Efficacy of a soft release strategy for translocating scaled quail in the Rolling Plains of Texas

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Trends in Texas

1966-2013
Breeding Bird Survey

- Overall decline
- Range contraction
- 7% per year
Texas Parks and Wildlife Department
Quail Forecast
Rolling Plains Ecoregion

Number of Scaled Quail

Year

Ultimate Causes

- Habitat fragmentation (Rho et al. 2015)
  - Increase in woody cover
  - Increase in spatial aggregation of cropland
- Drought (Bridges et al. 2002)
Population Impacts

- Reduced recolonization
  - Capable of long distance dispersal
  - Inhibited by unsuitable habitat

- Low density
  - Loss of ‘boom and bust’ cycles
  - Remnant populations decline without influx of new individuals

Cyclic components of scaled quail dynamics in Texas ecoregions based on TPWD counts.

1978 – 2002

Lusk et al. 2007
Translocation as a tool

- Reestablish historic populations
- Supplement remnant populations
- Long history of translocation
  - Bobwhite
  - Grouse
  - Prairie Chickens
  - Turkeys

Goal: improve effectiveness of translocation as a tool to reestablish scaled quail within the Rolling Plains by researching best practices.
Release strategy

- Impacts translocation success
- Species specific
- Hard vs. soft release
  - Hard release more commonly used
  - Social species with small home ranges may benefit from soft release (Moseby et al. 2014)
  - Quail translocations have employed both hard and soft release
Objective: compare survival and dispersal between two release treatment groups: hard and 4-week soft release

Objectives

• Hard vs. soft release
  - Previous unsuccessful translocations used hard release
  - RPQRR translocation successful using soft release
  - No studies have directly compared release strategy
Matador WMA Study Site

- State-owned and managed for wildlife: 1959
- 11,000 HA
- Predominately sandy soil with rough broken land drainages
- Dominant woody cover: mesquite, juniper, sand sage, and shinnery oak
- Scaled quail present until circa 2000
Field Methods

• Source:
  • Wild-caught
  • 3 locations: private and public lands
  • Edwards Plateau and High Plains
• Wire walk-in traps
• Age, sex, weigh, leg band, and genetic samples
• Radio-marked hens
• Transported to release site <24 hrs
Field Methods

• 3 release sites on study area
• Randomly assigned treatment groups
  • 12 – 15 quail per group
  • Hard release: immediate
  • Soft release: Surrogator © for 3-4 weeks, released April 22 2014
Field Methods

• Telemetry monitoring
  • Daily survival and locations post-release
  • Interval
    • Hard release: Mar - Aug, 159 days
    • Soft release: Apr - Aug, 125 days
  • Fixed wing surveys to locate missing hens
Data Analysis

- Uneven monitoring intervals
  - Rough terrain and long dispersal distances
  - Detection <1

- Open population capture-recapture
  - Cormack-Jolly-Seber (CJS) model Program MARK
  - Encounter history
    - Observed live = 1
    - Not observed/observed dead = 0
  - Parameters
    - Detection probability (p)
    - Daily apparent survival rate (DASR): probability that hen survives and does not emigrate
### Data Analysis

#### Table 1. Covariates used to model parameters in CJS models

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Covariate</th>
<th>Hypothesis</th>
</tr>
</thead>
<tbody>
<tr>
<td>DASR</td>
<td>Release treatment (hard vs. soft)</td>
<td>↑ soft release</td>
</tr>
<tr>
<td></td>
<td>Age (adult vs. juvenile)</td>
<td>No effect; ↑ adults</td>
</tr>
<tr>
<td></td>
<td>Time trend</td>
<td>↑ over time</td>
</tr>
<tr>
<td></td>
<td>Dispersal (low vs. high)</td>
<td>---</td>
</tr>
</tbody>
</table>

- All possible combinations
- AICc to rank models
- 80% confidence intervals of beta estimates to identify uninformative parameters (Arnold 2010)
Results

