Yellow-billed Cuckoo Distribution and Habitat Use, Lower Colorado River Multi-Species Conservation Plan, 2007 Results

Matthew Johnson, Scott Durst and Mark Sogge
USGS/Southwest Biological Science Center
Colorado Plateau Research Station
Northern Arizona University
Flagstaff, AZ
Lower Colorado River Multi-Species Conservation Plan (LCR-MSCP)  
Yellow-billed Cuckoo Objectives

**GOALS**
Maintain and increase Yellow-billed Cuckoo numbers

- Conduct surveys and research and better define cuckoo habitat requirements.
- Restore 4,050 acres of Yellow-billed Cuckoo habitat.
- Monitor and manage cuckoos and habitat.
Yellow-billed Cuckoo Objectives
Under the LCR-MSCP

• Conduct comprehensive, repeatable surveys in all potentially suitable habitat types within the MSCP project boundary.
• Evaluate the effectiveness of the current yellow-billed cuckoo breeding season survey protocol.
• Identify cuckoo habitat requirements.
• Identify core yellow-billed cuckoo breeding habitat.
Natural History

- Neotropical migrant

- Two populations
  - Eastern and Western

- Western Yellow-billed cuckoo is a riparian obligate

- Non-territorial
Yellow-billed Cuckoo Survey Methods

- Identified survey sites using historical detections (Dawson 1981) and the “look-see” method (Bibby et al. 1992)
- Five survey periods conducted between 10 June - 10 September
- Conducted playback surveys using “kuk-kowlp” call
- 100 m between points, 300 m after detection
- Supplemental non-survey visits to monitor behavior and determine breeding status
Definitions

• **Detection** – Aural and/or visual confirmation of a Yellow-billed Cuckoo’s presence on a survey

• **Occupied Patch** – A patch with Yellow-billed Cuckoo detections on two or more surveys
Cuckoo Study Areas

[Map of Cuckoo Study Areas showing locations such as Pahranagat NWR, Overton WMA, Grand Canyon NP, Lake Mead NPA, Havasu NWR, Bill Williams NWR, Ahakah Tribal Preserve, Cibola NWR, Imperial NWR, Mittry Lake WMA, Picacho SRA, Gila / Colorado River Confluence, Yuma West Wetlands, Quigley Pond WMA, and Limipede Division.]
2006 Yellow-billed Cuckoo
Yellow-billed Cuckoo Survey Results
2007 Yellow-billed Cuckoo
Yellow-billed Cuckoo Survey Results
Yellow-billed Cuckoo Detections by Survey Period

![Bar chart showing the number of Cuckoo detections by survey period from June 11 - September 9.](chart_image)
<table>
<thead>
<tr>
<th>Survey Area</th>
<th>YBCU Detections</th>
<th># of YBCU Occupied Sites</th>
<th># YBCU Breeding Detections</th>
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<tr>
<td>Pahranagat NWR</td>
<td>1 0</td>
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<td>0 0</td>
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<tr>
<td>Overton WMA</td>
<td>7 0</td>
<td>2 0</td>
<td>0 0</td>
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<tr>
<td>Grand Canyon NP/Lake Mead NRA</td>
<td>29 0</td>
<td>3 0</td>
<td>1 0</td>
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<tr>
<td>Havasu NWR</td>
<td>1 3</td>
<td>0 1</td>
<td>0 0</td>
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<tr>
<td>Bill Williams River NWR</td>
<td>117 139</td>
<td>8 12</td>
<td>10 27</td>
</tr>
<tr>
<td>Ahakhav Tribal Preserve - CRIT</td>
<td>NA 2</td>
<td>NA 0</td>
<td>0 0</td>
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<td>Cibola NWR</td>
<td>3 7</td>
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<td>Picacho State Recreation Area</td>
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<td>Imperial NWR</td>
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<tr>
<td>Limitrophe Division</td>
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<td>1 0</td>
<td>0 0</td>
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<td>Quigley Pond WMA</td>
<td>1 5</td>
<td>1 1</td>
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</table>
Cuckoo Breeding Activity at Bill Williams River NWR

