Experiments with Developing and Using Supplemental Feeders for Kiwikiu (Maui Parrotbill; *Psuedonestor xanthophrys*): Potentials for translocation efforts and increasing productivity

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Introduction

The Kiwikiu is a critically endangered insectivorous Hawaiian honeycreeper, with a population of ~500 individuals found only on the windward side of east Maui (Simon et al. 1997). Lack of habitat due to invasive species destruction and the presence of avian malaria and non-native predators are some of the reasons why Kiwikiu are endangered.

Additionally, recent research has indicated that productivity may be inadequate to increase the population, and available habitat may decrease with climate change. Two management strategies that could be critical towards recovery are:

1) Determining a method of population management that will increase reproductive output

2) Expanding available habitat through restoration and invasive species management in addition to creating a second population through reintroductions on the leeward side of east Maui

Providing supplemental food to birds has been found to increase reproductive output by boosting clutch size, number of breeding attempts, nestling weight, and the number of independent young produced, e.g. Song Sparrows (*Melospiza melodi*) (Arcese and Smith 1988) and Florida Scrub Jay (*Aphelocoma coerulescens*) (Schoech et al. 2007). Supplemental food has also been used when reintroducing a population, such as the endangered Hihi (*Notiomystis cincta*) in New Zealand (Castro et al. 2003). During the 2012 breeding season, we experimented with providing supplemental food to closely monitored Kiwikiu breeding pairs. If Kiwikiu use supplemental feeding stations this could increase productivity of the existing population and assist with the re-establishment of a second population.

Methods

Kiwikiu pairs were located and monitored February through June in 158 ha of The Nature Conservancy's Waikamoi Preserve, between 1600 and 1900m in elevation (Fig. 1). Feeding stations were set up in April based on pair activities.

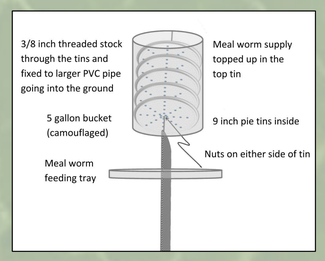


Figure 2. Feeder design.

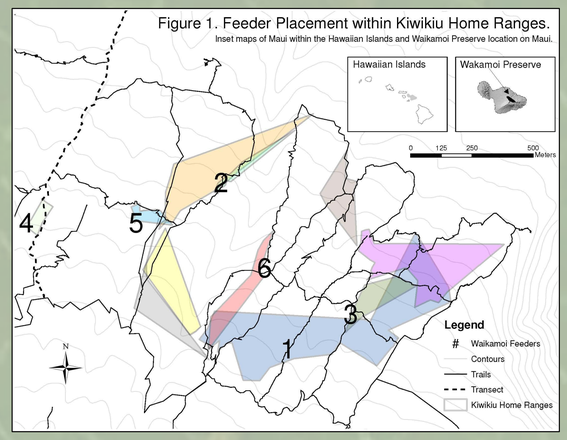
We provided commercially raised mealworms on a feeder tray situated ~1m above ground (Fig. 2). The feeding apparatus was designed to be rat-proof and to slowly dispense mealworms over time. Stations were monitored with remote trail cameras (Reconyx PC800 HyperFire Professional Semi-Covert IR) and visited every few days for maintenance.

Since Maui Alauahio (*Paroreomyza montana*, MAAL) and Kiwikiu (MAPA) forage together, we attempted to lure both species to the stations with playback and bird decoys. We also camouflaged half of the feeders with native vegetation.

Results

Six feeder stations were installed (Fig. 1, Table 1).

Five were located in an area where pairs with a hatch-year (HY) regularly foraged and one where a pair was nest building. Cameras were set up at 4 of 6 feeders.



The only species detected using the feeders were Red-billed Leiothrix (*Leiothrix lutea*, RBLE). Rats were also captured on camera but were never successful at getting onto the feeder trays.

When playback was used, alauahio would chip above the feeder but would not visit it.

Table 1. Feeder station description and locations.

#	Station Area	Kiwikiu Presence	Dates Active	Notes
1	Dam Trail	Near nest in construction, never active	04/04/12-06/13/12	• MAAL and MAPA playback and bird decoys (twice). • RBLE beginning 05/13/12 (possibly 2 pairs). 1 RBLE removed 06/05/12. • Mealworms consistently gone at feeder tray. • Foliage camouflage in June.
2	Lower W. Hon.	Near pair with 2 HYs	04/05/12-06/13/12	• MAAL playback (3 times). • RBLE beginning 04/19/12 (possibly 2 pairs). 1 RBLE removed 5/11/12. • Mealworms consistently gone at feeder tray. • Foliage camouflage beginning May.
3	Nukupuu	Near pair with HY. Other pair in area as well.	04/16/12-06/13/12	• MAAL playback and bird decoys (twice). • Rat nearby. • RBLE beginning 06/04/12. • Once RBLE present, mealworms gone at tray. • Foliage camouflage beginning May.
4	Transect 3	Near pair with HY	04/15/12-06/14/12	• MAAL playback (once). • RBLE beginning 4/28/12 (possibly 2 pairs). 1 RBLE removed 05/31/12. • Mealworms consistently gone at feeder tray.
5	Upper W. Hon.	Near pair with HY	05/06/12-06/13/12	• No camera. • No noticeable take of mealworms.
6	E. Hon.	Near pair with HY	05/12/12-06/13/12	• No camera. • No noticeable take of mealworms.

Discussion

To date, Kiwikiu have not visited the feeding stations; however, it can take time for target birds to find and use supplemented arthropod food (Podolsky et al. 2004). Even though we attempted to place feeders where Kiwikiu were foraging, pairs typically forage throughout their homes ranges, which are fairly large (average ~5ha/pair in the core of their population) (MFBRP unpublished data). It is possible that because of this, they did not find the feeders in the time that they were available. We could increase chance by setting up more than one feeder in a pairs' home range. Additionally, more experimentation could be done with making the feeders look more natural, such as making the feeder appearance mimic a preferred plant.

Red-billed Leiothrix forage low in the understory, have higher densities, and have smaller home ranges (3 ha) (Male et al. 1998), which may have pre-disposed them to discovering the feeders. Leiothrix pose several problems in that they quickly remove all mealworms, may chase off other birds, and may transmit avian disease and/or parasites via the feeder. To dissuade leiothrix from using the feeders in future trials, we will increase the height of the station above the common feeding level of leiothrix but still in the foraging range of Kiwikiu. We also could install feeders earlier to minimize overlap with the core of the leiothrix breeding season (April-August) (Male et al. 1998).

We would also like to work with captive Kiwikiu by installing feeders and monitoring their response in captivity. If feeders are used by these birds, perhaps released captive birds could "teach" wild birds to use the stations; this would be advantageous in designing the reintroduction protocols for Kiwikiu to leeward Haleakala.

Acknowledgements

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