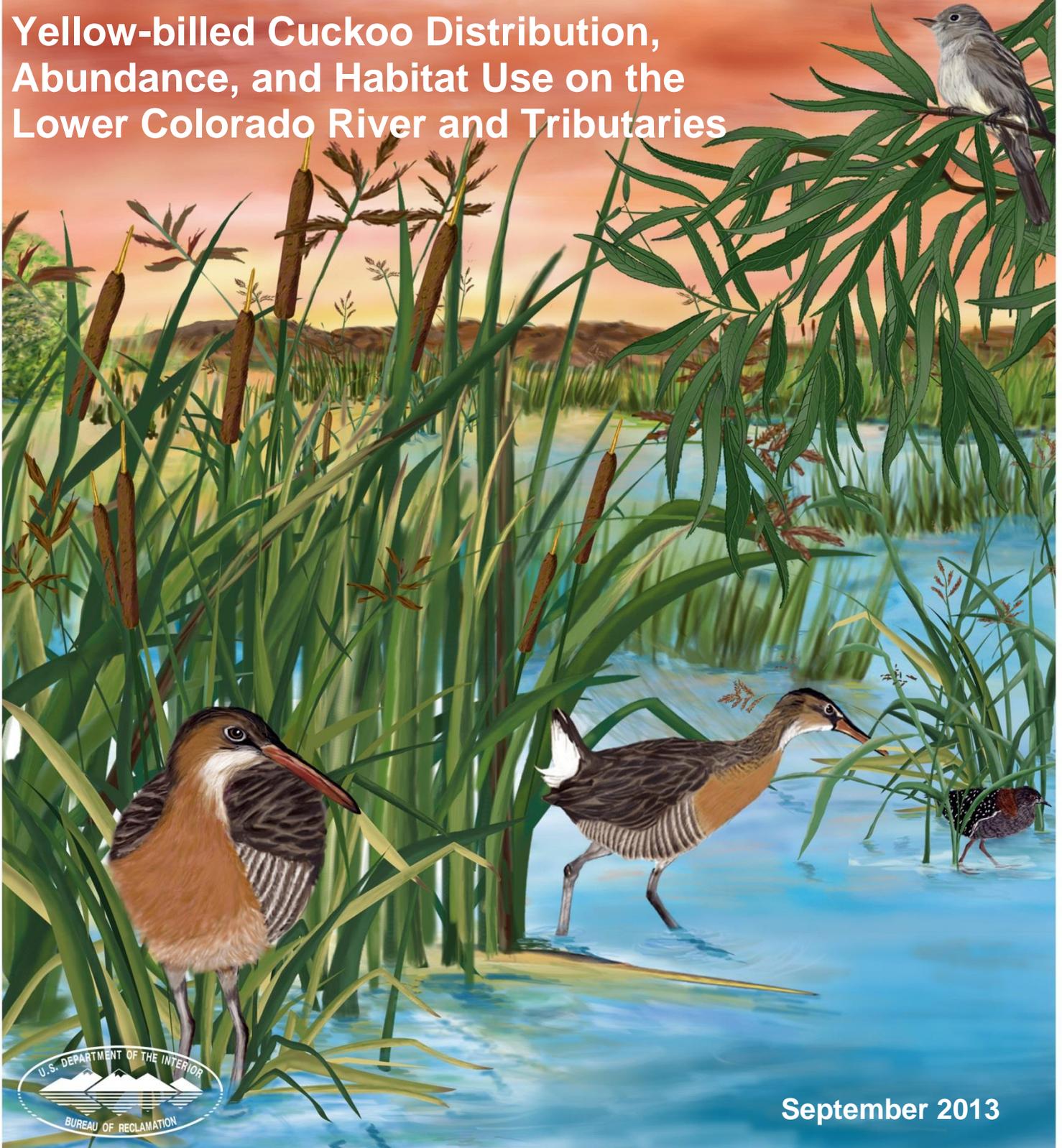


# Lower Colorado River Multi-Species Conservation Program



*Balancing Resource Use and Conservation*

## Yellow-billed Cuckoo Distribution, Abundance, and Habitat Use on the Lower Colorado River and Tributaries



September 2013

# Lower Colorado River Multi-Species Conservation Program Steering Committee Members

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U.S. Fish and Wildlife Service  
National Park Service  
Bureau of Land Management  
Bureau of Indian Affairs  
Western Area Power Administration

## **Arizona Participant Group**

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Arizona Electric Power Cooperative, Inc.  
Arizona Game and Fish Department  
Arizona Power Authority  
Central Arizona Water Conservation District  
Cibola Valley Irrigation and Drainage District  
City of Bullhead City  
City of Lake Havasu City  
City of Mesa  
City of Somerton  
City of Yuma  
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Mohave Valley Irrigation and Drainage District  
Mohave Water Conservation District  
North Gila Valley Irrigation and Drainage District  
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Salt River Project Agricultural Improvement and Power District  
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## **Other Interested Parties Participant Group**

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Desert Wildlife Unlimited

## **California Participant Group**

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City of Needles  
Coachella Valley Water District  
Colorado River Board of California  
Bard Water District  
Imperial Irrigation District  
Los Angeles Department of Water and Power  
Palo Verde Irrigation District  
San Diego County Water Authority  
Southern California Edison Company  
Southern California Public Power Authority  
The Metropolitan Water District of Southern California

## **Nevada Participant Group**

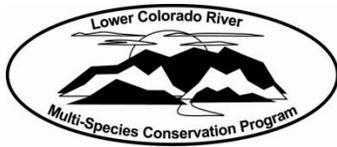
Colorado River Commission of Nevada  
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## **Native American Participant Group**

Hualapai Tribe  
Colorado River Indian Tribes  
Chemehuevi Indian Tribe

## **Conservation Participant Group**

Ducks Unlimited  
Lower Colorado River RC&D Area, Inc.  
The Nature Conservancy



# **Lower Colorado River Multi-Species Conservation Program**

## **Yellow-billed Cuckoo Distribution, Abundance, and Habitat Use on the Lower Colorado River and Tributaries**

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**September 2013**

# ACRONYMS AND ABBREVIATIONS

|             |   |
|-------------|---|
| AGFD        | Arizona Game and Fish Department                  |
| BWRNWR      | Bill Williams River National Wildlife Refuge      |
| CDFG        | California Department of Fish and Game            |
| COB         | confirmed   |
| CVCA        | Cibola Valley Conservation Area                   |
| ESA         | Endangered Species Act                            |
| g           | gram(s)   |
| GPS         | Global Positioning System                         |
| ha          | hectare(s)  |
| LCR         | lower Colorado River                              |
| LCR MSCP    | Lower Colorado Multi-Species Conservation Program |
| m           | meter(s)  |
| NWR         | National Wildlife Refuge                          |
| POS         | possible  |
| PRB         | probable  |
| PVER        | Palo Verde Ecological Reserve                     |
| Reclamation | Bureau of Reclamation                             |
| SY          | second-year                                       |
| USFWS       | U.S. Fish and Wildlife Service                    |
| YBCU        | yellow-billed cuckoo                              |

## **Symbols**

°C    degrees Celsius

%    percent

# CONTENTS

|   | Page |
|---|------|
| Executive Summary .....                                       | ES-1 |
| Introduction and Project Background .....                     | 1    |
| Yellow-billed Cuckoo History and Biology .....                | 1    |
| Lower Colorado River Multi-Species Conservation Program ..... | 2    |
| Methods.....  | 3    |
| Study Area and Survey Site Selection .....                    | 3    |
| Presence-Absence Surveys .....                                | 6    |
| Breeding Territory Estimation .....                           | 8    |
| Resights.....   | 9    |
| Nests.....  | 9    |
| Banding.....  | 10   |
| Results.....  | 10   |
| Presence-Absence Surveys .....                                | 10   |
| Breeding Territory Estimates .....                            | 16   |
| Nests.....  | 16   |
| Mist Netting, Color Banding, and Resights .....               | 16   |
| Discussion .....  | 18   |
| Acknowledgements.....   | 22   |
| Literature Cited .....  | 23   |

## Tables

| Table  | Page |
|--|------|
| 1 Yellow-billed cuckoo survey sites, LCR, 2013 .....   | 5    |
| 2 LCR YBCU survey period dates, 2013.....  | 6    |
| 3 Summary of definitions for study area, river reach, survey area,<br>survey site, and survey point.....                 | 7    |
| 4 Summary of definitions for breeding territory estimation .....   | 8    |
| 5 LCR YBCU survey detections and territory estimates for<br>Reach 3 (Havasu NWR) sites, 2013 .....                       | 11   |
| 6 LCR YBCU survey detections and territory estimates for<br>Reach 3 (BWRNWR) sites, 2013 .....                           | 11   |
| 7 LCR YBCU survey detections and territory estimates for<br>Reach 4 (Parker to Cibola) sites, 2013.....                  | 12   |
| 8 LCR YBCU survey detections and territory estimates for<br>Reaches 5 and 6 (Imperial to Yuma), 2013 .....               | 13   |
| 9 LCR YBCU survey detections and territory estimates by<br>river reach for all sites, 2013 (summary of tables 5–8) ..... | 13   |

## Tables (continued)

| Table |  | Page |
|-------|--|------|
| 10    | Area (ha), maximum territory estimate, maximum territories per ha, and maximum territories per 20 ha by survey area, sorted by size of area (ha) ..... | 18   |
| 11    | YBCU nests found on the LCR, 2013 .....  | 19   |
| 12    | Adult YBCU captured or resighted on the LCR, 2013 .....  | 20   |
| 13    | YBCU young banded on the LCR, 2013 .....   | 21   |

## Figures

| Figure |  | Page |
|--------|--|------|
| 1      | LCR yellow-billed cuckoo study area (2008–2012), including river reach boundaries..... | 4    |
| 2      | LCR YBCU survey detections by survey area, 2013. ....                                  | 14   |
| 3      | LCR survey detections by year (2008–2013), shown by survey area.....                   | 15   |
| 4      | YBCU maximum breeding territories by survey area, LCR, 2013.....                       | 17   |

## Attachments

### Attachment

- A        Birds Encountered during Yellow-billed Cuckoo Surveys, 2013

## EXECUTIVE SUMMARY

The western yellow-billed cuckoo (*Coccyzus americanus*) breeding population has declined dramatically over the past century following extensive riparian habitat loss. In 2005, the Lower Colorado River Multi-Species Conservation Program (LCR MSCP) was finalized to create, protect, and maintain wildlife habitat for yellow-billed cuckoos and other threatened and near-threatened species occurring within the historical lower Colorado River flood plain. This report details surveys conducted in 2013 to continue to assess the response of yellow-billed cuckoos to ongoing riparian habitat restoration and guide future habitat creation planned within the LCR MSCP boundary. Between mid-June and mid-August 2013, we conducted yellow-billed cuckoo call-broadcast surveys at 44 sites along the lower Colorado, Bill Williams, and Gila Rivers, covering approximately 1,400 hectares (ha) of potentially suitable breeding habitat. Survey sites included 17 LCR MSCP restoration phases as well as 27 sites system wide. We recorded 335 survey detections estimated to represent up to 61 potential breeding territories within the surveyed area. From 2012 to 2013, survey detections more than doubled at Palo Verde Ecological Reserve (PVER) and decreased by just over half at the Bill Williams River National Wildlife Refuge. We confirmed breeding at Havasu National Wildlife Refuge (Beal) and PVER Phases 2, 3, 5, 6, and 7, and Cibola Valley Conservation Area (CVCA) Phases 1 and 3. For the first time we confirmed breeding at PVER Phase 6 and 7 and at CVCA Phase 3. PVER Phase 7 (88 ha, planted in 2012) became the youngest site in the study area with confirmed nesting.

# INTRODUCTION AND PROJECT BACKGROUND

## Yellow-billed Cuckoo History and Biology

The western yellow-billed cuckoo (cuckoo, YBCU) population has declined dramatically over the last 100 years due to extensive loss or alteration of suitable breeding habitat, primarily pioneer riparian forests and associated bottomlands dominated by willow (*Salix* spp.), cottonwood (*Populus* spp.), or mesquite (*Prosopis* spp.) (Gaines and Laymon 1984; Laymon and Halterman 1987; Hughes 1999; Halterman et al. 2001). Historically, 160,000–200,000 hectares (ha) of alluvial flood plain was estimated to occur within the lower Colorado River (LCR) Valley between Fort Mohave and Yuma (Mearns 1907), which was densely wooded throughout (Grinnell 1914). At this time, cuckoos are thought to have been fairly common, although few early records exist (Gaines and Laymon 1984).

Over the past century, the LCR was transformed by dams to a string of reservoirs, and vast areas of flood plain were converted to agricultural fields and urban settlements (Stromberg 2001). Grinnell and Miller (1944) noted an extensive range reduction of western cuckoos due to wide-scale habitat loss. By 1980, only 32,678 ha of riparian woodland remained in the LCR Valley (Hunter et al. 1988). In the 1970s, the regional cuckoo population was estimated (from survey detections) at 358 individuals: 244 between Davis Dam and the Mexican border plus another 114 at the mouth of the Bill Williams River (Gaines and Laymon 1984). Much of the LCR flood plain is now dominated by arrowweed (*Pluchea sericea*) and non-native tamarisk (*Tamarix ramosissima*) (Ohmart et al. 1988). The current expanse of woody riparian vegetation within the Lower Colorado River Multi-Species Conservation Program (LCR MSCP) boundary is estimated to be 50,990 ha, of which just 18 percent (%) is native (Bureau of Reclamation [Reclamation] 2004a).

The taxonomic status of the western cuckoo remains unclear; whereas some researchers support a distinct western subspecies *occidentalis* based on morphological and other differences (Ridgeway 1887; Franzreb and Laymon 1993; Pruett et al. 2001), others find no basis for separation of eastern and western cuckoos (Banks 1988, 1990; Fleischer 2001; Farrell 2006). In 2001, the U.S. Fish and Wildlife Service (USFWS) determined that western yellow-billed cuckoos represent a distinct population segment, which became a candidate for listing for protection under the Endangered Species Act (ESA) (USFWS 2001). In 2002, the listing was determined to be warranted but precluded by higher priority listing actions (due to limited resources) (USFWS 2002). Yellow-billed cuckoos are listed as endangered in California (California Department of Fish and Game [CDFG] 1978), a species of special concern in Arizona (Arizona Game and Fish Department [AGFD] 1988), and a sensitive species on U.S. Forest Service lands within Arizona and New Mexico (United States Department of Agriculture 1988).

## **Yellow-billed Cuckoo Distribution, Abundance, and Habitat Use on the Lower Colorado River and Tributaries**

Yellow-billed cuckoos are among the latest-arriving neotropical migrants, beginning to arrive in Arizona and California in late May (Bent 1940). Their diet during the breeding season consists primarily of large insects, such as grasshoppers, katydids, caterpillars, mantids, and cicadas, as well as tree frogs and small lizards (Bent 1940; Hamilton and Hamilton 1965; Nolan and Thompson 1975; Laymon 1980; Laymon et al. 1997; Hughes 1999). Nesting usually occurs between late June and late July, but can begin as early as late May and continue until late September (Hughes 1999). In the LCR region, the nesting period tends to be late June to early August and peaking mid- to late July (McNeil et al. 2013a). The main nest tree species in this region are Goodding's willow (*S. gooddingii*), Fremont cottonwood (*P. fremontii*), and tamarisk, though other trees or large shrubs such as mesquite and seep willow (*Baccharis salicifolia*) may be used (McNeil et al. 2012, 2013a). Nests consist of a loose platform of twigs, which are built by both sexes, and take 1 to 2 days to build, though occasionally the nest of another species is used (Jay 1911; Bent 1940; Payne 2005; McNeil et al. 2011). Clutch size is 1–5 (Payne 2005), usually 2–3 (Laymon 1998), though 8 eggs have been found in one nest due to more than 1 female laying in the nest (Bent 1940). Eggs are generally laid daily until clutch completion (Jay 1911), and incubation begins once the first egg is laid, lasting 9–11 days (Potter 1980, 1981; Hughes 1999). Young hatch asynchronously and are fed mostly large insects (Laymon and Halterman 1985; Laymon et al. 1997; Halterman 2009). After fledging at 5 to 9 days, young may be dependent on adults for at least 3 (Laymon and Halterman 1985) to 3½ weeks (McNeil et al. 2013a). Fall migration is thought to begin in late August, with most birds gone by mid-September (Hughes 1999); however, on the LCR, some individuals appear to begin migrating in early August (McNeil et al. 2011, 2013a).

