Key Findings from Monitoring Riparian Birds on the Lower Colorado River 2011-2015

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Project Components:

1) System-wide and HCA monitoring of riparian birds including six covered species.

2) Pre-development surveys of the Laguna Division Conservation Area

3) Testing the accuracy of the double-sampling method of the Riparian Bird Survey project

4) Habitat surveys

5) Monitoring impacts of *Diorhabda* (saltcedar beetle) on riparian bird populations.
COMPONENT 2: PRE-DEVELOPMENT MONITORING AT LAGUNA DIVISION CONSERVATION AREA 2011

pre-development baseline inventory- before-after-control-impact data to evaluate bird responses to the habitat creation site
COMPONENT 3: TESTING THE ASSUMPTIONS OF THE DOUBLE-SAMPLING METHOD

— Tested the assumption that “intensive area searches result in unbiased estimates of bird numbers”
— 2011 to 2013
— A subset of plots surveyed by independent observers using 3 survey efforts:
  1. standard rapid area search (2x / season)
  2. standard intensive area search (8x/ season)
  3. Extra-intensive (EI) area search (16x / season)
COMPONENT 4: HABITAT SURVEYS

— Detailed habitat assessment for four LCR MSCP covered species
— Followed vegetation monitoring protocol for the LCR MSCP
— Surveyed a total of 436 vegetation plots for the four years of data collection, including 274 use and 162 non-use plots
COMPONENT 5: MONITORING IMPACTS OF *DIORHABDA* ON RIPARIAN BIRD POPULATIONS

— Detailed habitat assessment for four LCR MSCP covered species on willow flycatcher plots for modeling impacts

— Model impacts on riparian birds in SWLF plots, but the study was discontinued and we were not asked to analyze the results
**COMPONENT 1: POPULATION ESTIMATES OF AVIAN SPECIES**

Background

Implement long-term system-wide monitoring of riparian birds with focus placed on six LCRMSCP covered species

Our primary monitoring goal for both system-wide and HCA surveys

- To establish a baseline data set for long-term monitoring that allows detection of trends in population size and occupancy of the covered species and other riparian birds

- Arizona Bell’s Vireo
- Gila Woodpecker
- Gilded Flicker
- Sonoran Yellow Warbler
- Summer Tanager
- Vermilion Flycatcher
Double Sampling

- Two survey approaches (Rapid and Intensive), Stratified random plots selection
- Rapid surveys (two times/season) may result in biased estimates
- Intensive surveys (eight times/season) used to obtain an estimate of biases through detection ratios
- Detection ratios are used to account for biases associated with rapid surveyor effort in our population size estimates
Survey Methods

- Area search method
- Starts at sunrise, covers whole plot
- Passes all plot locations within 50
- All birds recorded including breeders and migrants
- All breeding evidence recorded
Component 1 Survey effort:

2011 - 2015:

— 400 system-wide rapid area searches
— 374 HCA rapid area searches
— 40 system-wide intensive area searches
— 20 HCA intensive area searches
— *330 unique plots, some of which were surveyed in two or more years
Overall Results 2011-2015

— Approximately 200 species detected in 5 years

— System-wide: 74 territorial breeding species with over 14,000 territories recorded in 5 years

— HCA: 55 territorial breeding species with over 4,800 territories recorded in 5 years
Population size estimates of covered species: system-wide
Population size estimates of covered species: habitat creation areas
Covered species breeding at BEAL 2011-2015
Covered species breeding at CRIT 2011-2015
Covered species breeding at PVER 2011-2015
Covered species breeding at CVCA 2011-2015

CVCA Covered Species Territories 2011-2015

Species
- Bell's Vireo
- Gila Woodpecker
- Summer Tanager
- Vermilion Flycatcher
- Yellow Warbler

Source: Bird, Digital Etch, Google, Environmental Geography. CVCA data by U.S. USDA, USGS, FCA, Geospatial, IAN, IEC, Swedtop, and the GIS User Community
Covered species breeding at Cibola NWR Farm Unit 1 and Crane Roost 2011-2015
Covered species breeding at Cibola NWR Farm Unit 1: Nature Trail 2011-2015
Covered species breeding at YEW 2011-2015

