Yellow-billed Cuckoo Studies on the Middle Rio Grande, New Mexico
• Initially petitioned for ESA listing in 1998
• Listed as a Candidate Species by USFWS in July 2001
• Western Yellow-billed Cuckoo comprised a Distinct Population Segment
YBCU in New Mexico:

- Historically rare statewide, but common along riparian areas of Pecos and Rio Grande (Bailey 1928, Hubbard 1978)
- Listed as sensitive but recent trend data lacking
- Recorded during Rio Grande WIFL surveys between 1997 and 2005
- Formal surveys beginning 2006
Studies including:

- Protocol surveys
- Radio telemetry
- Habitat quantification
- Migration
2011 Protocol Surveys

General Locations of Survey Site Reaches
Along the Middle Rio Grande

<table>
<thead>
<tr>
<th>River Reach</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belen</td>
<td>4.0 river miles</td>
</tr>
<tr>
<td>Sevilleta NWR/La Joya</td>
<td>10.5 river miles</td>
</tr>
<tr>
<td>San Acacia</td>
<td>12.0 river miles</td>
</tr>
<tr>
<td>Escondida</td>
<td>20.0 river miles</td>
</tr>
<tr>
<td>Bosque del Apache NWR</td>
<td>10.0 river miles</td>
</tr>
<tr>
<td>Tiffany</td>
<td>5.5 river miles</td>
</tr>
<tr>
<td>San Marcial</td>
<td>27.5 river miles</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>89.5 river miles</strong></td>
</tr>
</tbody>
</table>

* Please note - Boundaries from North to South are correct, however boundaries from East to West are exaggerated (real boundaries are only within riparian area of the Rio Grande)
2011 Survey Results

<table>
<thead>
<tr>
<th>River Reach</th>
<th>YBCU Detections</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number of Detections</td>
<td>Percent of Detections</td>
</tr>
<tr>
<td>Belen Reach</td>
<td>16</td>
<td>6%</td>
</tr>
<tr>
<td>Sevilleta NWR/La Joya Reach</td>
<td>6</td>
<td>2%</td>
</tr>
<tr>
<td>San Acacia Reach</td>
<td>6</td>
<td>2%</td>
</tr>
<tr>
<td>Escondida Reach</td>
<td>15</td>
<td>6%</td>
</tr>
<tr>
<td>Bosque del Apache NWR Reach</td>
<td>17</td>
<td>6%</td>
</tr>
<tr>
<td>Tiffany Reach</td>
<td>4</td>
<td>2%</td>
</tr>
<tr>
<td>San Marcial Reach</td>
<td>202</td>
<td>76%</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>266</strong></td>
<td><strong>100%</strong></td>
</tr>
<tr>
<td>Elephant Butte Reservoir (Subset of San Marcial Reach)</td>
<td>159</td>
<td>60%</td>
</tr>
</tbody>
</table>
# Historic Survey Results

<table>
<thead>
<tr>
<th>River Reach</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belen</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>1</td>
<td>3</td>
<td>16</td>
</tr>
<tr>
<td>Sevilleta/La Joya</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>4</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>San Acacia</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
<td>8</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>Escondida</td>
<td>NS</td>
<td>3</td>
<td>19</td>
<td>29</td>
<td>6</td>
<td>15</td>
</tr>
<tr>
<td>Bosque del Apache</td>
<td>NS</td>
<td>22</td>
<td>35</td>
<td>47</td>
<td>14</td>
<td>17</td>
</tr>
<tr>
<td>Tiffany</td>
<td>10</td>
<td>12</td>
<td>7</td>
<td>10</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>San Marcial</td>
<td>106</td>
<td>222</td>
<td>299</td>
<td>257</td>
<td>249</td>
<td>202</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>116</strong></td>
<td><strong>259</strong></td>
<td><strong>360</strong></td>
<td><strong>356</strong></td>
<td><strong>278</strong></td>
<td><strong>266</strong></td>
</tr>
<tr>
<td>Elephant Butte Reservoir</td>
<td>76</td>
<td>182</td>
<td>252</td>
<td>211</td>
<td>222</td>
<td>159</td>
</tr>
<tr>
<td>(Subset of San Marcial Reach)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Detections ≠ Territories
“Territory” Delineation Difficulties

• Breeding territories = 2 or 3 adults

• Both males and females vocalize

• YBCUs have large, undefended territories that can overlap and they move around A LOT

• Actual YBCU locations are calculated based on surveyor coordinates and estimated distance and bearing to the bird, all of which have inherent error

• Surveys conducted later in the breeding season (i.e. surveys 3 and 4) could detect hatch year fledglings that have dispersed from the nest site into surrounding areas
“Territory” Delineation