Number of Activities

Survey Period

One  Two  Three  Four  Five

Other  Copulation  Food Carry  Fledglings  Nests
Evaluation of Yellow-billed Cuckoo Survey Method, 2007

OBJECTIVES

1. Examine patterns in cuckoo responses to the number of playback recordings played.

2. Examine Cuckoo detection rates according to study areas.

3. Examine Cuckoo detection rates across the breeding season.
Yellow-billed Cuckoo responses to the number of playback recordings played, 2007
Unsolicited Initial Cuckoo Responses to Broadcasts in each Geographical Area, 2007
Cuckoo Detection Rates across the Breeding Season, 2007

![Bar chart showing cuckoo detection rates across the breeding season from June 11 to September 9, 2007. The chart displays data for solicited and unsolicited detections, with the highest detections in the 6/11 - 6/30 interval.](chart.png)
Yellow-billed Cuckoos Detected within Categories of Distance from the Survey Point, 2007

[Bar chart showing the percentage of cuckoo detections at different distance categories from the survey point.]
Characterizing Yellow-billed Cuckoo Habitat, 2007

To improve knowledge of Yellow-billed Cuckoo habitat requirements we:

1. Selected point-based sampling measures that characterize riparian habitat at the survey site/patch level rather than at the nest or territory scale.

2. Sampled occupied and unoccupied patches to describe vegetation composition and structure.
Plots were done in both occupied and unoccupied sites.

Plots assigned to random UTM coordinates within appropriate habitat boundaries using aerial photographs.

Vegetation characterization method: Modified B-Bird

- Canopy cover
- Canopy height
- Identify Vegetation Strata Layers
- Distribution and density of woody species
- Ground cover
Tree size class

Total Tree Count by Size Class, 2007

Smallest, t205 = 3.0, p = 0.004
Small, t205 = -1.4, p = 0.17
Large, t205 = 5.8, p<0.001
Largest, t205 = 2.3, p = 0.02
Strata Layer Cover, 2007

T205 = 5.0, $p < 0.0001$

T205 = 3.0, $p < 0.0001$
Mean Total Tree Height, 2007

T205 = 8.0, p < 0.001
Mean Stem count by Geographic Areas, 2007

F4,202 = 11.8; p < 0.0001
Canopy Cover, Canopy Layer, Sub-Canopy, and Shrub/sapling Layer, 2007

Mean Cover (%)

Grand Canyon NP
Lake Mead NRA
Havasu NWR
Bill Williams NWR
Cibola NWR
Yuma Restoration Sites

Goodding's willow
F4,202 = 11.8, p < 0.0001

Mixed Native/Exotic

Tamarisk
F4,202 = 8.1, p < 0.0001
Mean Total tree Height by Geographic Area, 2007

F$_{4,202} = 42.3$, p < 0.0001

Freemont cottonwoods or Goodding’s willows
Microclimate Characterization of Yellow-billed Cuckoo Habitat, 2007

OBJECTIVES

• Examined how microclimate (temperature and relative humidity) vary between Yellow-billed Cuckoo occupied and unoccupied sites and between geographic locations.

• Compared soil moisture at Yellow-billed Cuckoo occupied and unoccupied sites and between geographic locations.

• Finally, microclimate variables to vegetation structure and species composition.
Microclimate Methods, 2007

Temperature and Relative Humidity

• Multiple random samples within a site/patch were placed to describe the patch/site.

• Random UTM coordinates were assigned from aerial photographs from each study site within appropriate cuckoo habitat boundaries.

Soil Moisture

• Soil moisture was recorded below each HOBO, and at 1.0 m, 2.0 m, and 3.0 m in each cardinal direction.