## **Lower Colorado River Multi-Species Conservation Program**

The LCR MSCP is a coordinated, comprehensive, long-term, multi-agency effort, with goals including conserving habitat, working toward the recovery of threatened and endangered species, and reducing the likelihood of additional species being listed (Reclamation 2004b). The LCR MSCP covers areas within the historical flood plain of the Colorado River from Lake Mead to the United States-Mexico Southerly International Boundary, a distance of about 400 river miles (Reclamation 2004b). Developed between 1996 and early 2005, the LCR MSCP includes the creation of more than 3,278 ha (8,100 acres) of riparian, marsh, and backwater habitat for six federally (or ESA) listed species, 20 other covered species, and 5 evaluation species native to the lower Colorado River, including at least 1,639 ha (4,050 acres) of habitat for the riparian obligate yellow-billed cuckoo (Reclamation 2004b).

## **Yellow-billed Cuckoo Distribution, Abundance, and Habitat Use on the Lower Colorado River and Tributaries**

Our objective in 2013 was to continue conducting repeatable yellow-billed cuckoo surveys within the LCR MSCP project boundary. This will provide an assessment of annual habitat use, an estimate of the regional breeding cuckoo population, and provide information for Reclamation's ongoing adaptive management of riparian habitat in this region.

While surveys designed to monitor a species can uncover patterns of distribution and habitat use, the mechanisms behind these patterns are often better discerned through supplemental research such as nest observations, radio telemetry, and habitat analyses. We have done these additional tasks in previous years (see McNeil et al. 2013a, 2013b); however, this year, our contract with Reclamation included surveys only. All efforts beyond surveys were conducted using volunteer hours and in-kind use of equipment and supplies. Volunteers contributed 75 days to accomplish activities other than surveys.

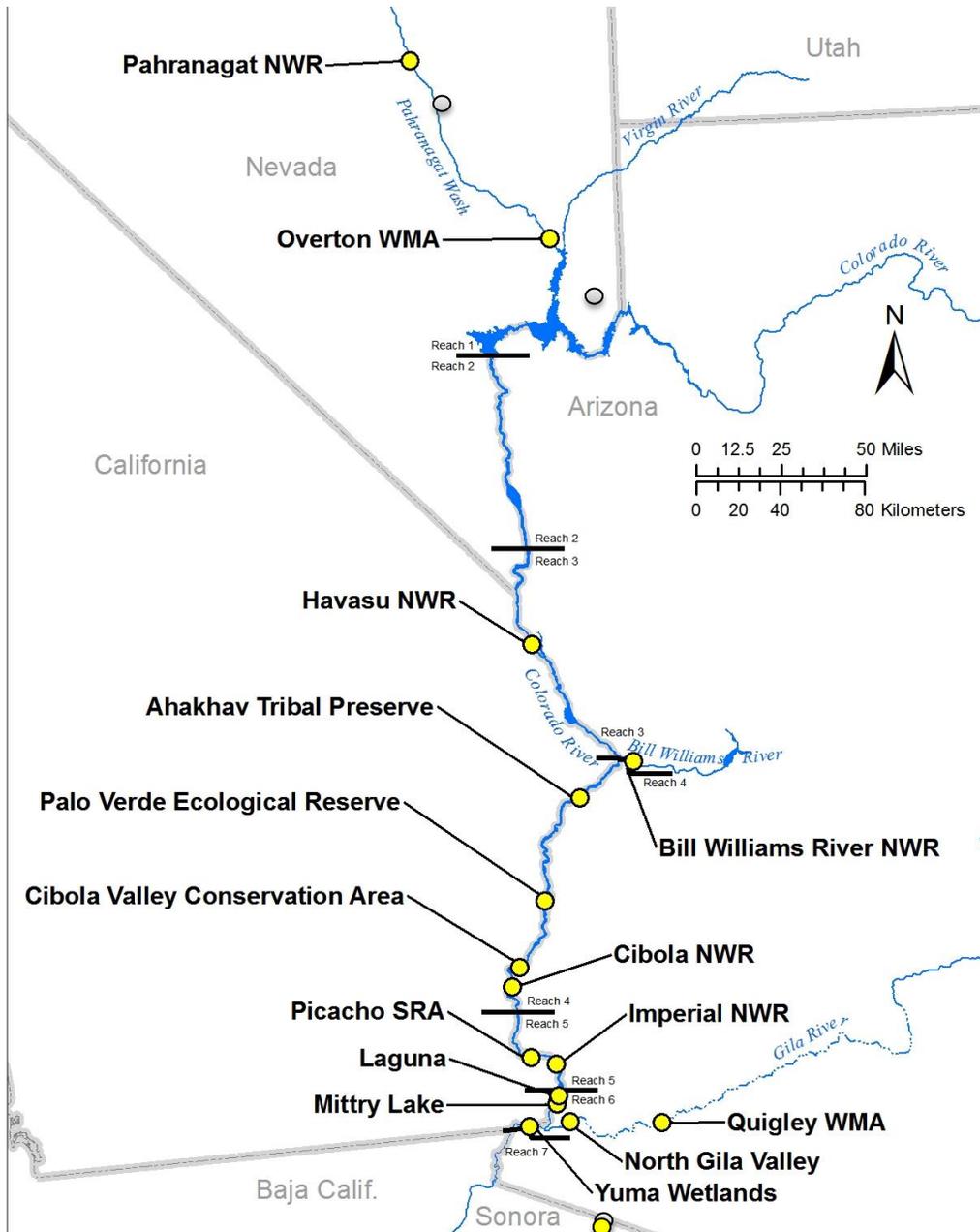
## **Methods**

### **Study Area and Survey Site Selection**

We conducted yellow-billed cuckoo surveys along approximately 200 river miles of the lower Colorado River and tributaries from Havasu National Wildlife Refuge to Yuma (the study area) (figure 1). Along this river stretch, all potentially suitable habitat patches were considered for inclusion. Potentially suitable habitat consisted of early to mature native or mixed native/exotic riparian forest, with woody riparian land cover structural types I–III, at least 4–5 meters (m) in height (Anderson and Ohmart 1984). A habitat patch was defined as an area of potentially suitable habitat 2 ha or greater in extent, separated from another patch of potentially suitable habitat by at least 300 m. A survey site was defined as part of a patch, an entire patch, or a collection of patches of potentially suitable habitat treated as one site. Sites were selected based on past cuckoo detections (Johnson et al. 2007, 2008; Halterman et al. 2009; McNeil et al. 2010, 2011, 2012, 2013a, 2013b), patch size, plant species composition, and structure. Sites were delineated by walking boundaries with a Global Positioning System (GPS) unit. If site boundaries were inaccessible (such as areas of BWRNWR), we estimated boundaries and site sizes (in ha) by using ArcGIS 9.3 and georeferenced 2004 or 2010 aerial imagery.

We surveyed 44 sites in 2013 (figure 1; table 1): 17 sites within actively managed LCR MSCP restoration projects and 27 other sites system wide (i.e., elsewhere within the LCR MSCP boundary containing suitable habitat for yellow-billed cuckoos system wide. We distinguished the uniqueness of the Bill Williams River sites by designating them as “Bill Williams Natural Sites.” These sites are still subjected to periodic flood events that result in natural recruitment of the cottonwood and willow habitat present there. We resurveyed all sites surveyed in 2012 except two at Pahranaagat National Wildlife Refuge (NWR), two at Overton Wildlife Management Area, two Laguna sites, and two North Gila Valley sites. These sites were excluded due to lack of cuckoo presence during previous years

**Yellow-billed Cuckoo Distribution, Abundance, and Habitat Use on the Lower Colorado River and Tributaries**



**Figure 1.—LCR yellow-billed cuckoo study area (2008–2012), including river reach boundaries.**

(2013 survey areas shown by yellow circles. Sites listed in tables 1 and 2 are clustered in these survey areas.)

and changing priorities within the LCR MSCP survey area. We added two sites at Palo Verde Ecological Reserve (PVER) (Phases 6 and 7), as these phases were planted with cottonwood and willow and are approaching the structure that is suitable for yellow-billed cuckoos. We resurveyed one site last surveyed in 2011 (Imperial Martinez Lake). Site descriptions can be found in McNeil et al. (2013b).

**Yellow-billed Cuckoo Distribution, Abundance, and Habitat Use  
on the Lower Colorado River and Tributaries**

Table 1.—Yellow-billed cuckoo survey sites, LCR, 2013

| Survey area                         | Site name                        | Site code | Size (ha)   | Site type               | River reach |
|-------------------------------------|----------------------------------|-----------|-------------|-------------------------|-------------|
| Havasu NWR                          | Beal Restoration                 | HAVBR     | 21.3        | LCR MSCP Restoration    | 3           |
|                                     | North Dike                       | HAVND     | 5.1         | System-wide             | 3           |
|                                     | Pintail Slough                   | HAVPS     | 11.7        | System-wide             | 3           |
|                                     | Topock Platform                  | HAVTPR    | 9.3         | System-wide             | 3           |
| BWRNWR                              | Bill Williams Marsh              | BWMA      | 19.7        | BWR Natural             | 3           |
|                                     | Borrow Pit                       | BWBP      | 33.6        | BWR Natural             | 3           |
|                                     | Cave Wash                        | BWCW      | 36.4        | BWR Natural             | 3           |
|                                     | Cougar Point                     | BWPT      | 43.1        | BWR Natural             | 3           |
|                                     | Cross River                      | BWCR      | 30.2        | BWR Natural             | 3           |
|                                     | Esquerra Ranch                   | BWER      | 40.2        | BWR Natural             | 3           |
|                                     | Fox Wash                         | BWFW      | 62.5        | BWR Natural             | 3           |
|                                     | Gibraltar Rock                   | BWGR      | 66.5        | BWR Natural             | 3           |
|                                     | Honeycomb Bend                   | BWHB      | 29.6        | BWR Natural             | 3           |
|                                     | Kohen Ranch                      | BWKR      | 37.1        | BWR Natural             | 3           |
|                                     | Middle Delta                     | BWMD      | 25.2        | BWR Natural             | 3           |
|                                     | Mineral Wash                     | BWMW      | 49.8        | BWR Natural             | 3           |
|                                     | Mosquito Flats                   | BWMF      | 37.1        | BWR Natural             | 3           |
|                                     | North Burn                       | BWNB      | 30.0        | BWR Natural             | 3           |
| Sandy Wash                          | BWSW                             | 50.9      | BWR Natural | 3                       |             |
| Colorado River Indian Reservation   | 'Ahakhav Tribal Preserve         | CRIT      | 59.6        | LCR MSCP Restoration    | 4           |
| Palo Verde Ecological Reserve       | Palo Verde Phase 1               | PVER1     | 8.3         | LCR MSCP Restoration    | 4           |
|                                     | Palo Verde Phase 2               | PVER2     | 24.2        | LCR MSCP Restoration    | 4           |
|                                     | Palo Verde Phase 3               | PVER3     | 19.8        | LCR MSCP Restoration    | 4           |
|                                     | Palo Verde Phase 4               | PVER4     | 35.8        | LCR MSCP Restoration    | 4           |
|                                     | Palo Verde Phase 5               | PVER5     | 51.8        | LCR MSCP Restoration    | 4           |
|                                     | Palo Verde Phase 6 <sup>1</sup>  | PVER6     | 81.0        | LCR MSCP Restoration    | 4           |
|                                     | Palo Verde Phase 7 <sup>2</sup>  | PVER7     | 88.0        | LCR MSCP Restoration    | 4           |
| Cibola Valley Conservation Area     | Cibola Valley Phase 1            | CVCA1     | 34.8        | LCR MSCP Restoration    | 4           |
|                                     | Cibola Valley Phase 2            | CVCA2     | 24.7        | LCR MSCP Restoration    | 4           |
|                                     | Cibola Valley Phase 3            | CVCA3     | 37.0        | LCR MSCP Restoration    | 4           |
| Cibola NWR                          | Cibola Crane Roost               | CIBCR     | 48.0        | LCR MSCP Restoration    | 4           |
|                                     | Cibola Eucalyptus                | CIBEUC    | 29.4        | System-wide             | 4           |
|                                     | Cibola Mass Planting             | CIBMP     | 23.7        | LCR MSCP Restoration    | 4           |
|                                     | Cibola Nature Trail              | CIBCNT    | 14.4        | LCR MSCP Restoration    | 4           |
|                                     | Cibola North                     | CIBNTH    | 7.2         | LCR MSCP Restoration    | 4           |
| Imperial NWR                        | Imperial NWR 20A                 | IMP20A    | 2.0         | System-wide Restoration | 5           |
|                                     | Imperial NWR 50                  | IMP50     | 4.2         | System-wide Restoration | 5           |
|                                     | Imperial NWR South               | IMPSTH    | 13.0        | System-wide Restoration | 5           |
|                                     | Imperial Martinez Lake           | IMPAST    | 6.8         | System-wide             | 5           |
| Picacho State Recreation Area (SRA) | Picacho SRA                      | PICSRA    | 14.8        | System-wide Restoration | 5           |
| Mitry Lake                          | Mitry Lake-Pratt                 | MLPR      | 13.0        | System-wide Restoration | 6           |
|                                     | Quigley Wildlife Management Area | GRQP      | 10.6        | System-wide Restoration | 6           |
| Yuma Wetlands                       | Yuma East Wetlands               | YUEW      | 46.0        | LCR MSCP Restoration    | 6           |
|                                     | Yuma West Wetlands               | YUWW      | 25.5        | System-wide Restoration | 6           |

<sup>1</sup> New site planted in 2011.

<sup>2</sup> New site planted in 2012; surveyed periods 3–5 only.

## Yellow-billed Cuckoo Distribution, Abundance, and Habitat Use on the Lower Colorado River and Tributaries

### Presence-Absence Surveys

A primary survey objective was to assess yellow-billed cuckoo habitat use within the study area. The use of multiple call-broadcast surveys during the breeding season is standardly used to increase the probability of detecting cuckoos and determine habitat occupancy (Johnson et al. 1981; Gaines and Laymon 1984; Halterman et al. 2008). Cuckoos are inherently secretive, avoid detection, and call infrequently (Hamilton and Hamilton 1965). Their furtive nature coupled with their somewhat transitory behavior may lead to imperfect detection of the species (McNeil et al. 2010, 2011, 2012, 2013a, 2013b). Also, the use of call-broadcasts can attract cuckoos from neighboring habitat into the surveyed habitat. Given these behaviors, surveys are not designed to determine the absolute number of cuckoos within an area, to identify breeding status, or assess small-scale habitat preferences.

We conducted five surveys at most sites, one per survey period (table 2). We conducted four surveys at sites with no detections during previous surveys. Surveys occurred along point transects on foot or by kayak, between sunrise and 10:30 a.m., or until temperatures reached 40 degrees Celsius (°C) (104 degrees Fahrenheit). Whenever possible, we surveyed adjacent sites on the same day to minimize the possibility of double counting the same cuckoo at adjacent sites. On these occasions, surveyors used radios to communicate with each other. Each site contained one or more transects with parallel transects spaced approximately 200 to 250 m apart. Survey points were spaced every 100 m along transects. Most transects traversed through the habitat patches; however, some ran along habitat edges or adjacent roads to exploit greater visual detectability from these locations or because the interior of the habitat was inaccessible. Survey points were located using Garmin GPS units ( $\pm 6$  m horizontal accuracy), and at each point we recorded the location, time, habitat type, and structure.

