Developing Dependable Monitoring Strategies for Nest Boxes to aid in the Recovery of an Elusive and Cryptic Endangered Species



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Puaiohi (Small Kaua'i Thrush)

- Hawaii Endemic
- Endangered
- Population Estimate
 - less than 1000
- Current Habitat
 - Streams in high elevation rain forests



Nesting specialist

 Nest along deeply incised stream corridors, mainly on recessed ledges on cliffs















Why nest boxes?

- Provide safe nest locations/ escape rat predation
- 2. Expand range on Kauai
 - Potentially allow
 translocation to other islands
- Successfully used with other species
 - Eastern Bluebirds, Wood Ducks, Purple Martin

Use of nest boxes

• 2002-2011

- 30 boxes on 2 different streams
- Limited monitoring
- 2011
 - Sign of use/ investigation in 5 boxes
 - 2 monitored nests in boxes
 - New rat proof designs rat resistance
- 2012-2013
 - 51 new rat resistant boxes



Original Monitoring Efforts





- In person box checks
 - Inconsistencies in detection/ data collection
 - Disturbance to birds and fragile habitat
 - Expensive
 - Only a spot check
- Ibuttons
- Track plates
- Field cameras

Original Monitoring cont.

- Field cameras
 - motion sensor
 - -timed trigger/ field scan







Trial 1

Effect of distance on capture rate of cameras in motion sensor mode

- Sensor as control
- 2 nest boxes
 - Baited to attract rats and birds
 - 1 and 2 meters from cameras
- Capture rate = percentage of positive (rat and bird) triggers

Capture Rate of Birds and Rats with Bushnell Trophy Cam



Alternatives

- Modified
 Reconyx
 - More sensitive
 - Fresnel Lens
- In Box Sensor
 - Passive Infrared
 "PIR"
- Microcontroller
 Can be used with modified
 - field cameras







SENSOR DESIGN

Roof-mounted pyroelectric (passive infrared or "PIR") sensors

Microcontroller triggers an external camera

Animal movements are detected and logged by a microcontroller

The microcontroller saves all event data to a MicroSD card from up to 3 connected nest boxes

Runs on 4 AA batteries; 1-2 month battery life

Trial 2

Compare capture rate of cameras with different trigger modes

 4 Bushnell Trophy Cams and 1 modified Reconyx on motion sensor

1 camera triggered by in-box sensor
1 camera on Field scan





MOH02-1&2 Sensor Activations







Why Nest Box Sensors

- Fewer visits to an area
 - less disturbance on environment and birds
- Allow monitoring of fleeting events
 - bird prospecting and mammal visitations
- More data
 - detailed logs of nest attendance in active boxes
- More efficient than time-lapse
 - longer battery and card life
- Cost efficient
 - can modify cheaper cameras
- Field cameras last longer
 - water damage
 - less gaps in data collection

Future

- More trials
 Other nests

 Natural nests
 Burrow/cavity animals
 May be cheaper than off the rack camera
 - Trap monitoring Feeders

Field technicians:

Mike Adams, Lidia D'Amico, Nicki Ozaki, Nick Seeger, Amy Shipley, Cody Bear Sutton, Kyle Pias

• Volunteers:

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THANKS!

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	Species Specific	Cost (per cluster of 3)	Disturbance to area/birds	Data Capture	Potential For Data Gaps	Post Hoc Data Sort
Ibutton	Ν	MED (300)	LOW	MED	LOW	LOW
Nickels	Ν	LOW (.15)	MED	LOW	HIGH	LOW
Track Plates	N/?	LOW (<5)	HIGH	LOW	HIGH	LOW
Stock Field Camera-PIR	Y	MED (600)	LOW	MED	HIGH	LOW
Stock Field Camera- Field Scan	Y	MED (600)	MED	HIGH	HIGH	HIGH
Modified Field Camera	Y	HIGH (2,400)	MED	MED	MED	MED
Weekly In Person Checks	Υ?	HIGH (Salary)	HIGH	MED	MED	MED
PIR Sensor + Microcontroller	N?	LOW (101)	LOW	MED	LOW	MED
Sensor/Microco ntroller+ Camera	Y	MED (303)	LOW	HIGH	LOW/MED	LOW