YEW Covered Species Territories 2011-2015

- Belts Vireo
- Gila Woodpecker
- Summer Tanager
- Vermilion Flycatcher
- Yellow Warbler
## Surveillance monitoring vs Effectiveness monitoring

<table>
<thead>
<tr>
<th>Surveillance monitoring</th>
<th>Effectiveness monitoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>• detecting trends</td>
<td>• determine net effects of local conservation action</td>
</tr>
<tr>
<td>based on region-wide</td>
<td>• habitat conservation monitoring</td>
</tr>
<tr>
<td>random samples</td>
<td></td>
</tr>
<tr>
<td>• system-wide</td>
<td></td>
</tr>
<tr>
<td>monitoring</td>
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</table>
Tip of the iceberg....
Distribution and Natural History of the MSCP Covered Species

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Great Basin Bird Observatory, Reno, NV
Distributional Maps:

- Maps depict the distribution of territories for covered species in two ways:
  1. Average number of territories per plot.
  2. Minimum convex polygons within and near habitat conservation areas.
### 100 Years of Demographic Data: Yellow Warbler

#### Surveys | Year   | Population Trend                        
-------------|--------|-----------------------------------------
Grinnell      | 1910   | Numerous in cottonwood-willow           
Monson        | 1950   | Steep population decline                
Rosenberg et al. | 1974-1984 | Almost extirpated from the LCRV       
McKernan & Braden | 1996-2001 | Confirmed breeding at all sites        
GBBO          | 2011-2015 | 1,853 pairs                             

Habitat Selection: Yellow Warbler

— Cottonwood-willow habitat
— Use areas containing saltcedar when a few large willow trees and inundated soils are present.
— Found in sites with nearby water.
Recommendations for Riparian Restoration: Yellow Warbler

— Mimic natural disturbance regimes, such as flooding
— Nearby wetlands may be important to this species based on high territory densities in these areas
— Goodding’s willow as a dominant tree and other willows as understory may potentially improve site suitability
Virgin River: Yellow Warbler

- Area high in Tamarisk and low in cottonwood-willow
- High water table and natural flooding
Lake Mohave: Yellow Warbler

- High breeding numbers found in pockets on Lake Mohave
- As many as 31 pairs (*note this includes partial territories)
# 100 Years of Demographic Data: Bell’s Vireo

<table>
<thead>
<tr>
<th>Surveys</th>
<th>Year</th>
<th>Population Trend</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grinnell</td>
<td>1910</td>
<td>Abundant</td>
</tr>
<tr>
<td>Rosenberg et al.</td>
<td>1974-1984</td>
<td>57% population decline during surveys</td>
</tr>
<tr>
<td>McKernan &amp; Braden</td>
<td>1996-2001</td>
<td>Found breeding at every site</td>
</tr>
<tr>
<td>GBBO</td>
<td>2011-2015</td>
<td>1351 pairs</td>
</tr>
</tbody>
</table>
Habitat Selection: Bell’s Vireo

— Tied to mesquite, although have been found breeding within other understory associations
— Proximity to water and open space might be important factors
— Absent or uncommon in some apparently suitable habitats
Recommendations for Riparian Restoration: Bell’s Vireo

- Mesquite plantings with dense understory
- Xeric plantings surrounded by cottonwood-willow that mimic natural riparian zones
- Planting close to water
Havasu NWR: Bell’s Vireo

— High concentrations at Beal
— Absent throughout much Havasu NWR
Territories at Beal 2011-2015: Bell’s Vireo
### 100 Years of Demographic Data: Summer Tanager

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<tr>
<th>Surveys</th>
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<th>Population Trend</th>
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<tr>
<td>Grinnell</td>
<td>1910</td>
<td>Characteristic species of cottonwood-willow</td>
</tr>
<tr>
<td>Rosenberg et al.</td>
<td>1974-1984</td>
<td>Uncommon (~138 individuals)</td>
</tr>
<tr>
<td>McKernan &amp; Braden</td>
<td>1996-2001</td>
<td>Breeding throughout study area</td>
</tr>
<tr>
<td>GBBO</td>
<td>2011-2015</td>
<td>~269 pairs</td>
</tr>
</tbody>
</table>
Habitat Selection: Summer Tanager

