Lower Colorado River Riparian Bird Inventory and Monitoring: Testing a double-sampling method in difficult riparian habitats

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Great Basin Bird Observatory, Reno, NV
Beth Sabin, Bureau of Reclamation
Project Goals:

1. Initiated in 2007 to provide system-wide monitoring of avian species with emphasis on 6 LCR-MSCP covered species:
   - Gilded Flicker
   - Gila Woodpecker
   - Vermilion Flycatcher
   - Arizona Bell’s Vireo
   - Sonoran Yellow Warbler
   - Summer Tanager

2. Monitoring avian use of the habitat creation sites
Study Area

Riparian corridors within the historic floodplain of the Colorado River

Plots are selected using a stratified random design
- Strata defined by habitat and geographic location

Plots size based on habitat, 300m x 300m or larger
Double Sampling Method

- Two survey efforts rapid and intensive
- Rapid surveys (2 times/season) may result in biased estimates of poorly detected birds
- Intensive surveys (8 times/season) used to obtain an estimate of rapid survey biases
- Two different surveyors for each effort
- Detection ratios are estimated using birds recorded during the rapid surveys & the actual number of territories present as determined by the intensive surveys
Component 1: Population Estimates, Trends and Distribution of Riparian Birds

Use double-sampling survey method:

System-wide
- Rapid (2 surveys/season) = 80 plots/year
- Intensive (8 surveys/season) = 8 plots/year

Habitat Creation Sites
- Rapid = 60 plots/year
- Intensive = 4 plots/year

*Starting in 2011 HCS were surveyed using the same double sampling design as the system-wide plots, prior to 2011 all HCS with at least 3 years of growth were surveyed with intensive area searches.
Component 2: Pre-Development Monitoring at Laguna Dam Habitat Conservation Area

One year of double sampling surveys to develop baseline inventory

- 35 randomly selected rapid plots (shown in orange)
- 4 randomly selected intensive plots (shown in light blue)

Area surveyed represented ~2/3 of the total area
Component 3: Testing the Assumptions of the Double Sampling Method

Do intensive area searches provide unbiased estimates of bird numbers

Factors that could bias the estimates:
- Secretive species
- Density of vegetation
- Density of birds

Extra Intensive (Amy will discuss in detail)
- 8 randomly selected plots
- Each plot surveyed 16 times
Component 4: Habitat Surveys

Perform detailed habitat assessment for four LCR MSCP covered species to derive recommendations for habitat creation

- Vegetation Surveys using new BOR protocol
- Hobo Data

The Vermilion Flycatcher and Gilded Flicker are not common enough to provide meaningful habitat analyses at this time
Area Search Survey Method

- Same method used by all 3 survey efforts
- Begin at sunrise and last several hours
- Plot systematically surveyed by passing within 50m of all points
- Surveyor identifies and tallies all birds
- Bird sightings, locations, and breeding evidence recorded

Sample of an intensive plot with territory mapping
Extra-Intensive Surveys: A test of the double-sampling method

- Evaluate the assumption that intensive surveys provide unbiased estimates of bird numbers
- Estimate the error rate occurring during intensive surveys
- Determine if differences in error rate exist between species or habitats
- Suggest improvements to the intensive survey methods to achieve higher accuracy
Plot selection

- GIS layer of plots most likely to contain the most covered species
- That layer is the most challenging habitat to survey on the river
- Extra Intensive plots are not random or representative of the entire study area.
Extra-Intensive Survey Methods

- A subset of plots are surveyed using all three survey efforts
- Plots are surveyed by 3 independent observer
- The triple sampling effort would be increasing what we think to be the biggest limiting factor of the intensive survey method: **Time.**
More time on extra intensive surveys will provide:

