EVALUATION OF POPULATION INDICES AND ESTIMATORS FOR SCALED QUAIL IN THE ROLLING PLAINS OF TEXAS

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Introduction

- One of 4 species occurring in Texas
- Various techniques used to monitor scaled quail

  - Spring Cock Counts
  - Fall Covey Call Counts
  - Helicopter Counts
  - Mark-recapture
  - Band-recovery
  - Roadside Counts
Study Area

• Rolling Plains Quail Research Ranch (RPQRR)
• 1,780 ha
• 56 cm PZ
• Bobwhites and scaled quail sympatric
• Low density area (~ 0.5 birds / ha)
• 2012- No birds seen, caught
Objectives

• Evaluate Cock Call Counts
• Helicopter Surveys
• Mark-Recapture
  • Intrinsic (AGE, SEX) and Extrinsic (TEMP, AMPM) Covariates
• Band Recovery (2016 hunting)
Methods

Cock Call Counts

• 25 listening stations
• ~600 m spacing
• Sunrise to ~ 1.5 hrs post sunrise
• Multiple observers
• 5 minute stops
• Routes alternated
• Mean count of “squawks”
Methods

Mark-Recapture

- November – December
- \( n = 296 \) trap sites annually
- Quadrants
- 5 occasions / trap site
- Program MARK
  - Huggins Random Effects
  - Delta Method

<table>
<thead>
<tr>
<th>No.</th>
<th>Model</th>
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<tbody>
<tr>
<td>1</td>
<td>AGE</td>
</tr>
<tr>
<td>2</td>
<td>SEX</td>
</tr>
<tr>
<td>3</td>
<td>TEMP</td>
</tr>
<tr>
<td>4</td>
<td>AMPM</td>
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<td>5</td>
<td>AGE + SEX</td>
</tr>
<tr>
<td>6</td>
<td>TEMP + AGE</td>
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<tr>
<td>7</td>
<td>TEMP + SEX</td>
</tr>
<tr>
<td>8</td>
<td>TEMP + AMPM</td>
</tr>
<tr>
<td>9</td>
<td>AMPM + AGE</td>
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<tr>
<td>10</td>
<td>AMPM + SEX</td>
</tr>
<tr>
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<td>AGE + SEX + AGE*SEX</td>
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<tr>
<td>12</td>
<td>TEMP + AMPM + AGE</td>
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<td>18</td>
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Methods

Band Recovery (2016 hunting)

• Double – sampling techniques
• Harvest initiated immediately following trapping
• Chapman estimator (Chapman 1951, Pollock 1990)

\[ \hat{N} = \frac{(MKP + 1)(Shot + 1)}{(Banded + 1)} - 1 \]

\[ \text{var} \hat{N} = \frac{(MKP + 1)(Shot + 1)(MKP - Banded)(Shot - Banded)}{(Banded + 1)^2(Banded + 2)} \]
Methods

Helicopter Surveys

- 2009 – 2016
- Raven R-44
- 8-m altitude
- 40 kph
- 90-km survey effort annually
- 3 observers and pilot
- Modified System for Electronic Surveys (MSES)
Results- Cock Counts

Highly correlated

However,

- Note *scale* of independent variable
- Few males typically heard (< 4 /stop)
Results- Mark-recapture

- **Time Response**
- **Behavioral response**
- **AMPM response (2 of 4 removed, SE)**
- **Age and Sex effects- betas bound by 0**
- **Mean individual capture probabilities were 0.27, 0.33, and 0.18 for 2014, 2015, and 2016, respectively.**
Results - Mark-recapture

Behavior Response Example

TEMP, AMPM Example
Results- Band Recovery

Statistically similar estimates

But,

• Few scaled quail harvested ($n = 23$)
• $12/23$ banded
Results- Helicopter Surveys

- 0 coveys seen before 2016
- 6 coveys (48 individuals) seen in January 2016
- 1 covey (9 individuals) seen in January 2017
- Too few detections for distance sampling

<table>
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<th>November MARK</th>
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<tr>
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<td>2015</td>
<td>202</td>
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<td>2016</td>
<td>335</td>
<td>461</td>
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Discussion

• Scaled quail were not prolific callers
  • < 4 birds / stop
  • < 4 calls / bird
• Temperature variation, AMPM
• Double sampling (band recovery) typically higher estimates than mark-recapture (O’Brien et al. 1985)
• Small samples
Discussion

• Detection probabilities from helicopters likely differ from bobwhites
  • Failed to detect
  or
  • Failed to distinguish species
Acknowledgments

• Rolling Plains Quail Research Foundation, technicians, and interns
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• Luis Bartolo, TAMUK
Questions