500m radius = 78.5ha;
Mean MCP (Sechrist *et al.* 2009) = 81.6ha

Problem: underestimation or overestimation
“Territory” Delineation - New

“Territory” = min of 2 detections over 4 surveys – <300 m apart during the same survey or <500 m apart during at least 2 surveys – otherwise detections not considered part of a breeding territory, but as “random/floater” detections
“Territory” Delineation - New

• “Territory” = min of 2 detections over 4 surveys – <300 m apart during the same survey or <500 m apart during at least 2 surveys – otherwise detections not considered part of a breeding territory, but as “random/floater” detections

• No more than 3 detections within 300 m during the same survey - more than 3 YBCU detections during the same survey period in an area <300 m suggests multiple breeding territories
“Territory” Delineation - New

- “Territory” = min of 2 detections over 4 surveys – <300 m apart during the same survey or <500 m apart during at least 2 surveys – otherwise detections not considered part of a breeding territory, but as “random/floater” detections

- No more than 3 detections within 300 m during the same survey – more than 3 YBCU detections during the same survey period in an area <300 m suggests multiple breeding territories

- Detection patterns evaluated based on number and proximity of detections during individual survey periods. Ideally, multiple discreet detections within 300 m of each other over multiple surveys are needed to confirm a breeding “territory”
“Territory” Delineation - New

- “Territory” = min of 2 detections over 4 surveys – <300 m apart during the same survey or <500 m apart during at least 2 surveys – otherwise detections not considered part of a breeding territory, but as “random/floater” detections

- No more than 3 detections within 300 m during the same survey - more than 3 YBCU detections during the same survey period in an area <300 m suggests multiple breeding territories

- Detection patterns evaluated based on number and proximity of detections during individual survey periods. Ideally, multiple discreet detections within 300 m of each other over multiple surveys are needed to confirm a breeding “territory”

- Although YBCU territories can overlap, natural breaks between detection clumps should be considered

- “Best biological opinion” is often consulted
## 2011 Survey Results and “Territory” Delineations

<table>
<thead>
<tr>
<th>River Reach</th>
<th>YBCU Detections</th>
<th>YBCU Territories</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number of</td>
<td>Percent of</td>
</tr>
<tr>
<td></td>
<td>Detections</td>
<td>Detections</td>
</tr>
<tr>
<td>Belen Reach</td>
<td>16</td>
<td>6%</td>
</tr>
<tr>
<td>Sevilleta NWR/La Joya Reach</td>
<td>6</td>
<td>2%</td>
</tr>
<tr>
<td>San Acacia Reach</td>
<td>6</td>
<td>2%</td>
</tr>
<tr>
<td>Escondida Reach</td>
<td>15</td>
<td>6%</td>
</tr>
<tr>
<td>Bosque del Apache NWR Reach</td>
<td>17</td>
<td>6%</td>
</tr>
<tr>
<td>Tiffany Reach</td>
<td>4</td>
<td>2%</td>
</tr>
<tr>
<td>San Marcial Reach</td>
<td>202</td>
<td>76%</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>266</strong></td>
<td><strong>100%</strong></td>
</tr>
<tr>
<td>Elephant Butte Reservoir (Subset of San Marcial Reach)</td>
<td>159</td>
<td>60%</td>
</tr>
</tbody>
</table>
Studies including:

- Protocol surveys
- **Radio telemetry**
- Nesting habitat quantification
- Migration
2007-2008
- 12 YBCU’s instrumented; data from 10 used
- Average of 94 locs/bird
- Southwestern Naturalist Feb 2012
2008 Cuckoo # 7:
Maximum Daily/Seasonal
Movements, Minimum Convex
Polygon & Kernel Home Range
Estimates

Legend
- Maximum Seasonal Distance Traveled (MSD)
- Maximum Daily Distance Traveled (MDD)
- Minimum Convex Polygon

Telemetry Points - Bird #7
- 8/5/2008
- 8/6/2008
- 8/7/2008
- 8/8/2008
- 8/9/2008
- 8/12/2008
- 8/13/2008
- 8/15/2008
- 8/19/2008

Kernel Home Range
Percent Probability
- 50
- 75
- 95

Mist Net Location 8/4/06
MSD = 3007m
MDD = 1365m
Mean home range:
• Combined MCP = 81.6 ha
• Combined 50 % KHR = 7.1 ha
• Combined 95 % KHR = 56.3 ha

Mean daily and seasonal movement:
• Combined max daily distance travelled = 786 m
• Combined max seasonal distance travelled = 1.6 km
Habitat Utilization

• Individual cuckoo habitat utilization was calculated based on the 50 and 95% KHR probabilities.

