Predator control in The Nature Conservancy’s Waikamoi Preserve

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Native Bird Research and Recovery

- Kiwikiu (Maui Parrotbill)
  - Endangered Hawaiian Honeycreeper
  - Threats: habitat degradation/loss, non-native predators, introduced mosquitoes and avian disease, climate change
  - ~500 individuals on windward slope
  - Next recovery goal: establish second population on leeward slope
Kiwikiu Reintroduction

- Both wild and captive Kiwikiu will be used for **reintroduction**
- Captive population only represents **eastern portion**
- Some wild birds will need to be sourced from **western portion**
  - Need to ensure most robust Kiwikiu population possible prior to removing individuals
Introduced Predators

- Climb trees and depredate eggs, nestlings, and nesting females
- Predator observations in The Nature Conservancy’s Waikamoi Preserve

Photo by TNC Hawai’i

Photo by Jack Jeffrey
Predator Reduction Program

• Essential component of endangered species and habitat management
• No broad scale method to reduce or eliminate predators across Kiwikiu territory
• This predator reduction program focuses on localized area of TNC’s Waikamoi Preserve
  • Edge of Kiwikiu range
  • Selection of individuals for reintroduction
  • Genetically distinct Kiwikiu population

Kiwikiu assignment probabilities to population genetic clusters from STRUCTURE. Mounce et al. 2012.
The Nature Conservancy’s Waikamoi Preserve

- Established in 1983
- Transitional wet-mesic native forest
- Kiwikiu demographics researched 2011-2014

Photo by Zach Pezzillo
Trapping Methods

- Conibear 220 traps
- Trapping area:
  - 178.5 ha (1.78 km²)
  - 5300-6200 ft
  - Over 50 stations incl. 70-80 Conibears, stations 100-150 m apart
“Ground” and “Elevated” trap styles
Bait and Lures

- Behind the trap vs tied to the whiskers
- Variety of bait and lures

<table>
<thead>
<tr>
<th>BAITS</th>
<th>LURES</th>
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<tbody>
<tr>
<td>Greased cat food</td>
<td>Catnip</td>
</tr>
<tr>
<td>Sardines</td>
<td>Feathers</td>
</tr>
<tr>
<td>Hot dogs</td>
<td>Tinsel</td>
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<tr>
<td>Pro baits</td>
<td>Clam juice</td>
</tr>
<tr>
<td>Wax blocks</td>
<td>Oyster Sauce</td>
</tr>
<tr>
<td>Cat treats</td>
<td>Fish juice</td>
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Game Cameras
Trapping Results

- November 2015-May 2017
- 26 checking sessions
- 13-55 days in between sessions

Total Animal Captures in TNC’s Waikamoi Preserve

<table>
<thead>
<tr>
<th></th>
<th>Rats</th>
<th>Mongooses</th>
<th>Cats</th>
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<tbody>
<tr>
<td></td>
<td>211</td>
<td>57</td>
<td>1</td>
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- Trap Nights = (Nights * (#traps-INOP))= 39262
Mongoose & Cat Captures

- Mongoose captures
  - Perimeter of site
  - High-capture stations

- Cats throughout site
  - Based on game cameras, scat, and 1 capture
Mongoose & Cat Seasonality

- **Mongooses:**
  - Fluctuation possibly due to their breeding (Mar-May, Oct-Dec)

- **Cats:**
  - Summer capture
  - Game cameras: Jan, Mar, Nov

![Graph showing mongoose captures over seasons from 2015 to 2017.](image-url)
Rat Seasonality

Response to modifying traps
Winter ‘15

Response to adding Goodnature™
A24s Fall ‘16

Captures/Trap Night

N=6
N=47
N=49
N=42
N=43
N=75

Winter 2015 Spring 2015 Summer 2016 Fall 2016 Winter 2017 Spring 2017

rats (Conibears+GN) rats

Winter Spring Summer Fall Winter Spring
Ground vs. Elevated

- No significant capture difference between two styles of stations
- Why use both?
  - Elevated: caught cat
  - Ground: 2 traps= same effort
Bait Preference

- Want something that will last long, be attractive for cats/mongooses AND rats won’t steal
  - Canned Sardines
- Baits tied onto whiskers tend to capture rats more often
  - Hot dogs and wax
Observations & Future

• Mongooses: captures suggest well-established population

• Cats: 1 captured plus 1-2 others on camera
  - 1 cat can do a lot of damage
  - May be seasonal. Travel over long distances and have large territories

• DOC250s

• Rats: Bycatch, Bait thieves, Obstruct traps
  - Goodnature™ A24s around Conibear stations
Goodnature™ A24s

- Prevent bait theft and Conibear obstruction
- More efficient trap
- Plans to expand

Rat Captures by Trap Type

- $t = 5.06$
- $p = 0.004$
Acknowledgements