Table 2.—LCR YBCU survey period dates, 2013

| Survey period | Dates                  |
|---------------|------------------------|
| 1             | June 15 to June 30     |
| 2             | July 1 to July 14      |
| 3             | July 15 to July 28     |
| 4             | July 29 to August 11   |
| 5             | August 12 to August 25 |

On arriving at a survey point, surveyors listened and watched for cuckoos for 1 minute. If none were detected, surveyors used an MP3 player and hand-held speaker to broadcast a 5-second yellow-billed cuckoo contact call (the “kowlp” call) (Hughes 1999) at approximately 70 decibels, once per minute for 5 minutes.

**Yellow-billed Cuckoo Distribution, Abundance, and Habitat Use  
on the Lower Colorado River and Tributaries**

A 5-second call was followed by 55 seconds of active observation and listening. If a cuckoo was detected, call-playbacks were discontinued immediately, and all pertinent data were recorded (see below). Following a detection, surveyors progressed along the point transect 300 m from the estimated location of the detected cuckoo in order to avoid additional disturbance and duplicate detections of the same bird.

For each detection, the surveyor recorded the true bearing and estimated distance from the surveyor to the cuckoo, time of detection, number of call-broadcasts played, response type, behavior, vocalizations, vegetation type, presence of other cuckoos, interactions, and the presence and/or color combination of leg bands. Any observed breeding evidence was recorded, including carrying food or nesting material, copulation, the presence of a juvenile, or a nest. An individual cuckoo visually observed or heard during a survey, including any detected while traveling between survey points, was recorded as a survey detection. If the same individual was presumed to have been detected more than once during a single survey, only the initial detection was used in calculating the survey detection total. Detections >300 m apart (>200 m at high-density sites) during a single survey were counted as separate individuals and therefore separate survey detections. Repeated detections of an individual and detections before or after a survey were classified as non-survey or incidental detections. Information collected for incidental detections was the same as that collected for survey detections. Additionally, we recorded all avian species encountered during surveys (attachment A). The terms related to surveys are summarized in table 3.

Table 3.—Summary of definitions for study area, river reach, survey area, survey site, and survey point

| Term                | Definition  |
|---------------------|---|
| Study area          | All potentially suitable cuckoo habitat along a 200-river-mile stretch of the lower Colorado River and tributaries from Havasu NWR to the United States-Mexico Southerly International Boundary.  |
| River reach (Reach) | A discrete watershed segment used by the LCR MSCP for the analysis of impacts and conservation measures (Reclamation 2004a). Sites are grouped by reach in tables.  |
| Survey area         | A collection of clustered survey sites (see figure 1).  |
| Survey site (site)  | A location consisting of an entire patch, a part of a patch, or a collection of patches of potentially suitable habitat surveyed in one morning (table 1). To adequately survey a site, one or more survey transects traversed each site. |
| Survey point        | Spatially explicit points spaced 100 m apart along transects within a survey site where cuckoo call-broadcasts (up to five broadcasts per point) were conducted.  |

**Yellow-billed Cuckoo Distribution, Abundance, and Habitat Use  
on the Lower Colorado River and Tributaries**

**Breeding Territory Estimation**

To estimate breeding territory abundance, we deemed areas as potentially harboring breeding cuckoos if detections occurred in two or more survey periods. We deemed a single detection in an area an unreliable indicator of breeding due to the transience of non-breeding cuckoos (Johnson et al. 2007; McNeil et al. 2011, 2012, 2013a, 2013b). All detections were assessed by location (using ArcGIS), observed behaviors, and detection dates. These detections were then used to categorize breeding status for each area as a *possible* (POS), *probable* (PRB), or *confirmed* (COB) *breeding territory* (table 4). Two or more total detections in an area during at least two survey periods and at least 10 days apart warranted a *possible breeding territory*. POS cuckoos observed repeatedly carrying food, traveling as a pair, exchanging vocalizations, or giving distraction displays were considered a *probable breeding territory*. Breeding was only *confirmed* when a copulation, stick carry, nest, or fledgling was observed. We used all detections to estimate breeding territories, including incidental, survey, and followup observations. Incidental observations include repeat detections of a cuckoo before, during, or after a survey; followup visits included all activities outside call-broadcast surveys such as nest searching, mist netting, and resight attempts. POS and PRB observations were followed up whenever possible (especially immediately after surveys) to increase the likelihood of confirming breeding.

Table 4.—Summary of definitions for breeding territory estimation

| Estimation type               | Term                               | Definition  |
|-------------------------------|------------------------------------|---|
| Breeding territory estimation | Possible breeding territory (POS)  | Two or more total detections in an area during two survey periods and at least 10 days apart. For example, within a certain area, one detection made during survey period 2 coupled with another detection made 10 days later during survey period 3 warrant a POS territory designation. |
|                               | Probable breeding territory (PRB)  | POS territory plus cuckoos observed carrying food, traveling as a pair, or exchanging vocalizations.  |
|                               | Confirmed breeding territory (COB) | Observation of copulation, stick carry, nest, or fledgling.   |
| Population estimation         | Minimum territory estimate         | The observed number of confirmed breeding territories (COB).  |
|                               | Maximum territory estimate         | The sum of possible (POS), probable (PRB) and confirmed (COB) breeding territories.   |

Using the POS, PRB, and COB classifications, we calculated minimum and maximum territory estimates. The minimum number of territories is the number of confirmed breeding territories and is our most conservative estimate. The maximum territory estimate is the sum of POS, PRB, and COB territories and may overestimate the true number of breeding territories. Note that these POS,

## **Yellow-billed Cuckoo Distribution, Abundance, and Habitat Use on the Lower Colorado River and Tributaries**

PRB, and COB observations are used to estimate the number of breeding territories and not the number of breeding pairs. Territory estimates represent the (usually two) adults associated with single nests. However, nesting females have been observed leaving the nest before young are independent (McNeil et al. 2011, 2013b); females can be polyandrous and may re-nest with another male after leaving their original nest (Halterman 2009). Following a successful or failed nest, one or both of the parents may choose to re-nest; thus, calling second nesting attempts additional pairs would be inappropriate.

### **Resights**

We attempted to resight banded cuckoos by observing with binoculars or photographing the legs of all cuckoos detected. For returning second-year (SY) birds (banded as chicks the previous year), we calculated natal dispersal distance as the distance between the bird's natal nest and its (assumed first) nesting location (calculated using ArcGIS). For returning banded adults, we calculated breeding dispersal distance as the distance between each year's nests associated with the bird. If we failed to find a resighted bird's nest, we used its capture or resight location to calculate its distance moved.

### **Nests**

To attempt to confirm breeding and improve our breeding territory estimates, we searched for nests opportunistically during and after surveys, and also during followup visits if time allowed, and through additional volunteer hours (45 mornings in the Blythe area). During surveys, we sighted all detected cuckoos if possible and opportunistically searched woody vegetation in their vicinity for nests (Martin and Geupel 1993). Cuckoos may respond from the nest to broadcast survey calls, and if they are close enough to the surveyor, the nest can be located. We also used the fact that nesting pairs share incubation duties (Potter 1980; Hughes 1999; Halterman 2009); soon after sunrise, the female replaces the male on the nest, both often vocalizing during the exchange. They may also call prior to arriving at the nest to feed young. One or more observers waited before dawn in the area of a suspected nest and triangulated the location of calling birds. We also followed localized activity or behavior (e.g., food or stick carries, alarm calls) and directed efforts into these areas. We also performed systematic searches in areas of activity, concentrating on edge and structural transition habitats. We distinguished used cuckoo nests from similar stick nests of other species (such as doves) by bluish egg fragments remaining in or below the nest.

After locating a nest, we recorded the GPS location a few meters away; a more accurate reading was taken after nesting ceased. We recorded nest site characteristics such as nest substrate species and height, nest height, stage, and the banded status of adults if known. We used telescoping mirror or camera

## **Yellow-billed Cuckoo Distribution, Abundance, and Habitat Use on the Lower Colorado River and Tributaries**

poles to check nests every 2–5 days, recording nest contents and any observed behaviors. We recorded clutch size as the total number of eggs known to have been laid in each nest. We judged nests successful if at least one young fledged, which we determined by detecting an adult or fledgling in the vicinity of the nest within 2 days of the estimated fledge date. Young cuckoos leave the nest before they can fly; thus, they climb or hop onto nearby branches where they may remain close to the nest for several days. We considered nests failed if they were found damaged or destroyed, or with large egg shell fragments or remains or empty before the earliest possible fledge date (~6 days after hatching) with no further activity detected nearby. Nests were considered deserted if intact eggs or live chicks were present with no more parental activity observed.

### **Banding**

Southern Sierra Research Station provided in-kind equipment (vehicle, canopy poles, nets, and banding supplies) and volunteer hours to mist net at PVER (10 mornings) and Cibola Valley Conservation Area (CVCA) (2 mornings). After locating a responsive cuckoo, we found a suitable net lane and used a target mist net technique modified from Sogge et al. (2001): we attached two to four stacked (7.8- to 12-m-high) nets ranging in length from 9 to 18 m between two canopy poles (Bat Conservation and Management, Inc.), placed in a vegetation gap of similar canopy height. We broadcast various recorded vocalizations from speakers placed on either side of the net to lure in cuckoos. We ceased our attempts when temperatures reached 40 °C. We banded all newly captured cuckoos with a magenta anodized Federal numbered aluminum band on one leg, and a pinstriped (two- or three-striped) aluminum band on the other leg, to form a unique color combination. Non-target captured birds were immediately released without banding. We also banded nestlings if reachable (i.e., from nests less than 7 m high and safely accessible by ladder), at 3–6 days old, when their tarsi were long enough to hold a leg band. We used a stopped wing rule to measure wing and tail length, calipers to measure tarsus and bill length, and a 100-gram (g) Pesola® or 400 g Acculab digital scale to weigh all birds. For adults, we recorded molt, feather wear, orbital ring color, cloacal protuberance score (0–3), and brood patch score. For future genetic analyses, we extracted a small amount of blood from each bird by brachial vein puncture, which we placed on PermaCode™ cards.

## **Results**

### **Presence-Absence Surveys**

From June 15 to August 19, 2013, we conducted 205 presence-absence surveys across 5 survey periods at 44 sites, yielding 335 survey detections (tables 5 through 9 and figure 2). PVER (n = 193) had the greatest number of survey

**Yellow-billed Cuckoo Distribution, Abundance, and Habitat Use  
on the Lower Colorado River and Tributaries**

Table 5.—LCR YBCU survey detections and territory estimates for Reach 3 (Havasus NWR) sites, 2013

| Site name        | Site code | Detections per survey period |          |          |          |          | Total     | Est. territories |          |          |
|------------------|-----------|------------------------------|----------|----------|----------|----------|-----------|------------------|----------|----------|
|                  |           | 1                            | 2        | 3        | 4        | 5        |           | POS              | PRB      | COB      |
| Pintail Slough   | HAVPS     | 0 (6/26)                     | 3 (7/9)  | 0 (7/19) | 0 (8/2)  | 0 (8/13) | 3         | 0                | 0        | 0        |
| North Dike       | HAVND     | 1 (6/26)                     | 0 (7/9)  | 0 (7/19) | 0 (8/2)  | 0 (8/13) | 1         | 0                | 0        | 0        |
| Topock Platform  | HAVTPR    | 0 (6/21)                     | 2 (7/4)  | 0 (7/18) | 0 (8/2)  | 1 (8/12) | 3         | 1                | 0        | 0        |
| Beal Restoration | HAVBR     | 5 (6/21)                     | 2 (7/4)  | 2 (7/18) | 1 (7/31) | 0 (8/12) | 10        | 1                | 0        | 1        |
| <b>Total</b>     |           | <b>6</b>                     | <b>7</b> | <b>2</b> | <b>1</b> | <b>1</b> | <b>17</b> | <b>2</b>         | <b>0</b> | <b>1</b> |

Estimated territories: POS = possible territory, PRB = probable territory, and COB = confirmed breeding territory.

Table 6.—LCR YBCU survey detections and territory estimates for Reach 3 (BWRNWR) sites, 2013

| Site name           | Site code | Detections per survey period |           |          |          |          | Total     | Est. territories |          |          |
|---------------------|-----------|------------------------------|-----------|----------|----------|----------|-----------|------------------|----------|----------|
|                     |           | 1                            | 2         | 3        | 4        | 5        |           | POS              | PRB      | COB      |
| Bill Williams Marsh | BWMA      | 0 (6/28)                     | 0 (7/11)  | 0 (7/24) | 0 (8/8)  | –        | 0         | 0                | 0        | 0        |
| Borrow Pit          | BWBP      | 0 (6/18)                     | 1 (7/1)   | 0 (7/16) | 0 (7/30) | 0 (8/9)  | 1         | 0                | 0        | 0        |
| Cave Wash           | BWCW      | 4 (6/27)                     | 2 (7/10)  | 1 (7/30) | 1 (8/9)  | 0 (8/19) | 8         | 2                | 0        | 0        |
| Cougar Point        | BWPT      | 0 (6/25)                     | 0 (7/8)   | 0 (7/24) | 0 (8/3)  | -        | 0         | 0                | 0        | 0        |
| Cross River         | BWCR      | 0 (6/20)                     | 1 (7/3)   | 2 (7/17) | 0 (7/31) | 0 (8/10) | 3         | 1                | 0        | 0        |
| Esquerra Ranch      | BWER      | 0 (6/19)                     | 0 (7/2)   | 0 (7/15) | 0 (7/24) | –        | 0         | 0                | 0        | 0        |
| Fox Wash            | BFWF      | 1 (6/20)                     | 2 (7/3)   | 0 (7/17) | 0 (7/31) | 0 (8/14) | 3         | 0                | 0        | 0        |
| Gibraltar Rock      | BWGR      | 2 (6/25)                     | 0 (7/8)   | 0 (7/22) | 1 (8/2)  | 0 (8/13) | 3         | 1                | 0        | 0        |
| Honeycomb Bend      | BWHB      | 0 (6/27)                     | 1 (7/10)  | 1 (7/30) | 2 (8/9)  | 0 (8/19) | 4         | 1                | 0        | 0        |
| Kohen Ranch         | BWKR      | 2 (6/25)                     | 0 (7/9)   | 0 (7/22) | 0 (8/2)  | 0 (8/13) | 2         | 0                | 0        | 0        |
| Middle Delta        | BWMD      | 0 (6/26)                     | 0 (7/11)  | 0 (7/22) | 0 (8/3)  | –        | 0         | 0                | 0        | 0        |
| Mineral Wash        | BWMW      | 3 (6/19)                     | 2 (7/2)   | 1 (7/15) | 4 (8/1)  | 0 (8/14) | 10        | 2                | 1        | 0        |
| Mosquito Flats      | BWMF      | 0 (6/26)                     | 0 (7/11)  | 1 (7/22) | 0 (8/1)  | 0 (8/12) | 1         | 0                | 0        | 0        |
| North Burn          | BWNB      | 0 (6/28)                     | 0 (7/11)  | 0 (7/24) | 0 (8/8)  | –        | 0         | 0                | 0        | 0        |
| Sandy Wash          | BWSW      | 1 (6/18)                     | 4 (7/1)   | 0 (7/16) | 1 (7/29) | 0 (8/8)  | 6         | 1                | 0        | 0        |
| <b>Total</b>        |           | <b>13</b>                    | <b>13</b> | <b>6</b> | <b>9</b> | <b>0</b> | <b>41</b> | <b>7</b>         | <b>1</b> | <b>0</b> |

Estimated territories: POS = possible territory, PRB = probable territory, and COB = confirmed breeding territory.