- More time for challenging species
- More time for edge and partial territories
- More visits allow the surveyor additional opportunities to observe breeding behavior:
  1. birds reaction to nest failures,
  2. re-nesting and multiple-clutches
  3. post-fledging period
<table>
<thead>
<tr>
<th>Intensive: EI Detection Ratio</th>
</tr>
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<tbody>
<tr>
<td><strong>25-50%</strong></td>
</tr>
<tr>
<td>— Least Bittern</td>
</tr>
<tr>
<td>— Marsh Wren</td>
</tr>
<tr>
<td>— Pied-billed Grebe</td>
</tr>
<tr>
<td>— Crissal Thrasher</td>
</tr>
<tr>
<td>— Summer Tanager</td>
</tr>
<tr>
<td>— Lawrence’s Goldfinch</td>
</tr>
<tr>
<td><strong>50-75%</strong></td>
</tr>
<tr>
<td>— Lesser Goldfinch</td>
</tr>
<tr>
<td>— Black Rail</td>
</tr>
<tr>
<td>— Lesser Nighthawk</td>
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<tr>
<td>— Verdin</td>
</tr>
<tr>
<td>— Lucy’s Warbler</td>
</tr>
<tr>
<td>— Abert’s Towhee</td>
</tr>
<tr>
<td><strong>75-100%</strong></td>
</tr>
<tr>
<td>— Common Yellowthroat</td>
</tr>
<tr>
<td>— Ladder-backed Woodpecker</td>
</tr>
<tr>
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</tr>
<tr>
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<tr>
<td>— American Coot</td>
</tr>
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<tr>
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<tr>
<td>— Black-tailed Gnatcatcher</td>
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<tr>
<td>— Bullock’s Oriole</td>
</tr>
<tr>
<td>— Song Sparrow</td>
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<tr>
<td>— Black Phoebe</td>
</tr>
<tr>
<td>— Great Horned Owl</td>
</tr>
<tr>
<td>— Virginia Rail</td>
</tr>
<tr>
<td><strong>100-125%</strong></td>
</tr>
<tr>
<td>— Western Kingbird</td>
</tr>
<tr>
<td>— Blue Grosbeak</td>
</tr>
<tr>
<td>— Canyon Wren</td>
</tr>
<tr>
<td>— Bewick’s Wren</td>
</tr>
<tr>
<td><strong>125-175%</strong></td>
</tr>
<tr>
<td>— Brown-crested Flycatcher</td>
</tr>
<tr>
<td>— Anna’s Hummingbird</td>
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<tr>
<td>— Phainopepla</td>
</tr>
<tr>
<td>— Ash-throated Flycatcher</td>
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Variation Between the Results of the Triple-Sampling survey efforts?

- Many avian species with varying natural histories
- Logistic difficulty of plots
- Timing
- Partial Territories
- Observer Bias
BEVI Territories on Plot 2878 over the 2011 season

Days past April 15

# territories

Intensive  Rapid  Extra Intensive
SOSP Territories on Plot 8223 over the 2011 season

Extra Intensive  Intensive  Rapid

Days past April 15

# territories
Bell’s Vireo Territories by Visit

- BEVI1 = 🔴
- BEVI2 = 🔵
- BEVI3 = 🔴

*Colors denotes an individual territory and #'s show on which visit the bird was observed.
Bell’s Vireo
Territories by Visit

- BEVI1 = 
- BEVI2 = 
- BEVI3 = 
- BEVI4 = 
- BEVI5 = 

*Colors denote an individual territory and #’s show on which visit the bird was observed
Bell’s Vireo Territories by Visit

- BEVI1 = ⬤
- BEVI2 = ⬤
- BEVI3 = ⬤
- BEVI4 = ⬤
- BEVI5 = ⬤

*Colors denotes an individual territory and #'s show on which visit the bird was observed
Bell’s Vireo Territories by Visit

- BEVI1 = 
- BEVI2 = 
- BEVI3 = 
- BEVI4 = 
- BEVI5 = 
- BEVI8 = 

*Colors denotes an individual territory and #'s show on which visit the bird was observed
Bell’s Vireo Territories by Visit

- BEVI1 = ⬜
- BEVI2 = ⬜
- BEVI3 = ⬜
- BEVI4 = ⬜
- BEVI5 = ⬜
- BEVI8 = ⬜

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Bell’s Vireo
Territories by Visit

- BEVI1 = •
- BEVI2 = •
- BEVI3 = •
- BEVI4 = •
- BEVI5 = •
- BEVI8 = •

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Bell’s Vireo Territories by Visit

- BEVI1 = *
- BEVI2 = *
- BEVI3 = *
- BEVI4 = *
- BEVI5 = *
- BEVI8 = *
- BEVI10 = *

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Bell’s Vireo Territories by Visit

- BEVI1 = •
- BEVI2 = •
- BEVI3 = •
- BEVI4 = •
- BEVI5 = •
- BEVI8 = •
- BEVI10 = •

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Challenges on difficult plots

EI plots represent the most challenging plots surveyed and are not representative of the entire study area, therefore we hypothesize that this is affecting the results.

- Vegetation density
- Bird density and diversity
- Access to plot edges
- Ability to see birds
## Total # of Territories on Extra-Intensive Plots in 2011

<table>
<thead>
<tr>
<th>Plot</th>
<th># territories</th>
</tr>
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<tbody>
<tr>
<td>6529</td>
<td>44</td>
</tr>
<tr>
<td>8682</td>
<td>44.75</td>
</tr>
<tr>
<td>8226</td>
<td>91.25</td>
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<tr>
<td>CRIT Plot C</td>
<td>92.75</td>
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<tr>
<td>8223</td>
<td>99.75</td>
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<tr>
<td>2878</td>
<td>127.75</td>
</tr>
<tr>
<td>8252</td>
<td>153.75</td>
</tr>
</tbody>
</table>
Discussion

We will use the knowledge gained from this season to:

Improve training to focus on more challenging species
Further adapt protocols and data collection
Assess threshold of plot “hardness” when the Intensive survey is working...
Acknowledgements

— US Bureau of Reclamation Wildlife Group
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— GBBO Staff
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