• Cuckoo habitat utilization was estimated from a modified Hink and Ohmart (1984) vegetation community and structure classification system.
Habitat Utilization

2008 Cuckoo # 7: 95% & 50% Kernel Home Range Vegetation Classification & Hydrology

Legend
- Telemetry Points - Bird #7
- Kernel Home Range
- Percent Probability
- 50
- 95
- Hydrology
  - Surface Water Present
- Vegetation Classes
  - Native Canopy
  - Native Canopy/Native Understory
  - Native Canopy/Mixed Understory
  - Native Canopy/Exotic Understory
  - Mixed Understory
  - Exotic Understory
  - Upland Veg
  - Open Veg
  - Open Area
  - Open Water

Mist Net Location 8/4/08
Habitat Utilization

Modified Hink and Ohmart Vegetation Types

Proportional Use Difference Between 50% and 95% KHR

-6 %  -4 %  -2 %  0%  2%  4%  6%

Possibly Preferred
Possibly Avoided

Native Canopy / Mixed Understory
Native Understory
Exotic Young Successional Stands
Native Canopy / Native Understory
Mixed Understory
Surface Water
Exotic Understory
Exotic Canopy / Exotic Understory
Native Canopy / Marsh Understory
Native Canopy
Mixed Young Successional Stands
Native Young Successional Stands
Native Canopy / Exotic Understory
Open Area
Upland Vegetation
Studies including:

- Protocol surveys
- Radio telemetry
- Nesting habitat quantification
- Migration
Nesting Habitat Quantification

Center plots only:
- Tally trees (> 5 cm DBH) by species, DBH class and live/dead in 0.15 ha plot
- Tally shrubs (0.5 to 5 cm DBH) within 1x4m plots by species and live/dead
- Ground cover (bare, litter, grass, forbs) by %
- Record nest data including nest height, nest substrate species and height, distance to riparian edge, water, etc.

All plots:
- Vegetated volume estimate for 4 height zones (0-3 m, 3-6 m, 6-9 m, 9-12 m) within 5 m radius of plot center
- Point-centered quarter measurements for each canopy layer (shrub and canopy)
Nest Site Data (n = 3)

• All nests in Goodding’s willow
• Canopy height = 10.3 m (9.8 to 10.6 m)
• Nest height = 4.2 m (2.9 to 6.2 m)
• Nest substrate height = 9.6 m (7.6 to 10.6 m)
• Substrate DBH = 21 cm (11 to 34 cm)
• Distance to riparian edge = 23.3 m (12.0 to 40.0 m)
• Distance to perennial water = 223 m (70 to 460 m)
Center Plot Data (n = 3)

- Live trees (>5 cm DBH) per hectare = 1,691 (1,014 to 2,756)
- 98% *Salix*, 2% saltcedar, 28% dead
- 44% Class 1, 43% Class 2, 13% Class 3
- Live shrub stems (<5 cm DBH) per m² = 1.5 (0.8 to 3.1)
- 77% *Salix*, 23% *Baccharis*, 37% dead
Subplot Data (n = 11)

- Canopy trees per hectare = 708 (87 to 2,500)
- Average canopy tree height = 8.1 m (6.0 to 9.9)
- Shrubs per hectare = 74,147 (152 to 640,000)
- Average shrub height = 1.8 m (0.5 to 4.8 m)
- Vegetated volume 0 to 3 m = 52.1%
- Vegetated volume 3 to 6 m = 46.0%
- Vegetated volume 6 to 9 m = 31.4%
- Vegetated volume 9 to 12 m = 8.3%
Studies including:

- Protocol surveys
- Radio telemetry
- Nesting habitat quantification
- Migration
Migration Studies
2009 Geolocator Study

- 13 Cuckoos captured and outfitted with 1.3 g mk14 BAS geolocators
- Backpack attachment methodology based on work by Paxton (USGS), Rappole and Tipton (1991) and Naef-Daenzer (2007)
- Provides continuous Lat/Long coordinates based on day length and absolute time of midday and midnight
Questions:

• Riparian corridor utilization – Pecos? Rio Grande? Others?
• Double breeding strategy? (Rowher et al.)
• Site fidelity
• Migration stopover and winter range
Results (n = 1)

- Recaptured 1.5 km from initial capture location
- Appeared to use Pecos River as migratory corridor – NOT Rio Grande
- Approx 9000 km between summer and winter locations
- Western Birds publication
- 4 Cuckoos instrumented with new generation Lotek radio transmitter/geolocator on Pecos River in 2011
Future

- Continue surveys
- Find nests and increase nest habitat sample size
- Recapture instrumented Pecos River Cuckoos
- Update veg maps
Thanks!

- Bureau of Reclamation Albuquerque Area Office and Science and Technology Program for funding
- Darrell Ahlers, Durel Carstensen, Rob Doster, Murrelet Halterman, Seth Kennedy, Eben Paxton, Vicky Ryan, Juddson Sechrist and scores of others…