**Yellow-billed Cuckoo Distribution, Abundance, and Habitat Use  
on the Lower Colorado River and Tributaries**

Table 7.—LCR YBCU survey detections and territory estimates for Reach 4 (Parker to Cibola) sites, 2013

| Site name                | Site code | Detections per survey period |           |           |           |           | Total      | Est. territories |          |           |
|--------------------------|-----------|------------------------------|-----------|-----------|-----------|-----------|------------|------------------|----------|-----------|
|                          |           | 1                            | 2         | 3         | 4         | 5         |            | POS              | PRB      | COB       |
| 'Ahakhav Tribal Preserve | CRIT      | 2 (6/17)                     | 3 (7/2)   | 1 (7/15)  | 0 (7/23)  | 0 (8/3)   | 6          | 1                | 0        | 0         |
| Cibola Crane Roost       | CIBCR     | 6 (6/26)                     | 6 (7/8)   | 3 (7/21)  | 5 (7/30)  | 2 (8/10)  | 22         | 2                | 1        | 0         |
| Cibola Eucalyptus        | CIBEUC    | 0 (6/28)                     | 0 (7/11)  | 0 (7/22)  | 0 (7/30)  | 0 (8/10)  | 0          | 0                | 0        | 0         |
| Cibola Mass Planting     | CIBMP     | 1 (6/19)                     | 2 (7/3)   | 0 (7/16)  | 1 (7/28)  | 0 (8/7)   | 4          | 1                | 0        | 0         |
| Cibola Nature Trail      | CIBCNT    | 1 (6/19)                     | 1 (7/3)   | 0 (7/16)  | 0 (7/28)  | 0 (8/7)   | 2          | 1                | 0        | 0         |
| Cibola North             | CIBNTH    | 0 (6/19)                     | 0 (7/3)   | 0 (7/16)  | 0 (7/28)  | 0 (8/7)   | 0          | 0                | 0        | 0         |
| Cibola Valley Phase 1    | CVCA1     | 2 (6/20)                     | 2 (7/4)   | 4 (7/17)  | 5 (7/29)  | 3 (8/8)   | 16         | 1                | 1        | 1         |
| Cibola Valley Phase 2    | CVCA2     | 4 (6/20)                     | 4 (7/4)   | 4 (7/17)  | 0 (7/29)  | 0 (8/8)   | 12         | 3                | 0        | 0         |
| Cibola Valley Phase 3    | CVCA3     | 4 (6/26)                     | 3 (7/8)   | 1 (7/21)  | 0 (7/30)  | 1 (8/10)  | 9          | 1                | 0        | 1         |
| Palo Verde Phase 1       | PVER1     | 0 (6/17)                     | 0 (7/1)   | 1*(7/15)  | 1 (7/26)  | 1 (8/5)   | 3          | 1                | 0        | 0         |
| Palo Verde Phase 2       | PVER2     | 0 (6/21)                     | 1 (7/5)   | 4 (7/18)  | 4 (7/29)  | 3 (8/8)   | 12         | 2                | 0        | 1         |
| Palo Verde Phase 3       | PVER3     | 0 (6/17)                     | 3 (7/1)   | 5 (7/15)  | 2 (7/27)  | 5 (8/5)   | 15         | 2                | 0        | 2         |
| Palo Verde Phase 4       | PVER4     | 2 (6/17)                     | 5 (7/1)   | 4 (7/15)  | 3 (7/26)  | 4 (8/5)   | 18         | 3                | 0        | 0         |
| Palo Verde Phase 5       | PVER5     | 12 (6/18)                    | 11 (7/2)  | 15 (7/16) | 18 (7/27) | 11 (8/6)  | 67         | 3                | 4        | 2         |
| Palo Verde Phase 6       | PVER6     | 12 (6/27)                    | 15 (7/9)  | 12 (7/23) | 14 (7/31) | 13 (8/9)  | 66         | 3                | 1        | 7         |
| Palo Verde Phase 7       | PVER7     | -                            | -         | 4 (7/19)  | 4 (7/31)  | 4 (8/9)   | 12         | 2                | 0        | 1         |
| <b>Total</b>             |           | <b>46</b>                    | <b>56</b> | <b>58</b> | <b>57</b> | <b>47</b> | <b>264</b> | <b>26</b>        | <b>7</b> | <b>15</b> |

Estimated territories: POS = possible territory, PRB = probable territory, and COB = confirmed breeding territory.

\* Cuckoo detected during adjacent survey; no detections during survey.

**Yellow-billed Cuckoo Distribution, Abundance, and Habitat Use  
on the Lower Colorado River and Tributaries**

Table 8.—LCR YBCU survey detections and territory estimates for Reaches 5 and 6 (Imperial to Yuma), 2013

| Site name                        | Site code | Detections per survey period |          |          |          |          | Total     | Est. territories |          |          |
|----------------------------------|-----------|------------------------------|----------|----------|----------|----------|-----------|------------------|----------|----------|
|                                  |           | 1                            | 2        | 3        | 4        | 5        |           | POS              | PRB      | COB      |
| Imperial NWR 20A                 | IMP20A    | 0 (6/26)                     | 0 (7/8)  | 0 (7/19) | 0 (8/3)  | –        | 0         | 0                | 0        | 0        |
| Imperial NWR 50                  | IMP50     | 0 (6/26)                     | 0 (7/8)  | 0 (7/19) | 0 (8/3)  | –        | 0         | 0                | 0        | 0        |
| Imperial NWR South               | IMPSTH    | 0 (6/26)                     | 0 (7/8)  | 0 (7/19) | 0 (8/3)  | –        | 0         | 0                | 0        | 0        |
| Imperial Martinez Lake           | IMPAST    | -                            | 0 (7/8)  | 0 (7/19) | 0 (8/3)  | –        | 0         | 0                | 0        | 0        |
| Mittry Lake-Pratt                | MLPR      | 3 (6/28)                     | 1 (7/10) | 0 (7/21) | 0 (8/1)  | 0 (8/12) | 4         | 1                | 0        | 0        |
| Picacho State Recreation Area    | PICSRA    | 0 (6/25)                     | 1 (7/7)  | 0 (7/18) | 0 (7/31) | –        | 1         | 0                | 0        | 0        |
| Quigley Wildlife Management Area | GRQP      | 0 (6/29)                     | 0 (7/11) | 0 (7/22) | 0 (8/4)  | –        | 0         | 0                | 0        | 0        |
| Yuma East Wetlands               | YUEW      | 2 (6/24)                     | 1 (7/6)  | 3 (7/17) | 0 (7/30) | 0 (8/9)  | 6         | 1                | 0        | 0        |
| Yuma West Wetlands               | YUWW      | 0 (6/27)                     | 2 (7/9)  | 0 (7/20) | 0 (8/2)  | -        | 2         | 0                | 0        | 0        |
| <b>Total</b>                     |           | <b>5</b>                     | <b>5</b> | <b>3</b> | <b>0</b> | <b>0</b> | <b>13</b> | <b>2</b>         | <b>0</b> | <b>0</b> |

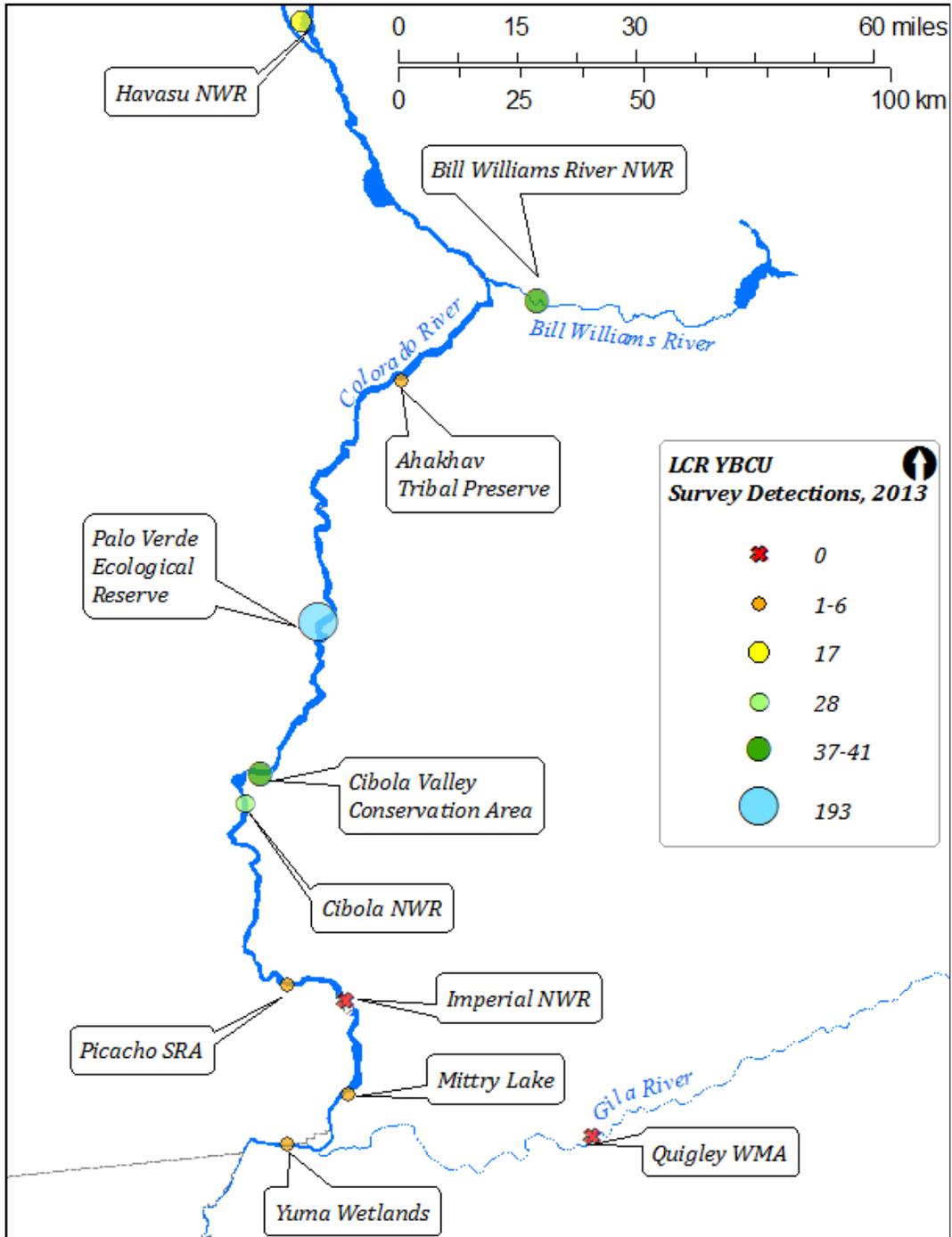
Estimated territories: POS = possible territory, PRB = probable territory, and COB = confirmed breeding territory.

Table 9.—LCR YBCU survey detections and territory estimates by river reach for all sites, 2013 (summary of tables 5–8)

| River reach                        | Detections per survey period |    |    |    |    | Total survey detections | Estimated territories |     |     |     |
|------------------------------------|------------------------------|----|----|----|----|-------------------------|-----------------------|-----|-----|-----|
|                                    | 1                            | 2  | 3  | 4  | 5  |                         | POS                   | PRB | COB | Max |
| Reach 3 (Havasu NWR)               | 6                            | 7  | 2  | 1  | 1  | 17                      | 2                     | 0   | 1   | 3   |
| Reach 3 (BWRNWR)                   | 13                           | 13 | 6  | 9  | 0  | 41                      | 7                     | 1   | 0   | 8   |
| Reach 4 (PVER)                     | 26                           | 35 | 41 | 46 | 41 | 193                     | 16                    | 5   | 13  | 34  |
| Reach 4 (CVCA)                     | 10                           | 9  | 9  | 5  | 4  | 37                      | 5                     | 1   | 2   | 8   |
| Reach 4 (Cibola NWR)               | 8                            | 9  | 3  | 6  | 2  | 28                      | 4                     | 1   | 0   | 5   |
| Reaches 5 and 6 (Imperial to Yuma) | 5                            | 5  | 3  | 0  | 0  | 13                      | 2                     | 0   | 0   | 2   |
| All sites                          | 70                           | 82 | 69 | 67 | 48 | 335                     | 37                    | 8   | 16  | 61  |

Estimated territories: POS = possible territory, PRB = probable territory, COB = confirmed breeding territory.

**Yellow-billed Cuckoo Distribution, Abundance, and Habitat Use on the Lower Colorado River and Tributaries**

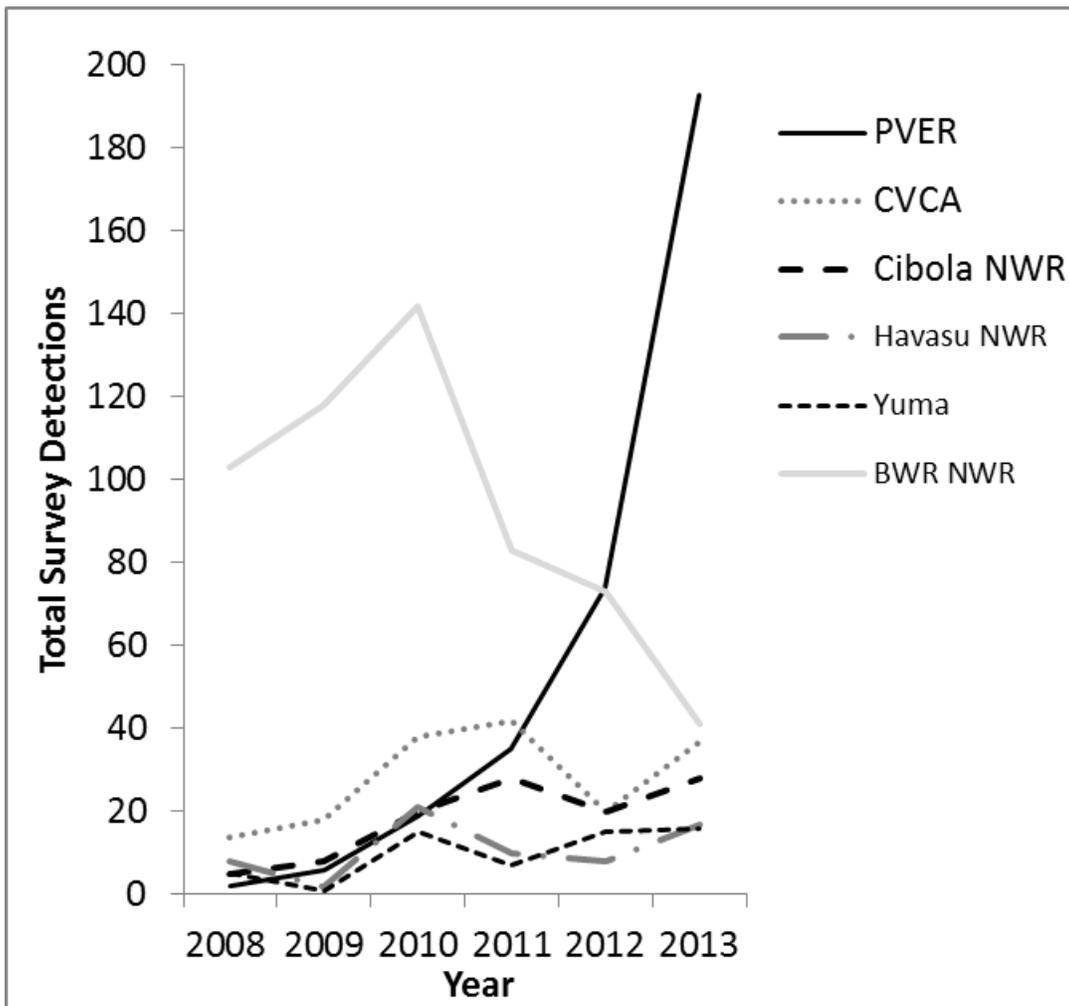


**Figure 2.—LCR YBCU survey detections by survey area, 2013.**

### Yellow-billed Cuckoo Distribution, Abundance, and Habitat Use on the Lower Colorado River and Tributaries

detections within the study area (58% of all survey detections) (see table 7). PVER 5 and 6, among the youngest LCR MSCP restoration phases (3 and 2 years old, respectively) dominated the detection totals throughout the season (n = 133, 40% of all survey detections).

Compared to previous years (2008–2012), 2013 survey detections greatly increased at PVER (mostly due to high PVER5 and PVER6 detections), were stable or slightly increased at Havasu NWR, CVCA, Cibola NWR, and Yuma (including Picacho, Imperial NWR, Mittry Lake, and Yuma Wetlands), and continued declining at the BWRNWR (figure 3).



**Figure 3.—LCR survey detections by year (2008–2013), shown by survey area.** PVER greatly increased, CVCA, Cibola NWR, Havasu NWR, and Yuma increased slightly from the previous year, and the BWRNWR continued to show a decline.

