Site Occupancy of Hochstetter’s Frogs (*Leiopelma hochstetteri*) in the Hunua Ranges, New Zealand

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New Zealand & Ecological Conservation

- Global biodiversity crisis
- New Zealand
  - Extended isolation
  - Unique species and ecosystems
  - Threatened/endangered since human arrival
Hochstetter’s Frog

- Amphibians-
  Important indicators
  - Sensitivity to disturbance
- NZ Amphibians
  - Primitive characteristics
  - All Leiopelma endangered
  - Habitat fragmentation and modification
  - Robust monitoring techniques needed
Monitoring Programs of Rare Species

- Monitoring of rare species used to:
  - Track changes in distribution and abundance
  - Identify key issues for conservation policy/management

- Current monitoring techniques
  - Abundance counts
  - Site occupancy
Site Occupancy

• Benefits
  – Statistically robust, non-invasive, habitat variation, spatial scale
• Estimate # sites occupied by species in certain area
• Reflect distribution and population status
• Patterns of detection/non-detection over multiple visits to the same sites
Non-Detection

- Absent
  - Moisture
  - Stream type
  - Temperature
  - Introduced mammals

- Present, but not detected
  - Vegetation, crevices, large rocks
  - Small, cryptic colouring
Objectives

• Ascertain detection probabilities and site occupancy of *Leiopelma hochstetteri* in KMA
• Separate size/age classes
• Assess current status of Hochstetter’s in predator control management area
• Conduct the first comprehensive site-occupancy monitoring of Hochstetter’s
Hunuas: 17,000 ha indigenous forest

KMA: 600 ha managed for predator control
Methods

• May 31-July 15, 2005
• KMA streams divided into 100m sections
• 20m transects
• Unsearchable sites
• 2 searchers
• 3 repeat searches
  – 20 minutes-72 hours apart
Methods

- Precautions
- Cover objects
- Age classes
  - Juvenile <18mm
  - Sub-adult 18-29mm
  - Adult 30>mm
- Environmental factors
Results

566 Total Frogs!

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>w/ Frogs</th>
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</thead>
<tbody>
<tr>
<td>Sites</td>
<td>55</td>
<td>52 (94.5%)</td>
</tr>
<tr>
<td>Searches</td>
<td>165</td>
<td>135 (81.8%)</td>
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</table>
Age Distribution

- Juveniles: 36%
- Sub-adults: 30%
- Adults: 34%

Sites <20m: 58%
Sites =20m: 42%
Possible Repeats

- 90% Different frogs
- 10% Possible Repeats

- 39% Juveniles
- 33% Sub-adults
- 28% Adults
### Inter-observer Variability

<table>
<thead>
<tr>
<th>Metric</th>
<th>Heather</th>
<th>Janelle</th>
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<tbody>
<tr>
<td>meters/search</td>
<td>16.32</td>
<td>16.37</td>
</tr>
<tr>
<td>rocks/search</td>
<td>155</td>
<td>185</td>
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<tr>
<td>rocks/meter</td>
<td>10</td>
<td>12</td>
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<tr>
<td>minutes/search</td>
<td>31.7</td>
<td>30.4</td>
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<tr>
<td>minutes/meter</td>
<td>2.1</td>
<td>2.0</td>
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<tr>
<td>frogs</td>
<td>289</td>
<td>277</td>
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<tr>
<td>frogs/search</td>
<td>3.4</td>
<td>3.2</td>
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<tr>
<td>juveniles/search</td>
<td>1.0</td>
<td>1.3</td>
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<tr>
<td>sub-adults/search</td>
<td>1.1</td>
<td>0.9</td>
</tr>
<tr>
<td>adults/search</td>
<td>1.3</td>
<td>1.1</td>
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</table>
Analyses

- PRESENCE
- Covariates
  - Temperature
  - Surveys 1, 2, 3
  - Time (experience)
  - Morning/afternoon
  - Observer
Conclusions

• Brodest survey ever conducted for Hochstetter’s frogs in New Zealand

• Kokako Management Area
  – Healthy population
Conclusions

- Adequate monitoring technique
  - Advantages
    - Statistically robust
    - Size/age classes
    - Minimal damage to frogs and habitat
    - Account for biases and adjust site occupancy
  - Disadvantages
    - Resource intensive
Recommendations

• Continue monitoring!
  – Compare to unmanaged areas
  – EcoQuest

• Shorten transect (<10 metres)
  – To obtain 30-70% site occupancy

• More sites

• Multiple seasons

• Decrease number of factors recorded when a frog was found
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