— Found in cottonwood and willow.
— Areas containing at least a few tall trees, among saltcedar forest, and in other cases featured a continuous or broken canopy of cottonwoods and/or willows.
— Contiguous native riparian gallery forest is most suitable for this species.
Recommendations for Riparian Restoration:

*Summer Tanager*

— Densities remain low at HCAs.
— Possible factors to increase densities:
  1. Increase shrub cover (which may optimize invertebrate resources)
  2. Increase canopy density
  3. Change hydrology (may affect microclimate, nest success, and insect abundance)
Havasu NWR: Summer Tanager

—At least one to two territories found each year at Beal
Bill Williams River NWR: Summer Tanager
100 Years of Demographic Data: Gila Woodpecker

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<tr>
<th>Surveys</th>
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<th>Population Trend</th>
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<tr>
<td>Grinnell</td>
<td>1910</td>
<td>Common and widespread</td>
</tr>
<tr>
<td>Rosenberg et al.</td>
<td>1974-1984</td>
<td>Estimated 1,000 individuals</td>
</tr>
<tr>
<td>GBBO</td>
<td>2011-2015</td>
<td>Apparently stable; 589 pairs</td>
</tr>
</tbody>
</table>
Habitat Selection: Gila Woodpecker

- Nesting habitat: often saguaros or large cottonwoods at Bill Williams. Nests also found in Goodding’s Willow, Athel Tamarisk
- Seems to use any site with suitable large, decadent trees for nesting
- 2015: First year using created habitats during breeding
  - PVER, Yuma East Wetlands; also at ‘Ahakhav Tribal Preserve
Havasu NWR: Gila Woodpecker

Topock Marsh: Northern limit of range
Bill Williams River: Gila Woodpecker
Recommendations for Riparian Restoration: Gila Woodpecker

— Decadent trees seem to be the most important habitat requirement
— Over the long term, continued growth and aging of plantings expected to attract this species
  — Partial territories in created habitats first established in 2015 were in plantings of 5, 9, and 14 years old
100 Years of Demographic Data: **Gilded Flicker**

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<th>Population Trend</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grinnell</td>
<td>1910</td>
<td>Common where saguaros present</td>
</tr>
<tr>
<td>Rosenberg et al.</td>
<td>1974-1984</td>
<td>Fairly common at Bill Williams River, rare elsewhere</td>
</tr>
<tr>
<td>McKernan &amp; Braden</td>
<td>1996-2001</td>
<td>Confirmed breeding at numerous sites along the mainstem</td>
</tr>
<tr>
<td>GBBO</td>
<td>2011-2015</td>
<td>Nearly extirpated</td>
</tr>
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</table>
Upper Bill Williams River: Gilded Flicker
Habitat Requirements: *Gilded Flicker*

- Using upland saguaros for breeding, riparian areas for foraging
- Some movement into riparian areas in fall and winter
- Absent from the rest of the Bill Williams River despite apparently suitable habitat
- Saguaroos seem to be critical at this point
100 Years of Demographic Data: Vermilion Flycatcher

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<tr>
<th>Surveys</th>
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<th>Population Trend</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grinnell</td>
<td>1910</td>
<td>Numerous from Ehrenberg to Yuma</td>
</tr>
<tr>
<td>Rosenberg et al.</td>
<td>1974-1984</td>
<td>&lt;10 pairs</td>
</tr>
<tr>
<td>GBBO</td>
<td>2011-2015</td>
<td>Very local. 99 pairs estimated</td>
</tr>
</tbody>
</table>
Distribution: Vermilion Flycatcher

— Very few using native habitat
— Preferred nesting areas include cemeteries, parks, golf courses
Recommendations for Riparian Restoration:

Vermilion Flycatcher

— Factors that may attract this species:
  — Moist soil
  — Grassy understory
  — Open strips or patches with a few large trees (mesquites)
Acknowledgements

- US Bureau of Reclamation Wildlife Group
- USGS Snake River Field Station: Jon Bart
- National Wildlife Refuge Staff
- Awesome field crews over the years