## **Yellow-billed Cuckoo Distribution, Abundance, and Habitat Use on the Lower Colorado River and Tributaries**

### **Breeding Territory Estimates**

Based on the timing, location, and persistence of all detected cuckoos, we estimated up to 61 breeding territories within the surveyed parts of the study area (figure 4), including 37 possible, 8 probable, and 16 confirmed breeding territories (see tables 5 through 9). We estimated 51 territories (84%) at LCR MSCP restoration sites, including 34 (56%) at PVER and 8 (13%) at CVCA (see table 9). We also estimated eight territories at the BWRNWR. Table 10 shows maximum estimated territories per 20 ha across all survey areas for comparison.

### **Nests**

We found 15 nests in the study area in 2013 (table 11), all but 2 at PVER. We spent less time nest searching in 2013 compared to previous years, so the number of nests found is not directly comparable to previous years. Birds at PVER remained active after our final surveys in mid-August, and we assumed they continued nesting into September, as we observed in 2012. We again confirmed successful double-brooding at PVER (Phases 5–7) by resighting two banded adults each at two successful nests. We found a used nest and three recent fledglings in PVER7 (planted 2012) being fed by a banded adult who had earlier successfully nested near the north edge of PVER6 (adjacent to PVER7).

### **Mist Netting, Color Banding, and Resights**

Between June 27 and July 28, we made 17 mist net attempts over 12 mornings. We captured 10 adults at PVER (table 12), newly color banding 9 and recapturing 1 we previously banded in 2011 (at Cibola NWR). Due to the reduced netting effort in 2013 compared to previous years (e.g., 109 attempts over 51 mornings in 2012), the numbers captured are not directly comparable to previous years. We also banded 23 young from 9 nests (table 13). We resighted an additional 10 birds previously banded between 2009 and 2012 and were able to identify the unique color combinations of three individuals (table 12). Three returning adults dispersed an average distance of 1,188 m from their previous breeding location (range 625–2,300 m). Two males and one female returned to their previous breeding sites, two to PVER and one to CVCA. The returning CVCA bird was a male first banded as an adult in 2009, who returned to CVCA for the fifth consecutive year (LJ, resighted in CVCA1 in 2013 640 m from his 2012 nest; 2013 nest not found). The second returning male (PF) was initially captured and banded near a PVER2 nest in 2009, who was first resighted in 2012 feeding a fledgling in PVER4, and resighted again in 2013 at a PVER5 nest (2,300 m from his 2012 nest). The returning female was banded in 2012 near her nest in PVER5 and resighted 625 m away in PVER5 in 2013 (nest not found). The dispersing adult was a male (NUR) first banded at Cibola NWR Crane Roost in 2011, and recaptured at a PVER6 nest (41.8 kilometers north). This is the greatest between-season dispersal distance we have recorded in this study area.

Yellow-billed Cuckoo Distribution, Abundance, and Habitat Use on the Lower Colorado River and Tributaries

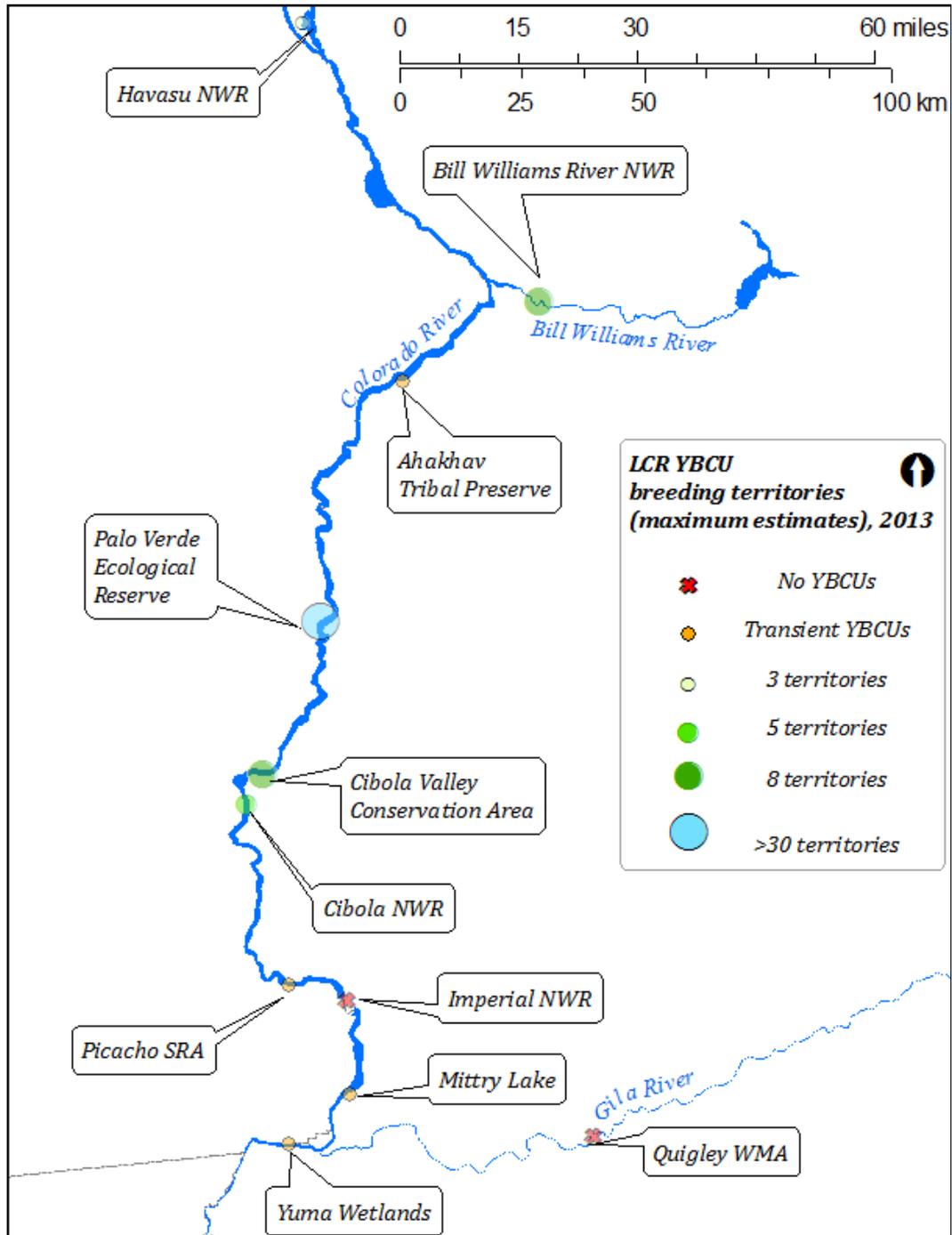


Figure 4.—YBCU maximum breeding territories by survey area, LCR, 2013.

**Yellow-billed Cuckoo Distribution, Abundance, and Habitat Use  
on the Lower Colorado River and Tributaries**

Table 10.—Area (ha), maximum territory estimate, maximum territories per ha, and maximum territories per 20 ha by survey area, sorted by size of area (ha)

| Survey area                      | Area (ha) | Maximum estimated territories | Maximum estimated territories per ha | Maximum estimated territories per 20 ha |
|----------------------------------|-----------|-------------------------------|--------------------------------------|---|
| PVER                             | 308       | 34                            | 0.110                                | 2.21                                    |
| BWRNWR East                      | 306       | 6                             | 0.020                                | 0.39                                    |
| BWRNWR West                      | 297       | 2                             | 0.007                                | 0.13                                    |
| Cibola NWR                       | 132       | 5                             | 0.038                                | 0.76                                    |
| CVCA                             | 96        | 8                             | 0.083                                | 1.67                                    |
| 'Ahakhav Tribal Preserve         | 60        | 1                             | 0.017                                | 0.33                                    |
| Havasu NWR                       | 54        | 3                             | 0.056                                | 1.11                                    |
| Yuma Wetlands                    | 49        | 1                             | 0.020                                | 0.41                                    |
| Imperial NWR                     | 18        | 0                             | 0.000                                | 0.00                                    |
| Picacho State Recreation Area    | 15        | 0                             | 0.000                                | 0.00                                    |
| Mittry Lake                      | 12        | 1                             | 0.083                                | 1.67                                    |
| Quigley Wildlife Management Area | 11        | 0                             | 0.000                                | 0.00                                    |

## Discussion

Compared to previous years of surveys (2008–2012), in 2013 we recorded markedly increased survey detections at PVER; Phases 6 and 7 added almost 170 ha of new suitable habitat to this area, and birds continued to favor the young, 2–3 year-old cottonwood-willow habitat (Phases 5–6). For example, in 2012, PVER Phase 4 had a high territory density (10 nests found, 8.9 territories per 20 ha) (McNeil et al. 2013b), but in 2013, we saw a marked drop in activity and just 3 territories estimated. One banded male’s nesting history also demonstrates a preference for young phases; he was first found nesting in PVER2 in 2009 (2-year-old habitat), resighted in 2012 nesting in PVER4 (3 years old), and resighted in 2013 nesting in PVER5 (2 years old).

The BWRNWR continued its recent decline beginning in 2011, dropping in survey detections and estimated territories by over half since 2012. Pioneer cottonwood-willow forests are maintained by periodic flood disturbance (Stromberg 2001), including the insect community that generally favors young vegetation (Raupp and Denno 1983); as no large flood has been released at the BWRNWR since 2005, we may be witnessing a reduction in cuckoo prey biomass (and therefore cuckoo territories) due to the lack of vegetation turnover.

**Yellow-billed Cuckoo Distribution, Abundance, and Habitat Use  
on the Lower Colorado River and Tributaries**

Table 11.—YBCU nests found on the LCR, 2013

| Site code | Nest No. | Adult 1 | Adult 2 | Date found | Find method | Tree sp. | Tree height (m) | Nest height (m) | No. eggs | No. hatched | First fate date | Fate | Notes                          |
|-----------|----------|---------|---------|------------|-------------|----------|-----------------|-----------------|----------|-------------|-----------------|------|--------------------------------|
| HAVBR     | 1        | UNK     | UNK     | 7/24       | BEH         | PRGL     | 5               | 4               | 2        | 2           | 8/13            | S    | Banded 2 chicks – both fledged |
| PVER2     | 1        | UNK     | UNK     | 7/30       | BEH         | SAGO     | 12              | 8.5             | 5        | 0           | 8/8             | X    | Unknown predator               |
| PVER3     | 1        | UNB     | UNK     | 8/3        | BEH         | POFR     | 14              | 11              | 2        | 2           | 8/14            | S    | Fledged 2                      |
| PVER3     | 2        | UNB     | UNK     | 8/8        | BEH         | POFR     | 20              | 13              | 3        | 3           | 8/18            | S    | Fledged 3                      |
| PVER5     | 1        | PF      | UNB     | 7/10       | BEH         | POFR     | 14              | 6               | 3        | 2           | 7/13            | S    | Banded 2 chicks – both fledged |
| PVER5     | 2        | PF      | UNK     | 8/6        | BEH         | POFR     | 11              | 4.5             | ?        | ?           | 8/6             | S    | Found after fledged            |
| PVER6     | 1        | HAN     | LEA     | 7/4        | BEH         | SAGO     | 7.4             | 3.8             | 3        | 3           | 7/13            | S    | Banded 3 chicks – all fledged  |
| PVER6     | 2        | UNB     | UNB     | 7/9        | SS          | POFR     | 14              | 5.2             | 4        | 3           | 7/21            | S    | Banded 3 – all fledged         |
| PVER6     | 3        | NUR     | SCU     | 7/10       | BEH         | SAGO     | 8.5             | 5               | 2        | 2           | 7/19            | S    | Banded 2 – all fledged         |
| PVER6     | 4        | SER     | UNK     | 7/13       | BEH         | SAGO     | 7.5             | 3.5             | 3        | 3           | 7/17            | S    | Banded 3 – all fledged         |
| PVER6     | 5        | MAL     | UNB     | 7/13       | BEH         | SAGO     | 9               | 5.6             | 3        | 2           | 7/13            | S    | Banded 2 – all fledged         |
| PVER6     | 6        | UNB     | UNB     | 7/13       | BEH         | SAGO     | 9.5             | 5.7             | 4        | 3           | 7/22            | S    | Banded 3 – all fledged         |
| PVER6     | 7        | UNK     | UNK     | 8/17       | FA          | POFR     | 10.9            | 6.7             | ?        |             | 7/22            | S    | Found after fledged            |
| PVER7     | 1        | MAL     | UNK     | 8/8        | BEH         | POFR     | 7.9             | 1.2             | 3        | 3           | 8/8             | S    | Found 3 fledglings near nest   |
| CVCA1     | 1        | UNB     | UNB     | 7/11       | BEH         | SAGO     | 10.5            | 5.2             | 4        | 2           | 7/21            | S    | Banded 2 chicks – both fledged |

Adult 1, 2: UNK = unknown, UNB = unbanded; otherwise, known adults captured 2009–2013 resighted at nest or feeding fledglings; PF = nesting adult banded at PVER2 in 2009; NUR = adult male banded in 2011 at Cibola NWR. Find method: BEH = breeding behavior, SS = systematic search, FA = found accidentally. Tree sp.: SAGO = *Salix gooddingii*, POFR = *Populus fremontii*, PRGL = *Prosopis glandulosa*. Tree/nest heights are approximate. First fate date = known or estimated date of first fledging or failure. Fate: S = successfully fledged at least 1 young, U = unknown, X = failed.

**Yellow-billed Cuckoo Distribution, Abundance, and Habitat Use  
on the Lower Colorado River and Tributaries**

Table 12.—Adult YBCU captured or resighted on the LCR, 2013

| Cap No. | Date | Site code | Band Code | ID  | Sex | How sexed | Color bands | Band No.   | Age | Notes                     |
|---------|------|-----------|-----------|-----|-----|-----------|-------------|------------|-----|---------------------------|
| 1       | 7/3  | PVER5     | N         | FIR | F   | WS        | Mg/Bk-O-Bk  | 1202-68011 | AHY |                           |
| 2       | 7/3  | PVER4     | N         | GER | F   | W         | Mg/Lv-W-Lv  | 1713-67925 | AHY |                           |
| 3       | 7/10 | PVER5     | N         | JTK | M   | S         | Mg/O-IB     | 1202-68027 | AHY |                           |
| 4       | 7/12 | PVER6     | N         | WAN | F   | S         | As/Y-Lv-Y   | 1202-68028 | AHY |                           |
| 5       | 7/12 | PVER6     | N         | SER | M   | S         | As/W-Lv     | 1202-68029 | AHY | Nest PVER6-N4             |
| 6       | 7/14 | PVER6     | N         | MAL | M   | S         | Mg/Bk-W     | 1202-68001 | AHY | Nest PVER6-N5?            |
| 7       | 7/15 | PVER6     | N         | LEA | F   | W         | As/Y-Lv     | 1202-68002 | AHY | Nest PVER6-N1             |
| 8       | 7/15 | PVER6     | N         | HAN | M   | W         | Mg/O-Y      | 1202-68003 | AHY | Nest PVER6-N1             |
| 9       | 7/15 | PVER6     | R         | NUR | M   | D         | mB/G-Bk-G   | 1202-68030 | ATY | Nest PVER6-N3             |
| 10      | 7/17 | PVER6     | N         | SCU | F   | WS        | Mg/W-Y      | 1713-67912 | AHY | Nest PVER6-N3             |
| –       | 7/10 | PVER5     | S         | PF  | M   | D         | O W/Ag mB   | 1212-13730 | A5Y | Nest PVER5-1&2; PVER4 '12 |
| –       | 7/13 | PVER5     | S         | CHL | F   | D         | Mg/W-mB     | 1202-68010 | ASY | Nested '12 PVER5          |
| –       | 7/23 | CVCA1     | S         | LJ  | M   | D         | W Ag/W O    | 1212-13733 | A5Y | Returned CVCA1-2 '09-'13  |

Band Code: N = new, R = recapture, S = resight. Sex: by morphology: W = weight (F > M), S = size (F wing > M), D = DNA. Band color: As = silver, Bk = black, G = green, IB = light blue, Lv = lavender, mB = mid blue, Mg = magenta, O = orange, W = white, Y = yellow. "–" = split band. Age: AHY = after hatch yr, ASY = after 2nd yr, ATY = after 3rd yr, A5Y = after 5th yr.

