Wintering and Breeding Bird Population Response to On-going Large-scale Grassland Restoration

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Non-native grasses

- Spread throughout the United States
- Mixed effects on birds:
  - Vegetation structure is more important than species for wintering grassland birds
  - For some species of grassland bird, non-native grasses can substitute for nesting cover when native grasses are lacking

1 Block and Morrison 2010, Macías-Duerte and Panjabi 2013, Ruth et al. 2014
2 Jones and Bock 2005
Buffelgrass

- Buffelgrass (*Pennisetum ciliare*) is a bunch-forming grass native to Africa
- Creates dense monotypic stands, reducing diversity and structure of grasslands
- Presently found throughout the southwestern United States limited to areas without freezing

Photos: Matt Wojda
Buffelgrass: South Texas “Wondergrass”

- Planted in southern Texas in the early 1900s. Failed to establish until the 1940s
- Hailed as a solution to drought-related forage problems
- Increased stocking rates from 12 ha/animal unit to 4 ha/animal unit (Hanselka 1988)

Photos: Matt Wojda
Buffelgrass and Birds

- Little is known regarding effects of buffelgrass on birds
- Flanders et al. (2006) found decreased densities of birds on buffelgrass-dominated grasslands
- Dealt only with breeding birds; wintering bird response to buffelgrass unknown

Photos: Anthony Henehan
Habitat Restoration

- Prior research on grassland restoration dealt with small-scale (<5 ha) studies
- Large-scale (>50 ha) restoration projects may offer insight into population-wide responses of grassland birds to these efforts
- Our study: 118 ha restoration project

Photo: Matt Wojda
Hypotheses and Objective

- **H1**: Buffelgrass decreases the density of wintering and breeding grassland birds
- **H2**: Maintaining brush mottes will maintain an avian presence during restoration
- Estimate density of these groups and compare among study areas over time

Photos: Anthony Henehan
3 Study Areas in La Salle County, TX

- **Non-native Area** (109-ha): dominated by buffelgrass and mesquite (*Prosopis glandulosa*)
- **Native Area** (117-ha): thorn-scrub dominated by species such as granjeno (*Celtis ehrenbergiana*) and huisache (*Acacia farnesiana*)
- **Restoration Area** (118-ha): pre-restoration similar to non-native area. During restoration, site devoid of grass. Some mesquite mottes left
Restoration Area Pre- and During Restoration

Pre-restoration

During restoration
Study Areas

Non-native Area

Native Area
Bird Survey Methods

- Point-transect distance sampling
- Start at sunrise, end 3 hours after sunrise
- 100-m radius, 3 minutes of silence, 5 minutes of surveying
- Record distance to every bird from point with laser rangefinder
- Non-native control: 15 points
- Native control: 23 points
- Restoration: 23 points
Data Analysis

- Analyzed data in Distance 6.2
- 2 Analyses:
  - Study area and year
  - Grassland and Shrubland Birds
- Tested 6 different models for each dataset
- Chose best model based on AIC values
- Bootstrapped 999 iterations
- Reporting bootstrapped densities with 95% CI
Rainfall

Total Rainfall

<table>
<thead>
<tr>
<th>Season</th>
<th>2013/2014</th>
<th>2014/2015</th>
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<tbody>
<tr>
<td>Winter</td>
<td>4.83</td>
<td>7.79</td>
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<tr>
<td>Summer</td>
<td>11.38</td>
<td>17.79</td>
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</tbody>
</table>
Winter Bird Richness

Winter Bird Richness

Number of Species

- Native Study Area: 18 (2013), 19 (2014)

Legend:
- Blue: 2013
- Purple: 2014
**Winter Total Density**

**Total Winter Bird Densities**

- **NN**:
  - Pre-restoration: 15.93
  - During Restoration: 13.07

- **NA**:
  - Pre-restoration: 7.12
  - During Restoration: 12.56

- **RE**:
  - Pre-restoration: 19.7
  - During Restoration: 4.08

Reporting bootstrapped densities with 95% CI.
Winter Group Densities

Winter Grassland Bird Densities

Winter Shrubland Bird Densities

Reporting bootstrapped densities with 95% CI
Summer Bird Richness

Summer Bird Richness During Restoration

<table>
<thead>
<tr>
<th>Study Area</th>
<th>2014</th>
<th>2015</th>
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<tbody>
<tr>
<td>NN</td>
<td>16</td>
<td>13</td>
</tr>
<tr>
<td>NA</td>
<td>18</td>
<td>20</td>
</tr>
<tr>
<td>RE</td>
<td>19</td>
<td>7</td>
</tr>
</tbody>
</table>
Summer Total Density

**Total Summer Bird Densities During Restoration**

- **NN** (2014): 10.48, 9.01
- **NA** (2014): 18.63, 12.4
- **RE*** (2015): 5.98, 2.72

Reporting bootstrapped densities with 95% CI

*n < 15*
Summer Group Densities

Summer Grassland Bird Densities During Restoration

- **NN Study Area**
  - 2014: 2.61
  - 2015: 7.01

- **NA Study Area**
  - 2014: 1.37
  - 2015: 1.43

- **RE Study Area**
  - 2014: 1.17

Summer Shrubland Bird Densities During Restoration

- **NN Study Area**
  - 2014: 7.96
  - 2015: 3.94

- **NA Study Area**
  - 2014: 17.15
  - 2015: 11.38

- **RE Study Area**
  - 2014: 4.97

Reporting bootstrapped densities with 95% CI

*n < 15*
Discussion - Restoration Area

- Large decrease in wintering birds on restoration area to be expected
  - Hope to document an increase in wintering and breeding bird densities post-restoration
- Still maintained an avian presence during winter
- Breeding birds appear to be mainly shrubland birds
- Even during heavy rainfall year (2015), did not obtain sufficient observations to estimate density

Photos: Anthony Henehan
Other insights

- Non-native grasslands utilized heavily by grassland birds in winter
- Depending on rainfall, non-native grassland breeding bird assemblage changes from shrubland to grassland birds
  - Mostly Dickcissel (Rappole and Blacklock 1985)

Photos: Anthony Henehan
Management Implications

- Brush mottes appear to act as refugia for maintaining an avian presence during winter.

- Not as effective for breeding birds.

- Buffelgrass stands may not be as adverse environments as initially thought for wintering birds.


Rappole, J. H., and G. W. Blacklock. 1985. Birds of the Texas Coastal Bend. Texas A&M University, College Station, Texas, USA.

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- The Hixon Ranch
- Tim and Karen Hixon
- Rene Barrientos
- Coastal Bend Audubon Society
- South Texas Quail Coalition
- Texas Parks & Wildlife
- Exxon Mobile
Questions