- 88 total quail trapped and released
  - 40 radio-marked hens
  - 47 males
  - 1 unknown juvenile

- Dispersal
  - 0.5 – 22 km
  - 85% dispersed >2 km
  - 30% dispersed >10 km

- 13 hens permanently missing
  - 10 hard release, 3 soft release

Table 2. Sample sizes of radio-marked hens per treatment group

<table>
<thead>
<tr>
<th></th>
<th>Adult</th>
<th>Juvenile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soft release</td>
<td>4</td>
<td>14</td>
</tr>
<tr>
<td>Hard release</td>
<td>5</td>
<td>17</td>
</tr>
</tbody>
</table>
## Results

Table 3. Truncated candidate model set.

<table>
<thead>
<tr>
<th>Model</th>
<th>AICc</th>
<th>Δ AICc</th>
<th>AICc Weight</th>
<th>k</th>
</tr>
</thead>
<tbody>
<tr>
<td>φ (age + release), p (group)</td>
<td>1462.425</td>
<td>0</td>
<td>0.23089</td>
<td>5</td>
</tr>
<tr>
<td>φ (T), p (group)</td>
<td>1462.76</td>
<td>0.3411</td>
<td>0.19469</td>
<td>4</td>
</tr>
<tr>
<td>φ (release + T), p (group)</td>
<td>1462.84</td>
<td>0.4179</td>
<td>0.18735</td>
<td>5</td>
</tr>
<tr>
<td>φ (age + release + T), p (group)</td>
<td>1463.04</td>
<td>0.6192</td>
<td>0.16941</td>
<td>6</td>
</tr>
<tr>
<td>φ (age + T), p (group)</td>
<td>1463.89</td>
<td>1.4711</td>
<td>0.11065</td>
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</tr>
<tr>
<td>φ (release), p (group)</td>
<td>1464.04</td>
<td>1.6193</td>
<td>0.10275</td>
<td>4</td>
</tr>
<tr>
<td>φ (.), p (.)</td>
<td>1507.85</td>
<td>45.425</td>
<td>0</td>
<td>2</td>
</tr>
</tbody>
</table>
Results

• Covariate effects on DASR
  • Time trend (T) was uninformative
  • Age and release
    • Soft > hard release
    • Adults > juveniles

<table>
<thead>
<tr>
<th>Release Strategy</th>
<th>Age</th>
<th>DASR</th>
<th>SE</th>
<th>120 day interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hard</td>
<td>Juvenile</td>
<td>0.95</td>
<td>0.01</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td></td>
<td>Adult</td>
<td>0.97</td>
<td>0.01</td>
<td>0.03</td>
</tr>
<tr>
<td>Soft</td>
<td>Juvenile</td>
<td>0.98</td>
<td>&lt;0.01</td>
<td>0.09</td>
</tr>
<tr>
<td></td>
<td>Adult</td>
<td>0.99</td>
<td>&lt;0.01</td>
<td>0.30</td>
</tr>
</tbody>
</table>

Table 4. Estimates of DASR.
Discussion

• Overall DASR low compared to estimates of resident true survival
  • But, DASR includes emigration
  • Published true survival: 0.22 – 0.8
  • 3 of 4 estimates <0.1
  • Exception: adult, soft release hens
  • Release treatment had largest effect

• Dispersal distance high
  • Typical home range: 0.3 – 1.2 km²
  • 2 long distance moves >20 km
  • Biased low
  • 10 of 22 hard released hens went missing
Management Implications

• Soft release strategy may be advantageous
  • ↑ in DASR and ↓ exposure time
  • Other quails and gallinaceous birds
    • Mountain quail: 3-4 months (Stephenson et al. 2011)
    • Bobwhite quail: 7 days (Scott et al. 2013)
    • Sharptail grouse: 10 weeks (Rodgers 1992)

• Select for higher proportion of adults
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