Similarly, at LCR MSCP sites we may see reduced cuckoo activity once the trees in all phases are over 3 years old unless vegetation turnover continues through adaptive management.

Despite large increases in survey detections from 2012 to 2013, we estimated 19 fewer territories in 2013 compared to 2012. We also had a smaller field crew in 2013 and spent less time following up on survey detections, and we did no radio telemetry (which tends to increase nests found) (McNeil et al. 2013b). We also had a slightly reduced 2013 field season (finishing mid-August instead of continuing into September) and therefore had no chance of observing later breeding. These factors may have helped to reduce our overall estimated territories this year. Additionally, PVER Phases 5 and 6 had high survey detections throughout the season, and without sufficient followup visits and telemetry, it was difficult to determine breeding territory numbers, knowing that they can nest in high densities at these sites.

**Yellow-billed Cuckoo Distribution, Abundance, and Habitat Use  
on the Lower Colorado River and Tributaries**

Table 13.—YBCU young banded on the LCR, 2013

| Date      | Site code | Chick ID | Band No.   | Color bands |
|-----------|-----------|----------|------------|-------------|
| 7/19/2013 | CVCA1     | N1-1     | 1202-68066 | Y-O/Mg      |
| 7/22/2013 | CVCA1     | N1-2     | 1202-68074 | G-IB-G/Mg   |
| 8/2/2013  | HAVBR     | N1-1     | 1202-68070 | Lv-G-Lv/Mg  |
| 8/2/2013  | HAVBR     | N1-2     | 1202-68071 | G-R/Mg      |
| 7/10/2013 | PVER5     | N1-1     | 1202-68014 | IB-Bk-IB/Mg |
| 7/10/2013 | PVER5     | N1-2     | 1202-68015 | Bk-Lv/Mg    |
| 7/10/2013 | PVER6     | N1-1     | 1202-68012 | W-IB/Mg     |
| 7/10/2013 | PVER6     | N1-2     | 1202-68013 | Y-IB/Mg     |
| 7/12/2013 | PVER6     | N1-3     | 1202-68016 | G-Bk-G/Mg   |
| 7/19/2013 | PVER6     | N2-1     | 1202-68047 | G-Bk/Mg     |
| 7/19/2013 | PVER6     | N2-2     | 1202-68064 | O-G/Mg      |
| 7/19/2013 | PVER6     | N2-3     | 1202-68065 | W-Y/Mg      |
| 7/17/2013 | PVER6     | N3-1     | 1202-68045 | G-Lv-G/Mg   |
| 7/17/2013 | PVER6     | N3-2     | 1202-68046 | Ag-mB-Ag/Mg |
| 7/16/2013 | PVER6     | N4-1     | 1202-68043 | Lv-Y/Mg     |
| 7/16/2013 | PVER6     | N4-2     | 1202-68026 | W-Lv/Mg     |
| 7/16/2013 | PVER6     | N4-3     | 1202-68036 | Bk-IB/Mg    |
| 7/13/2013 | PVER6     | N5-1     | 1202-68017 | Y-G-Y/Mg    |
| 7/13/2013 | PVER6     | N5-2     | 1202-68018 | Bk-G-Bk/Mg  |
| 7/21/2013 | PVER6     | N6-1     | 1202-68067 | R-Y/Mg      |
| 7/21/2013 | PVER6     | N6-2     | 1202-68068 | mB-Lv/Mg    |
| 7/21/2013 | PVER6     | N6-3     | 1202-68069 | G-O-G/Mg    |

Note: Colors are as in table 12.

It remains unclear if recent increases at PVER originated from locally dispersing birds, or if they are related to decreased activity observed at other sites, within the LCR region (i.e., the BWRNWR) or elsewhere within the breeding range. Fluctuations in cuckoo populations have been noted in other areas, attributed to climate change (Price et al. 2005; Anders and Post 2006) and insect population fluctuations (Nolan and Thompson 1975). Declines in their range may indicate cuckoos choosing other breeding sites (Dettling and Howell 2011) possibly due to an increase in prey abundance (Laymon and Halterman 1987) or available habitat at these alternate locations (Laymon et al. 1997).

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## **ATTACHMENT A**

Birds Encountered during Yellow-billed Cuckoo Surveys,  
2013

Table A-1.—Birds encountered during YBCU surveys,  
 Reach 3 (Havasu NWR), 2013  
 (The number of survey periods each species was detected  
 is displayed. LCR MSCP covered species are in **bold**)

| <b>Species name</b>       | <b>HAVBR</b> | <b>HAVND</b> | <b>HAVPS</b> | <b>HAVTPR</b> |
|---------------------------|--------------|--------------|--------------|---------------|
| Abert's towhee            | 5            | 4            | 5            | 5             |
| American coot             | 1            |              |              |               |
| American crow             |              |              |              | 1             |
| Anna's hummingbird        |              | 1            | 1            | 1             |
| Ash-throated flycatcher   | 2            | 3            |              |               |
| <b>Bell's vireo</b>       | 4            | 5            | 3            |               |
| Bewick's wren             | 1            | 2            |              |               |
| Black phoebe              | 2            | 2            | 3            |               |
| Black-chinned hummingbird |              | 1            |              |               |
| Black-crowned night-heron |              | 1            |              |               |
| Black-tailed gnatcatcher  | 4            | 3            | 5            | 4             |
| Blue grosbeak             | 5            | 4            | 5            | 3             |
| Brown-crested flycatcher  |              | 2            | 1            | 3             |
| Brown-headed cowbird      | 4            | 3            | 4            | 3             |
| Bullock's oriole          | 4            | 1            | 2            | 2             |
| Cassin's tern             | 1            |              |              |               |
| Common moorhen            | 1            |              |              | 1             |
| Common raven              |              | 1            | 1            |               |
| Common yellowthroat       | 5            | 2            | 2            |               |
| Crissal thrasher          | 4            | 3            | 3            | 3             |
| Double crested cormorant  | 2            |              |              |               |
| Eurasian collared dove    |              |              |              | 1             |
| Gambel's quail            | 3            | 4            | 5            | 4             |
| Great blue heron          | 1            | 1            | 3            |               |
| Great egret               |              | 1            | 2            |               |
| Great horned owl          | 1            |              | 1            | 1             |
| Greater roadrunner        | 3            | 3            | 5            | 2             |
| Great-tailed grackle      | 3            | 4            | 4            |               |
| Green heron               | 1            |              |              | 1             |
| House finch               | 1            |              | 3            | 2             |
| Killdeer                  | 1            |              |              |               |

Table A-1.—Birds encountered during YBCU surveys,  
 Reach 3 (Havasu NWR), 2013  
 (The number of survey periods each species was detected  
 is displayed. LCR MSCP covered species are in **bold**)

| <b>Species name</b>           | <b>HAVBR</b> | <b>HAVND</b> | <b>HAVPS</b> | <b>HAVTPR</b> |
|-------------------------------|--------------|--------------|--------------|---------------|
| Ladder-backed woodpecker      | 3            | 4            | 1            | 2             |
| Lawrence's goldfinch          |              | 1            |              |               |
| Lazuli bunting                |              | 1            | 1            |               |
| Lesser nighthawk              | 3            | 2            | 2            | 3             |
| Loggerhead shrike             |              | 1            | 3            | 1             |
| Lucy's warbler                | 2            | 1            | 1            | 2             |
| Mourning dove                 | 5            | 5            | 5            | 4             |
| Northern harrier              |              |              |              | 1             |
| Northern mockingbird          |              |              | 1            |               |
| Northern rough-winged swallow | 2            | 2            | 2            |               |
| Pied-billed grebe             | 4            |              |              | 1             |
| Red-tailed hawk               | 1            | 1            | 1            |               |
| Red-winged blackbird          | 2            |              | 2            | 1             |
| Sharp-shinned hawk            |              |              | 1            |               |
| Song sparrow                  | 2            | 1            | 1            | 1             |
| <b>Summer tanager</b>         | 4            | 2            | 1            |               |
| Turkey vulture                |              |              | 1            | 1             |
| Verdin                        | 3            | 3            | 1            | 3             |
| <b>Vermilion flycatcher</b>   |              |              | 1            |               |
| Western kingbird              | 1            | 1            | 1            | 1             |
| Western tanager               |              |              |              | 1             |
| Western wood-pewee            | 1            |              |              |               |
| White-faced ibis              | 4            | 2            |              | 1             |
| White-winged dove             | 4            | 5            | 5            | 4             |
| Willet                        | 1            |              |              |               |
| <b>Yellow warbler</b>         | 4            | 3            | 2            |               |
| <b>Yellow-billed cuckoo</b>   | 2            | 1            | 1            | 2             |
| Yellow-breasted chat          | 4            | 4            | 3            | 3             |
| Yellow-headed blackbird       | 1            | 1            | 1            |               |

Table A-2.—Birds encountered during YBCU surveys, Reach 3 (Bill Williams River NWR), 2013  
 (The number of survey periods each species was detected is displayed. LCR MSCP covered species are in **bold**)

| Species name              | BWBP | BWCR | BWCW | BWER | BWFW | BWGR | BWHB | BWKR | BWMA | BWMD | BWMF | BWMW | BWNB | BWPT | BWSW |
|---------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| Abert's towhee            | 5    | 5    | 4    | 4    | 5    | 5    | 5    | 5    |      | 4    | 4    | 5    | 3    | 3    | 5    |
| American coot             |      |      | 3    |      |      |      | 4    |      | 1    |      |      |      |      |      |      |
| American crow             |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 1    |
| Anna's hummingbird        |      |      |      |      |      |      |      |      |      |      | 1    | 1    |      |      |      |
| Ash-throated flycatcher   | 1    |      | 3    | 1    | 3    | 3    | 2    | 2    |      |      | 1    | 5    |      | 2    | 2    |
| Barn swallow              |      |      |      |      |      |      |      | 1    |      |      |      |      |      |      |      |
| <b>Bell's vireo</b>       | 3    | 4    | 4    | 3    | 2    | 1    | 5    | 4    |      |      | 5    | 5    | 3    | 4    | 4    |
| Bewick's wren             | 3    | 4    | 3    | 4    | 4    | 5    | 2    | 4    | 1    | 3    | 5    | 5    | 3    | 3    | 4    |
| Black phoebe              |      |      | 2    | 1    | 1    | 2    | 4    | 1    | 4    |      |      | 3    |      |      |      |
| Black rail                | 1    |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| Black-chinned hummingbird | 1    | 1    | 1    |      |      | 1    |      |      | 1    |      | 1    |      |      |      |      |
| Black-crowned night-heron |      |      |      |      |      |      | 1    |      |      |      |      |      |      |      |      |
| Black-headed grosbeak     |      |      |      |      | 1    |      | 1    | 1    |      |      |      | 1    |      |      |      |
| Black-tailed gnatcatcher  | 4    | 2    | 2    | 1    | 5    | 4    | 4    | 4    | 2    | 1    | 4    | 4    | 2    | 3    | 2    |
| Black-throated sparrow    |      |      |      |      |      |      | 2    | 1    |      |      |      |      |      |      | 1    |
| Blue grosbeak             | 3    | 1    | 4    | 1    | 4    | 5    | 5    | 3    | 1    | 1    | 1    | 5    | 2    | 3    | 5    |
| Bronzed cowbird           |      |      |      |      |      | 1    |      |      |      |      |      |      |      |      |      |
| Brown-crested flycatcher  | 4    | 2    | 4    | 3    | 4    | 4    | 5    | 5    | 4    |      | 4    | 5    | 2    | 4    | 4    |
| Brown-headed cowbird      | 3    | 2    | 3    | 3    | 3    | 3    | 1    | 4    | 2    | 1    | 3    | 2    | 1    | 2    | 4    |
| Bullock's oriole          |      |      | 1    |      |      |      | 1    | 1    |      |      | 1    | 3    |      | 1    | 1    |
| Cackling goose            |      |      |      |      |      |      |      |      |      |      |      |      | 1    |      |      |
| Cactus wren               |      |      |      |      |      |      | 1    |      |      |      |      |      |      |      |      |
| Canyon wren               | 3    | 4    | 2    | 2    | 3    | 5    | 5    | 5    | 3    | 3    | 5    | 5    | 3    | 3    | 4    |
| Clapper rail              |      |      |      | 1    |      |      | 1    |      |      |      |      |      |      |      |      |
| Cliff swallow             |      |      |      |      | 1    |      |      |      |      |      |      |      |      |      |      |
| Common moorhen            |      |      | 1    | 1    |      |      | 2    |      | 4    |      |      | 1    |      |      |      |
| Common poorwill           |      |      |      |      |      |      | 1    |      |      |      |      |      |      |      |      |
| Common raven              | 1    |      |      | 1    | 1    | 2    | 1    | 1    |      |      |      | 1    |      | 1    |      |
| Common yellowthroat       | 3    | 3    | 4    | 4    | 4    | 3    | 5    | 4    | 4    | 4    | 5    | 5    | 4    | 3    | 5    |
| Coopers hawk              |      |      |      |      |      |      | 1    | 1    |      |      |      | 2    |      |      | 1    |
| Crissal thrasher          | 2    | 1    | 2    | 1    | 2    | 4    | 2    | 2    | 2    |      | 2    | 5    |      | 4    | 2    |

Table A-2.—Birds encountered during YBCU surveys, Reach 3 (Bill Williams River NWR), 2013  
 (The number of survey periods each species was detected is displayed. LCR MSCP covered species are in **bold**)

| Species name                  | BWBP | BWCR | BWCW | BWER | BWFW | BWGR | BWHB | BWKR | BWMA | BWMD | BWMF | BWMW | BWNB | BWPT | BWSW |
|-------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| Double crested cormorant      |      |      | 1    | 1    |      |      | 1    |      | 2    |      |      |      |      |      |      |
| Gambel's quail                | 1    |      | 3    | 2    | 4    | 1    | 2    | 3    |      |      | 2    | 5    |      | 2    | 1    |
| <b>Gila woodpecker</b>        | 5    | 4    | 4    | 3    | 5    | 5    | 3    | 5    | 4    | 4    | 5    | 5    | 2    | 4    | 5    |
| Great blue heron              | 1    |      |      |      | 1    |      | 1    | 2    | 4    |      |      | 1    | 1    | 2    | 1    |
| Great horned owl              |      |      |      | 1    |      |      | 2    |      |      |      |      | 1    | 1    | 1    |      |
| Greater roadrunner            | 2    | 1    | 2    | 2    | 2    | 5    | 4    | 3    |      |      | 3    | 3    |      | 4    | 4    |
| Great-tailed grackle          |      |      |      |      |      |      |      |      | 2    |      |      | 1    | 1    |      |      |
| Green heron                   |      |      |      | 1    | 1    |      | 1    |      | 2    |      |      |      |      |      |      |
| House finch                   | 2    | 1    | 2    |      | 1    | 1    | 3    | 4    |      |      | 1    | 1    | 1    | 1    | 3    |
| Ladder-backed woodpecker      | 4    | 2    | 5    | 3    | 5    | 4    | 5    | 5    | 3    | 3    | 4    | 5    | 1    | 4    | 4    |
| Lazuli bunting                |      |      |      |      |      |      |      | 1    |      |      |      |      |      |      |      |
| Least bittern                 |      |      |      |      |      |      |      |      | 2    |      |      |      |      |      |      |
| Lesser goldfinch              |      | 1    | 1    |      | 1    | 1    | 1    |      |      |      |      | 1    |      |      |      |
| Lesser nighthawk              | 2    | 4    | 3    | 2    | 4    | 2    | 1    | 3    | 3    | 2    | 3    | 4    |      | 3    | 2    |
| Loggerhead shrike             |      |      |      |      |      | 1    | 3    | 2    | 1    |      | 1    | 3    |      | 2    |      |
| Lucy's warbler                | 2    | 2    | 3    | 2    | 3    | 5    | 3    | 4    |      | 1    | 3    | 4    | 1    | 2    | 2    |
| Macgillivray's warbler        |      |      |      |      |      |      |      |      |      |      |      | 1    |      |      |      |
| Mourning dove                 | 3    | 5    | 5    | 4    | 3    | 4    | 5    | 5    | 3    | 3    | 4    | 3    | 3    | 3    | 5    |
| Northern cardinal             |      |      |      |      |      |      |      |      |      |      |      |      |      | 1    |      |
| Northern mockingbird          |      |      | 1    |      |      |      |      |      |      |      |      |      |      |      |      |
| Northern rough-winged swallow |      |      |      | 1    | 2    |      |      | 1    | 2    |      | 1    | 1    |      | 1    |      |
| Nutting's flycatcher          |      |      |      |      | 1    |      |      |      |      |      |      |      |      |      |      |
| Pacific-slope flycatcher      |      |      |      |      |      |      |      | 1    |      |      | 1    | 1    |      |      |      |
| Phainopepla                   |      |      |      |      | 1    |      |      |      |      |      |      |      |      |      |      |
| Pied-billed grebe             |      |      | 1    |      |      |      |      |      | 2    |      |      |      |      |      |      |
| Red-naped sapsucker           |      |      |      |      |      |      |      |      |      |      |      | 1    |      |      |      |
| Red-tailed hawk               |      | 1    |      |      |      |      |      | 2    |      |      |      | 1    |      | 1    |      |
| Red-winged blackbird          |      |      |      | 1    |      |      |      | 1    | 1    |      |      |      |      |      |      |
| Rock wren                     | 1    |      |      |      | 1    | 1    |      | 1    | 1    |      |      | 1    |      |      |      |
| Say's phoebe                  | 1    |      |      |      |      | 1    | 1    | 1    |      |      |      | 1    |      | 1    |      |
| Sharp-shinned hawk            |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 1    |