- **Diurnal Temperature (º C):**
  - Occupied: $t_{93} = -4.0; p < 0.0001$
  - Unoccupied: $t_{93} = 4.4; p < 0.0001$

- **Nocturnal Temperature (º C):**
  - Occupied: $t_{93} = 5.3; p < 0.0001$
  - Unoccupied: $t_{93} = 5.3; p < 0.0001$

- **Diurnal Relative Humidity (%):**
  - Occupied: $t_{93} = 5.3; p < 0.0001$
  - Unoccupied: $t_{93} = 5.3; p < 0.0001$

- **Nocturnal Relative Humidity (%):**
  - Occupied: $t_{93} = 5.3; p < 0.0001$
  - Unoccupied: $t_{93} = 5.3; p < 0.0001$
Mean Diurnal and Nocturnal Temperature and Relative Humidity among Cuckoo Geographic Study Areas, 2007

![Bar chart showing diurnal and nocturnal temperature and relative humidity across different geographic areas.](chart.png)

- **Grand Canyon NP - Lake Mead NRA**
- **Havasu NWR**
- **Bill Willimas NWR**
- **Cibola NWR**
- **Yuma Restoration Sites**

Range: 36.8 – 38.4 ºC; F4,90 = 22.1, p < 0.0001

F4,90 = 19.2, p < 0.0001

Microclimate Variables:
- Diurnal Temp
- Nocturnal Temp
- Diurnal RH
- Nocturnal RH

Temperature (º C):
- 0
- 10
- 20
- 30
- 40
- 50
- 60
- 70

Relative Humidity (%):
- 0
- 10
- 20
- 30
- 40
- 50
- 60
- 70
Mean Diurnal Temperature Versus Mean Canopy Cover, 2007
Mean soil moisture among yellow-billed cuckoo
Geographic Study Areas, 2007

![Bar chart showing soil moisture (%) for different geographic study areas: Grand Canyon NP - Lake Mead NRA, Havasu NWR, Bill Williams River NWR, Cibola NWR, Yuma Restoration Sites. The chart indicates that Cibola NWR has the highest soil moisture, followed by Yuma Restoration Sites and Bill Williams River NWR. The other areas have significantly lower soil moisture values.]
Occupied Sites

Bill Williams River NWR
Unoccupied Sites

Limitrophe Division

Havasu NWR – Topock Tamarisk
Restoration Sites

Topock Marsh Restoration

CRIT Restoration

Pratt Restoration
Lake Mead NRA – Chuckwalla Cove
Lake Mead NRA – Iceberg Ridge
Lake Mead NRA - Cuckoo Beach

2007
Stem Density at Grand Canyon NP – Lake Mead NRA 2006, 2007
### Microclimate Variables

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<th>Relative Humidity (%)</th>
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#### Diagram

![Diagram showing temperature and relative humidity for two years (2006 and 2007). The bars for each microclimate variable show the range (error bars).](chart.png)

**Microclimate Variables**
- Diurnal Temp
- Nocturnal Temp
- Diurnal RH
- Nocturnal RH
Results, 2007

- The majority of detections occurred at the Bill Williams River NWR.
- Observed changes in cuckoo detections, sites occupied and breeding in Grand Canyon NP/Lake Mead NRA.
- Occupied sites have a lower density of the smallest trees – these smallest trees are mostly tamarisk.
- Occupied sites have greater numbers of larger, native trees than unoccupied sites.
- Occupied sites were cooler and higher relative humidity.
Future Yellow-billed Cuckoo Habitat Characterization

• Continue within-patch habitat measures of vegetation.

• Examine patches at the landscape level.

• Continue to evaluate survey protocol.

• Continue to identify core cuckoo breeding habitat.
ACKNOWLEDGEMENTS

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Bill Williams River NWR
Imperial NWR
Cibola NWR
Pahranagat NWR
Overton WMA
Colorado River Indian Tribes

The success of the project is ultimately due to the efforts of the field personnel on the 2006 and 2007 USGS field crew.