Apache Cicada

(*Diceroprocta apache*)

A Locally Abundant Bird Fare
What constitutes suitable cuckoo breeding habitat?

- Patch Size
- Microclimate Characteristics
- Vegetation Structure
- Prey availability

Eastern populations of the Yellow-billed Cuckoo have been shown to respond to fluctuations in periodical cicada numbers (Koenig and Liebhold 2005).
Do fluctuations in cicada populations affect Yellow-billed Cuckoo numbers within the lower Colorado River watershed?
Methods

• **Live Cicada Counts**
  An index of the number of cicadas detected at each survey point was recorded during surveys.

• **Cicada Exuviae Counts**
  Apache cicada nymphs emerge from the soil, and shed their nymphal exoskeleton (exuviae) on or near the ground.
**Results**

**Live Cicada Counts**

- Data show cuckoo detections peak approximately three weeks before cicada counts do.

**Figure 1** 2007-2009 average live cicada counts and YBCU survey detections by week.
Results

**LIVE CICADA COUNTS** (cont.)

- Live cicada count data suggests a weak to moderate dependence of cuckoo detections on cicada numbers. This relationship was weaker for Restoration sites.

**Table 1** Chi² test statistics for cuckoo occupancy dependence on live cicada counts (2007-2009 data).

<table>
<thead>
<tr>
<th></th>
<th>$\chi^2$</th>
<th>$P$</th>
<th>$\lambda$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural Sites</td>
<td>348.916</td>
<td>&lt;0.001</td>
<td>0.075</td>
</tr>
<tr>
<td>Restoration Sites</td>
<td>58.939</td>
<td>&lt;0.001</td>
<td>0.026</td>
</tr>
<tr>
<td>Combined</td>
<td>168.114</td>
<td>&lt;0.001</td>
<td>0.024</td>
</tr>
</tbody>
</table>
Results

**CICADA EXUVIAE COUNTS**

- Exuviae counts show a positive correlation with cuckoo detections at natural sites for both 2008 and 2009 data.
- Restoration sites did not show this correlation.

**Table 2** Correlation ($r^2$) results and sample size (n) for the response of YBCU detections to cicada exuviae counts.

<table>
<thead>
<tr>
<th></th>
<th>Natural</th>
<th>Restoration</th>
<th>Combined</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>$r^2=0.483$ (18)</td>
<td>$r^2=0.067$ (17)</td>
<td>$r^2=0.227$ (35)</td>
</tr>
<tr>
<td>2009</td>
<td>$r^2=0.541$ (26)</td>
<td>$r^2=0.05$ (21)</td>
<td>$r^2=0.259$ (47)</td>
</tr>
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</table>
Summary

- Cuckoo detections peak approximately 3 weeks before the number of cicadas do.

- At natural sites cuckoo detections were effected by the number of cicadas detected.

- The relationship between cuckoo detections and cicada does not appear to exist at restoration sites.
What does this mean for the cicada?

Be fast, it’s a rough life for locally abundant food resources!
What does this mean for the cuckoo?

- Further evidence that cicadas are an important food resource for cuckoos within the region at least at some sites.
- Cuckoos may be exploiting different arthropod species at restoration sites than they are a natural sites.
Acknowledgements

- 2007 Data collected by the USGS
- A special thanks to refuge staff and land managers for logistical and permitting assistance.
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