Table A-2.—Birds encountered during YBCU surveys, Reach 3 (Bill Williams River NWR), 2013  
 (The number of survey periods each species was detected is displayed. LCR MSCP covered species are in **bold**)

| Species name                | <b>BWBP</b> | <b>BWCR</b> | <b>BWCW</b> | <b>BWER</b> | <b>BWFW</b> | <b>BWGR</b> | <b>BWHB</b> | <b>BWKR</b> | <b>BWMA</b> | <b>BWMD</b> | <b>BWMF</b> | <b>BWMW</b> | <b>BWNB</b> | <b>BWPT</b> | <b>BWSW</b> |
|-----------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Song sparrow                | 3           | 4           | 5           | 4           | 5           | 3           | 4           | 5           | 3           | 3           | 4           | 5           | 3           | 2           | 4           |
| Spotted sandpiper           |             |             |             |             |             |             |             |             | 1           |             |             |             |             |             |             |
| <b>Summer tanager</b>       | 3           | 3           | 4           | 2           | 1           | 1           | 4           | 4           | 1           | 1           | 4           | 4           | 1           | 4           | 1           |
| Tree swallow                |             |             |             |             |             |             |             |             | 1           |             |             |             |             | 1           | 1           |
| Turkey vulture              | 1           |             |             |             | 1           | 1           |             | 3           |             |             | 1           | 1           |             | 1           | 1           |
| Verdin                      | 3           | 1           | 2           | 1           | 3           | 2           | 1           | 1           | 1           |             | 3           | 5           |             | 2           | 2           |
| <b>Vermilion flycatcher</b> |             |             |             | 2           |             |             |             |             |             |             |             |             |             |             |             |
| Warbling vireo              | 1           |             |             |             |             |             |             |             |             |             |             |             |             |             |             |
| Western kingbird            | 1           | 2           | 1           |             |             |             |             |             | 1           | 1           |             |             |             | 1           |             |
| Western meadowlark          |             |             |             |             |             |             |             |             |             |             |             | 1           |             |             |             |
| Western screech owl         |             |             |             |             |             |             |             |             |             |             |             |             |             | 1           |             |
| Western tanager             |             |             |             |             |             |             | 2           | 1           |             |             |             | 1           |             | 2           |             |
| Western Wood-pewee          |             |             |             |             |             |             |             |             |             |             |             | 1           |             |             |             |
| White-faced ibis            |             |             |             |             |             |             |             |             | 1           |             |             |             | 1           |             |             |
| White-throated swift        | 1           |             |             |             | 1           |             |             |             |             |             |             |             |             |             | 1           |
| White-winged dove           | 3           | 3           | 5           | 4           | 5           | 4           | 2           | 5           | 1           | 3           | 4           | 5           | 3           | 4           | 5           |
| <b>Yellow warbler</b>       | 1           | 2           | 2           | 3           | 2           | 2           | 4           | 3           | 2           |             | 4           | 5           | 2           | 1           | 1           |
| <b>Yellow-billed cuckoo</b> | 1           | 2           | 3           |             | 2           | 2           | 3           | 1           |             |             | 1           | 4           |             |             | 3           |
| Yellow-breasted chat        | 5           | 5           | 5           | 4           | 5           | 5           | 5           | 5           | 4           | 4           | 5           | 5           | 4           | 3           | 5           |

Table A-3.—Birds encountered during YBCU surveys, Reach 4 (CRIT to Cibola), 2013  
 (The number of survey periods each species was detected is displayed. LCR MSCP covered species are in **bold**)

| Species name                | <b>CIBCNT</b> | <b>CIBCR</b> | <b>CIBEUC</b> | <b>CIBMP</b> | <b>CIBNTH</b> | <b>CRIT</b> | <b>CVCA1</b> | <b>CVCA2</b> | <b>CVCA3</b> | <b>PVER1</b> | <b>PVER2</b> | <b>PVER3</b> | <b>PVER4</b> | <b>PVER5</b> | <b>PVER6</b> | <b>PVER7</b> |
|-----------------------------|---------------|--------------|---------------|--------------|---------------|-------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Abert's towhee              | 5             | 5            | 5             | 3            | 4             | 5           | 5            | 4            | 5            | 5            | 5            | 5            | 5            | 5            | 5            | 1            |
| American coot               |               |              |               | 1            |               |             |              |              |              |              |              |              |              |              |              |              |
| American kestrel            | 1             | 1            | 5             | 1            |               | 2           | 1            |              |              |              | 1            |              | 1            | 3            | 1            |              |
| Anna's hummingbird          | 2             | 1            |               |              |               | 4           | 1            |              |              |              | 1            |              | 1            | 1            |              |              |
| Ash-throated flycatcher     | 5             | 4            | 4             | 3            | 4             | 3           | 5            | 5            | 5            | 2            | 4            | 2            | 4            | 5            | 4            | 2            |
| Barn owl                    |               |              |               |              |               |             | 1            |              |              |              |              | 1            |              |              |              |              |
| <b>Bell's vireo</b>         | 3             |              |               |              |               |             | 1            |              | 1            |              |              |              |              |              |              |              |
| Bewick's wren               | 1             |              |               |              |               | 1           |              |              |              |              |              |              |              |              |              |              |
| Black phoebe                | 2             | 5            | 3             | 2            | 1             | 4           | 3            | 4            | 2            | 1            | 2            | 4            | 2            | 4            | 4            | 2            |
| Black-chinned hummingbird   | 1             | 2            | 2             | 2            | 2             | 4           | 4            | 2            | 2            | 1            | 4            | 3            | 3            | 3            | 2            | 1            |
| Black-headed grosbeak       | 1             | 1            | 3             | 1            | 1             |             | 3            | 1            | 3            | 2            | 2            | 1            | 3            | 3            |              |              |
| Black-tailed gnatcatcher    | 1             | 3            | 5             | 1            | 2             | 3           | 3            |              | 4            |              | 1            |              |              | 1            |              |              |
| Black-throated gray warbler |               |              |               |              |               |             |              |              |              |              |              |              |              | 1            |              |              |
| Blue grosbeak               | 4             | 5            | 5             | 5            | 3             | 3           | 5            | 5            | 5            | 5            | 5            | 5            | 5            | 5            | 5            | 2            |
| Brown-crested flycatcher    |               |              | 5             |              |               | 5           | 1            |              | 2            |              |              |              |              | 2            |              |              |
| Brown-headed cowbird        | 4             | 4            | 4             | 3            | 4             | 5           | 5            | 4            | 4            | 4            | 5            | 5            | 4            | 5            | 5            | 3            |
| Bullock's oriole            | 4             | 4            | 5             | 3            | 3             | 3           | 4            | 2            | 5            | 1            | 3            | 4            | 5            | 5            | 5            | 1            |
| Cattle egret                |               |              |               |              |               |             |              |              |              |              | 1            | 1            |              | 1            | 1            | 1            |
| Chipping sparrow            |               |              |               |              |               |             | 2            | 2            |              |              |              | 1            |              |              | 1            |              |
| Cliff swallow               |               | 4            | 4             | 1            | 1             |             | 3            |              | 3            | 1            | 4            | 3            | 3            | 5            | 5            | 2            |
| Common ground dove          |               | 1            | 1             |              |               |             | 1            |              | 1            | 1            |              | 1            |              | 5            | 4            | 2            |
| Common moorhen              |               |              |               | 2            |               |             |              |              |              |              |              |              |              |              |              |              |
| Common raven                | 1             | 2            | 1             |              |               | 1           |              |              | 1            | 1            | 1            | 4            | 1            | 2            | 4            |              |
| Common yellowthroat         | 1             | 4            |               | 3            |               | 3           |              |              |              | 4            | 4            | 1            | 5            | 5            | 5            | 3            |
| Coopers hawk                |               |              |               |              |               |             | 2            | 1            |              | 1            |              | 2            | 1            | 1            | 1            |              |
| Costa's hummingbird         |               |              | 1             |              |               |             | 1            | 1            |              |              |              |              |              |              |              |              |

Table A-3.—Birds encountered during YBCU surveys, Reach 4 (CRIT to Cibola), 2013  
 (The number of survey periods each species was detected is displayed. LCR MSCP covered species are in **bold**)

| Species name             | <b>CIBCNT</b> | <b>CIBCR</b> | <b>CIBEUC</b> | <b>CIBMP</b> | <b>CIBNTH</b> | <b>CRIT</b> | <b>CVCA1</b> | <b>CVCA2</b> | <b>CVCA3</b> | <b>PVER1</b> | <b>PVER2</b> | <b>PVER3</b> | <b>PVER4</b> | <b>PVER5</b> | <b>PVER6</b> | <b>PVER7</b> |
|--------------------------|---------------|--------------|---------------|--------------|---------------|-------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Crissal thrasher         | 2             | 4            | 5             | 5            | 2             | 4           | 4            | 1            | 4            | 1            | 1            |              |              | 3            | 3            |              |
| Double crested cormorant |               |              |               |              |               | 1           |              |              |              |              |              |              |              |              |              |              |
| Eurasian collared dove   | 2             | 1            | 4             |              |               | 1           | 3            | 3            | 1            | 1            | 1            | 1            | 3            | 1            |              |              |
| European starling        |               | 1            | 1             |              |               |             | 2            | 1            |              |              |              |              |              |              |              |              |
| Gambel's quail           | 3             | 1            | 3             | 4            | 3             | 4           | 2            | 4            | 5            | 2            | 4            | 3            |              | 4            | 1            | 1            |
| <b>Gila woodpecker</b>   |               |              |               |              |               | 3           | 2            | 1            |              |              |              |              |              |              | 1            |              |
| Gray catbird             |               |              |               | 1            |               |             |              |              |              |              |              |              |              |              |              |              |
| Great blue heron         |               |              | 1             |              |               |             |              |              |              |              |              | 1            |              | 1            | 1            | 1            |
| Great egret              |               |              | 1             | 1            |               |             | 1            |              |              |              | 1            | 1            | 1            | 2            | 1            | 1            |
| Great horned owl         | 3             |              | 2             | 4            |               | 4           | 3            | 4            | 5            |              | 3            | 4            | 4            | 4            | 1            |              |
| Greater roadrunner       |               | 1            |               | 1            |               | 2           | 1            |              | 1            |              | 1            | 3            | 2            | 4            |              | 1            |
| Greater yellowlegs       |               |              |               |              |               |             |              |              |              |              |              |              |              | 1            |              |              |
| Great-tailed grackle     |               | 3            | 4             | 1            | 1             | 5           |              | 2            | 3            |              | 2            | 1            | 1            | 3            | 3            | 1            |
| Green heron              |               | 1            |               |              |               |             |              |              |              |              |              |              |              |              |              |              |
| Green-winged teal        |               |              |               |              |               |             |              |              |              |              |              |              |              |              |              | 1            |
| Horned lark              |               |              | 2             | 1            |               |             |              |              |              |              |              |              |              | 1            |              |              |
| House finch              | 5             | 3            | 5             | 5            | 5             | 3           | 3            | 5            | 5            | 3            | 5            | 5            | 5            | 5            | 5            | 2            |
| House wren               | 1             |              |               |              |               |             | 1            |              |              |              |              |              |              | 1            | 1            |              |
| Inca dove                |               |              |               |              |               |             | 1            |              |              |              |              |              | 3            | 1            | 1            |              |
| Indigo bunting           | 1             |              |               |              | 1             |             | 3            | 3            | 1            |              | 1            | 3            | 3            | 5            | 5            | 2            |
| Killdeer                 | 1             | 3            | 3             | 1            | 1             |             | 5            |              |              |              | 2            | 2            |              | 1            | 1            |              |
| Ladder-backed woodpecker | 3             | 4            | 5             | 3            | 1             | 5           | 4            | 2            | 4            | 2            | 4            | 3            | 2            | 3            | 4            |              |
| Lazuli bunting           |               |              |               |              |               |             | 1            | 1            |              |              |              |              |              |              |              |              |
| Lesser goldfinch         | 1             |              |               | 4            | 2             | 2           | 4            | 2            |              |              |              | 1            | 1            |              |              |              |
| Lesser nighthawk         | 4             | 3            | 4             | 4            | 1             | 5           | 3            | 2            | 5            |              | 1            | 1            | 1            | 4            | 3            | 2            |
| Loggerhead shrike        | 3             | 4            | 5             | 4            | 3             | 3           | 4            | 2            | 5            | 2            | 1            | 1            | 1            | 5            | 1            | 2            |

Table A-3.—Birds encountered during YBCU surveys, Reach 4 (CRIT to Cibola), 2013  
 (The number of survey periods each species was detected is displayed. LCR MSCP covered species are in **bold**)

| Species name                  | CIBCNT | CIBCR | CIBEUC | CIBMP | CIBNTH | CRIT | CVCA1 | CVCA2 | CVCA3 | PVER1 | PVER2 | PVER3 | PVER4 | PVER5 | PVER6 | PVER7 |
|-------------------------------|--------|-------|--------|-------|--------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Long-billed curlew            |        |       |        |       |        |      |       |       |       |       |       |       |       | 2     | 1     |       |
| Lucy's warbler                | 2      | 1     | 1      | 1     |        | 2    |       | 3     | 2     |       | 3     | 4     | 2     | 5     | 3     |       |
| Macgillivray's warbler        |        |       |        |       |        |      |       |       | 1     |       |       |       |       |       |       |       |
| Mallard                       |        |       |        |       |        |      |       |       |       |       | 1     |       |       | 1     |       |       |
| Mourning dove                 | 5      | 5     | 5      | 5     | 5      | 4    | 5     | 5     | 5     | 5     | 5     | 5     | 5     | 5     | 5     | 3     |
| Northern harrier              |        |       |        | 1     |        |      |       | 1     | 1     |       |       |       | 1     | 2     | 1     |       |
| Northern mockingbird          |        | 3     | 1      | 2     | 1      | 2    | 1     |       | 1     | 1     | 2     | 2     |       | 1     | 2     |       |
| Northern rough-winged swallow |        |       | 1      | 1     |        | 1    |       |       |       |       |       | 1     |       | 1     |       |       |
| Orange-crowned warbler        |        |       |        |       |        |      | 2     | 1     | 1     |       |       |       |       |       |       |       |
| Pacific-slope flycatcher      |        |       | 1      | 1     |        |      |       |       |       |       | 1     |       |       |       |       |       |
| Peregrine falcon              |        |       |        | 1     | 1      |      |       |       |       |       |       |       |       |       |       |       |
| Phainopepla                   |        |       |        |       |        |      | 1     |       |       | 1     |       |       |       |       |       |       |
| Red-shouldered hawk           | 1      |       |        |       |        |      |       |       |       |       |       |       |       |       |       |       |
| Red-tailed hawk               |        |       |        |       |        | 1    | 1     | 1     |       |       | 1     |       |       |       | 1     |       |
| Red-winged blackbird          | 1      | 4     | 5      | 3     | 1      | 3    | 4     | 4     | 4     | 5     | 4     | 5     | 5     | 5     | 5     | 2     |
| Rose-breasted grosbeak        |        |       |        |       |        |      |       |       |       |       |       |       |       | 1     |       |       |
| Say's phoebe                  |        |       | 1      | 1     |        |      |       |       |       |       |       |       |       | 2     |       |       |
| Song sparrow                  | 1      | 5     | 2      | 2     |        |      |       |       |       | 3     | 4     | 1     | 5     | 5     | 5     | 2     |
| <b>Summer tanager</b>         | 1      | 1     |        | 1     |        | 2    | 1     | 1     |       |       | 1     | 1     | 1     |       | 1     |       |
| Swainson's hawk               |        | 1     |        |       |        |      |       |       | 1     |       | 1     | 3     |       | 3     | 1     |       |
| Tree swallow                  |        |       | 1      |       |        |      |       |       |       |       |       |       |       |       |       |       |
| Tropical kingbird             |        | 1     |        |       |        | 1    |       |       |       |       |       |       |       |       |       |       |
| Turkey vulture                |        |       | 5      | 1     |        | 3    | 4     | 2     | 2     | 1     | 1     | 3     | 1     | 2     | 2     |       |
| Unknown empid                 |        |       |        |       |        |      |       |       |       |       |       | 1     |       |       |       |       |
| Unknown flycatcher            |        |       |        |       |        |      |       |       |       |       |       |       |       | 1     |       |       |

Table A-3.—Birds encountered during YBCU surveys, Reach 4 (CRIT to Cibola), 2013  
 (The number of survey periods each species was detected is displayed. LCR MSCP covered species are in **bold**)

| Species name                | CIBCNT | CIBCR | CIBEUC | CIBMP | CIBNTH | CRIT | CVCA1 | CVCA2 | CVCA3 | PVER1 | PVER2 | PVER3 | PVER4 | PVER5 | PVER6 | PVER7 |
|-----------------------------|--------|-------|--------|-------|--------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Unknown hummingbird         |        | 1     |        |       |        |      |       |       |       | 1     |       |       |       | 1     | 1     | 1     |
| Verdin                      | 4      | 3     | 5      | 4     | 3      | 4    | 5     | 3     | 5     | 1     | 2     |       | 5     | 3     |       |       |
| Violet-green swallow        |        |       | 1      |       |        |      |       |       |       |       |       |       |       |       |       |       |
| Western flycatcher          |        |       |        |       |        |      |       | 2     |       |       |       |       |       | 1     | 1     |       |
| Western kingbird            | 5      | 5     | 5      | 5     | 4      | 5    | 4     | 5     | 5     | 1     | 5     | 5     | 4     | 5     | 5     | 1     |
| Western tanager             | 1      | 2     | 3      |       |        | 2    | 1     | 2     |       |       |       |       | 1     | 2     | 1     | 2     |
| Western wood-pewee          |        | 1     |        |       |        | 1    | 1     |       |       |       | 1     |       |       |       |       |       |
| White-faced ibis            | 1      | 3     | 4      | 1     |        | 1    | 2     | 3     | 2     | 1     | 2     | 1     |       | 2     | 2     |       |
| White-tailed kite           |        |       |        |       |        |      |       |       |       |       |       |       |       |       | 3     |       |
| White-throated swift        |        |       |        |       |        |      |       |       | 1     |       | 1     |       |       |       |       |       |
| White-winged dove           | 5      | 5     | 5      | 5     | 5      | 5    | 5     | 5     | 5     | 5     | 5     | 5     | 5     | 5     | 5     | 3     |
| <b>Willow flycatcher</b>    |        |       |        | 1     |        |      |       |       |       |       |       |       |       |       |       |       |
| Wilson's warbler            |        |       |        |       |        |      | 2     |       |       |       | 1     |       | 1     |       |       |       |
| <b>Yellow warbler</b>       |        |       |        |       |        | 1    |       |       | 2     |       |       |       | 5     | 3     | 2     |       |
| <b>Yellow-billed cuckoo</b> | 2      | 5     |        | 3     |        | 2    | 5     | 5     | 4     | 3     | 4     | 5     | 5     | 5     | 5     | 4     |
| Yellow-breasted chat        | 3      | 5     |        | 4     | 1      | 3    | 2     | 2     |       | 3     | 4     | 2     | 5     | 5     | 5     | 3     |
| Yellow-headed blackbird     |        | 1     | 1      | 2     |        | 2    |       | 1     | 1     |       | 1     | 1     | 1     | 2     | 3     | 1     |

Table A-4.—Birds encountered during YBCU surveys, Reaches 5 and 6 (Imperial to Yuma), 2013

(The number of survey periods each species was detected is displayed. LCR MSCP covered species are in **bold**)

| Species name              | GRQP | IMP20A | IMP50 | IMPSTH | IMPAST | MLPR | PICSRA | YUEW | YUWW |
|---------------------------|------|--------|-------|--------|--------|------|--------|------|------|
| Abert's towhee            | 4    |        | 3     | 3      | 3      | 5    | 4      | 5    | 4    |
| American coot             |      |        | 2     |        | 4      | 3    |        | 2    |      |
| American kestrel          | 1    | 1      |       | 1      |        | 1    |        | 1    |      |
| Anna's hummingbird        | 1    |        |       |        |        | 2    |        | 5    | 4    |
| Ash-throated flycatcher   | 3    | 1      | 3     | 1      | 3      | 3    | 2      | 3    | 2    |
| Barn owl                  |      |        |       |        |        | 1    |        | 1    |      |
| <b>Bell's vireo</b>       |      |        | 4     |        | 1      |      | 4      |      |      |
| Belted kingfisher         |      |        |       |        |        | 1    |        |      |      |
| Black phoebe              | 4    | 1      | 4     | 1      | 3      | 4    | 1      | 2    | 1    |
| Black-chinned hummingbird | 4    |        |       |        |        |      |        | 3    | 4    |
| Black-crowned night-heron |      |        | 2     |        | 4      |      |        | 4    | 1    |
| Black-headed grosbeak     | 2    |        |       | 1      |        | 2    | 2      | 1    | 2    |
| Black-necked stilt        |      | 1      | 1     |        | 2      |      | 1      |      |      |
| Black-tailed gnatcatcher  | 3    | 1      | 4     | 2      | 4      | 4    | 4      | 4    | 4    |
| Blue grosbeak             | 2    |        |       | 3      |        | 5    | 3      | 5    | 2    |
| Brown pelican             |      |        |       |        | 1      |      |        |      |      |
| Brown-crested flycatcher  | 1    | 1      | 1     | 3      | 3      |      | 4      |      | 1    |
| Brown-headed cowbird      | 4    |        | 4     | 1      | 3      | 4    | 2      | 4    | 4    |
| Bullock's oriole          | 4    | 2      | 3     | 2      | 2      | 2    | 4      | 4    | 3    |
| Caspian tern              |      |        |       |        |        |      | 1      |      |      |
| Cattle egret              | 3    |        |       |        |        |      | 1      |      | 1    |
| Chipping sparrow          | 1    |        |       |        |        |      |        |      |      |
| Cinnamon teal             |      |        | 1     |        |        |      |        |      |      |
| <b>Clapper rail</b>       |      |        | 2     |        |        |      |        |      |      |
| Clarks grebe              |      |        | 1     |        |        |      |        |      |      |
| Cliff swallow             | 4    | 2      | 3     |        | 4      | 2    | 3      | 3    | 2    |

Table A-4.—Birds encountered during YBCU surveys, Reaches 5 and 6 (Imperial to Yuma), 2013

(The number of survey periods each species was detected is displayed. LCR MSCP covered species are in **bold**)

| Species name             | GRQP | IMP20A | IMP50 | IMPSTH | IMPAST | MLPR | PICSRA | YUEW | YUWW |
|--------------------------|------|--------|-------|--------|--------|------|--------|------|------|
| Common ground dove       | 4    |        | 1     | 1      | 2      | 2    |        | 2    | 4    |
| Common moorhen           |      |        |       |        | 1      | 3    |        | 4    |      |
| Common yellowthroat      |      | 4      | 4     | 1      | 3      | 5    | 4      | 5    | 4    |
| Coopers hawk             |      |        |       |        |        | 1    |        |      |      |
| Crissal thrasher         | 1    | 1      |       |        |        |      | 1      | 3    | 2    |
| Double crested cormorant |      | 2      | 3     |        |        |      |        |      |      |
| Eurasian collared dove   | 4    | 1      | 1     |        | 1      | 4    | 1      | 5    | 4    |
| European starling        | 1    | 2      |       |        |        | 1    |        | 1    | 3    |
| Gambel's quail           | 4    | 1      | 3     | 1      | 1      | 5    | 4      | 1    | 3    |
| <b>Gila woodpecker</b>   |      | 1      | 1     | 3      | 3      | 2    | 4      | 5    | 4    |
| Great blue heron         |      | 1      |       |        | 3      | 3    | 1      | 3    |      |
| Great egret              |      | 1      | 3     |        | 3      | 4    | 1      | 5    | 1    |
| Great horned owl         | 3    |        | 2     |        |        | 5    |        |      |      |
| Greater roadrunner       | 1    |        |       |        |        |      | 1      | 2    | 2    |
| Greater yellowlegs       |      | 1      |       |        |        |      |        | 2    |      |
| Great-tailed grackle     | 4    | 4      | 4     |        | 4      | 5    | 3      | 5    | 4    |
| Green heron              |      |        |       |        | 2      | 1    |        | 4    |      |
| Hooded oriole            | 1    |        |       |        |        |      |        |      |      |
| House finch              | 4    | 1      | 1     |        |        | 1    | 1      | 2    | 2    |
| House sparrow            |      |        |       |        |        |      |        |      | 1    |
| Inca dove                |      |        | 1     |        |        |      |        | 4    | 2    |
| Killdeer                 | 2    | 4      | 4     |        | 1      | 4    | 1      | 5    |      |
| Ladder-backed woodpecker | 4    | 2      | 2     | 2      | 4      | 4    | 4      | 5    | 4    |
| Lazuli bunting           | 1    |        |       |        |        |      |        |      |      |
| Least bittern            |      |        |       |        | 1      | 1    |        | 4    |      |
| Least sandpiper          |      | 1      |       |        |        |      |        | 1    |      |

Table A-4.—Birds encountered during YBCU surveys, Reaches 5 and 6 (Imperial to Yuma), 2013  
 (The number of survey periods each species was detected is displayed. LCR MSCP covered species are in **bold**)

| Species name                  | GRQP | IMP20A | IMP50 | IMPSTH | IMPAST | MLPR | PICSRA | YUEW | YUWW |
|-------------------------------|------|--------|-------|--------|--------|------|--------|------|------|
| Lesser goldfinch              | 4    |        |       |        |        | 1    |        |      |      |
| Lesser nighthawk              | 2    | 4      | 4     | 2      | 2      | 3    |        | 3    |      |
| Loggerhead shrike             | 4    | 4      | 4     | 1      | 2      | 5    | 4      | 3    | 2    |
| Long-billed curlew            |      |        |       |        | 1      | 1    |        |      |      |
| Lucy's warbler                | 1    |        | 1     |        | 2      | 2    |        |      |      |
| Mallard                       |      |        |       |        |        | 2    |        |      |      |
| Marsh wren                    |      |        |       |        |        |      |        | 4    |      |
| Mourning dove                 | 4    | 4      | 3     | 2      | 4      | 5    | 4      | 5    | 3    |
| Nashville warbler             |      |        | 1     |        |        |      | 1      |      |      |
| Northern cardinal             |      |        |       |        |        |      |        |      | 1    |
| Northern mockingbird          |      | 3      | 2     |        | 1      |      |        | 4    | 4    |
| Northern rough-winged swallow | 1    |        | 1     |        | 2      |      |        | 1    |      |
| Orange-crowned warbler        | 1    |        |       |        |        | 1    |        |      |      |
| Osprey                        | 1    |        |       |        |        |      |        |      |      |
| Peregrine falcon              |      |        |       |        |        | 2    |        |      |      |
| Phainopepla                   | 1    |        |       |        |        |      | 2      |      | 3    |
| Pied-billed grebe             |      | 2      | 4     |        | 4      | 5    | 4      | 5    |      |
| Prairie falcon                |      |        |       |        |        |      |        | 1    |      |
| Red-shouldered hawk           |      |        |       |        |        |      |        |      | 1    |
| Red-tailed hawk               |      | 1      |       |        |        |      | 1      |      |      |
| Red-winged blackbird          | 4    |        |       |        | 1      | 5    |        | 5    | 1    |
| Rock pigeon                   |      |        |       |        |        |      |        | 5    | 3    |
| Say's phoebe                  | 2    |        |       |        |        | 2    |        |      | 1    |
| Snowy egret                   | 1    | 1      | 1     |        | 1      | 3    |        | 4    |      |
| Song sparrow                  |      |        | 4     | 2      | 4      | 2    |        | 3    |      |
| <b>Summer tanager</b>         |      |        |       | 3      | 1      |      | 3      |      |      |

Table A-4.—Birds encountered during YBCU surveys, Reaches 5 and 6 (Imperial to Yuma), 2013

(The number of survey periods each species was detected is displayed. LCR MSCP covered species are in **bold**)

| Species name                | GRQP | IMP20A | IMP50 | IMPSTH | IMPAST | MLPR | PICSRA | YUEW | YUWW |
|-----------------------------|------|--------|-------|--------|--------|------|--------|------|------|
| Swainson's hawk             | 1    |        |       |        |        |      | 1      |      |      |
| Tree swallow                |      |        |       |        | 1      |      |        |      |      |
| Tropical kingbird           | 2    |        |       |        |        |      |        |      |      |
| Turkey vulture              | 4    |        |       | 2      | 2      |      | 4      |      |      |
| Verdin                      | 4    | 4      | 4     | 3      | 3      | 4    | 4      | 5    | 4    |
| <b>Vermilion flycatcher</b> | 4    |        |       |        | 1      |      |        |      |      |
| Violet-green swallow        | 1    |        |       |        |        |      |        |      |      |
| Warbling vireo              | 1    |        |       |        |        |      | 1      |      |      |
| Western grebe               |      |        | 2     |        |        |      |        |      |      |
| Western kingbird            | 4    | 4      | 4     | 2      | 4      | 4    | 4      | 4    | 2    |
| Western tanager             | 1    |        |       | 1      | 2      | 1    | 2      | 1    | 1    |
| Western wood-pewee          |      |        |       | 1      |        |      | 1      |      |      |
| White-faced Ibis            | 2    |        | 1     |        | 1      | 3    | 3      | 1    | 1    |
| White-tailed kite           |      |        |       |        |        |      |        | 2    |      |
| White-throated swift        |      |        |       |        |        |      | 1      |      |      |
| White-winged dove           | 4    | 3      | 4     | 3      | 4      | 5    | 4      | 5    | 4    |
| Wilson's warbler            | 1    |        |       |        |        | 1    |        |      |      |
| <b>Yellow warbler</b>       |      |        |       | 1      | 1      |      |        | 1    |      |
| <b>Yellow-billed cuckoo</b> |      |        |       |        |        | 2    | 1      | 3    | 1    |
| Yellow-breasted chat        |      |        | 3     | 1      | 4      | 5    | 4      |      | 1    |
| Yellow-headed blackbird     |      | 2      |       | 1      | 1      |      |        | 1    |      |