

## INTRODUCTION

Kiwikiu (*Pseudonestor xanthophrys*; MAPA) and 'ākohekohe (*Palmeria dolei*; AKOH) are endangered Hawaiian honeycreeper species, expected to go extinct within the next decade due to avian malaria despite extensive conservation efforts in their home ranges (Paxton et al. 2022, Judge et al. 2021). In response, managers have decided to establish a viable population of kiwikiu in a captive avian conservation center. The goal is to eventually release individuals back into the wild once mosquito populations have been effectively controlled. Between September 2023 and January 2024, MAPA were captured and held in the field before bringing them to a captive conservation facility on island. Given prior experiences of aggressive behavior in captivity, a conservation translocation to suitable habitat on Hawai'i Island was proposed for 'ākohekohe. In November 2023, AKOH were captured and held in the field to develop techniques for holding and obtaining knowledge on dietary preferences for the species.

## RESULTS & DISCUSSION

### Holding

- The addition of a skylight window in the holding boxes (Fig. 3) allowed more light to penetrate the boxes and may have increased foraging time.
- One female MAPA was released after less than 24hrs due to concerns that she was not eating and displaying elevated signs of stress. The start of a brood patch was observed upon capture and her breeding status may have influenced her stress response in the holding box. Nine MAPA were successfully transferred by helicopter and vehicle to the captive center.
- All five AKOH were successfully held overnight in the holding boxes and deemed suitable candidates for translocation. All were released back into the wild post field holding. During subsequent trips, staff re-sighted four of the five AKOH near their capture locations.
- AKOH males exhibited higher stress levels than females, as evidenced by behaviors such as pace flying. Stress was mitigated by incorporating vegetation in the holding boxes, reducing lighting, increasing the interval between checks, and adding more cloth to cover the openings. These behaviors were observed visually in person and recorded using smartphones and small body cameras.

### Diet

- Quantifying food eaten was challenging for both MAPA and AKOH. MAPA are known to be messy eaters and spread their food throughout the boxes. The AKOH feeding tubes leaked small quantities of fluid when the birds used them making it unfeasible to get accurate measurements.
- Weighing birds at least twice daily proved to be a reliable method for ensuring that birds were eating and in overall good health.
- Starting prophylaxis for MAPA in field was implemented to reduce the chance of illness caused by the stress of capture, holding, and transfer to the captive center.

## CONCLUSIONS

Field holding of MAPA and AKOH aided with the understanding of species' specific requirements and dietary preferences. These observations lay the foundation for adaptive management of field holding of other Hawaiian forest bird species during implementation of ex-situ conservation measures.

## METHODS

### Capture

From September 2023- January 2024, MAPA and AKOH were safely captured and held temporarily in remote field camps. Both species were captured using mist nets, employing passive netting techniques and/or audio playback. A total of 10 MAPA (5 ♀, 5 ♂) and 5 AKOH (2 ♀, 3 ♂) were captured and held for periods ranging from one to three days in avian holding boxes. Upon capture, the birds were weighed and given a brief physical examination before being transported to a remote camp in small wooden transport boxes (Fig. 1). A blood sample was taken for later disease analysis.

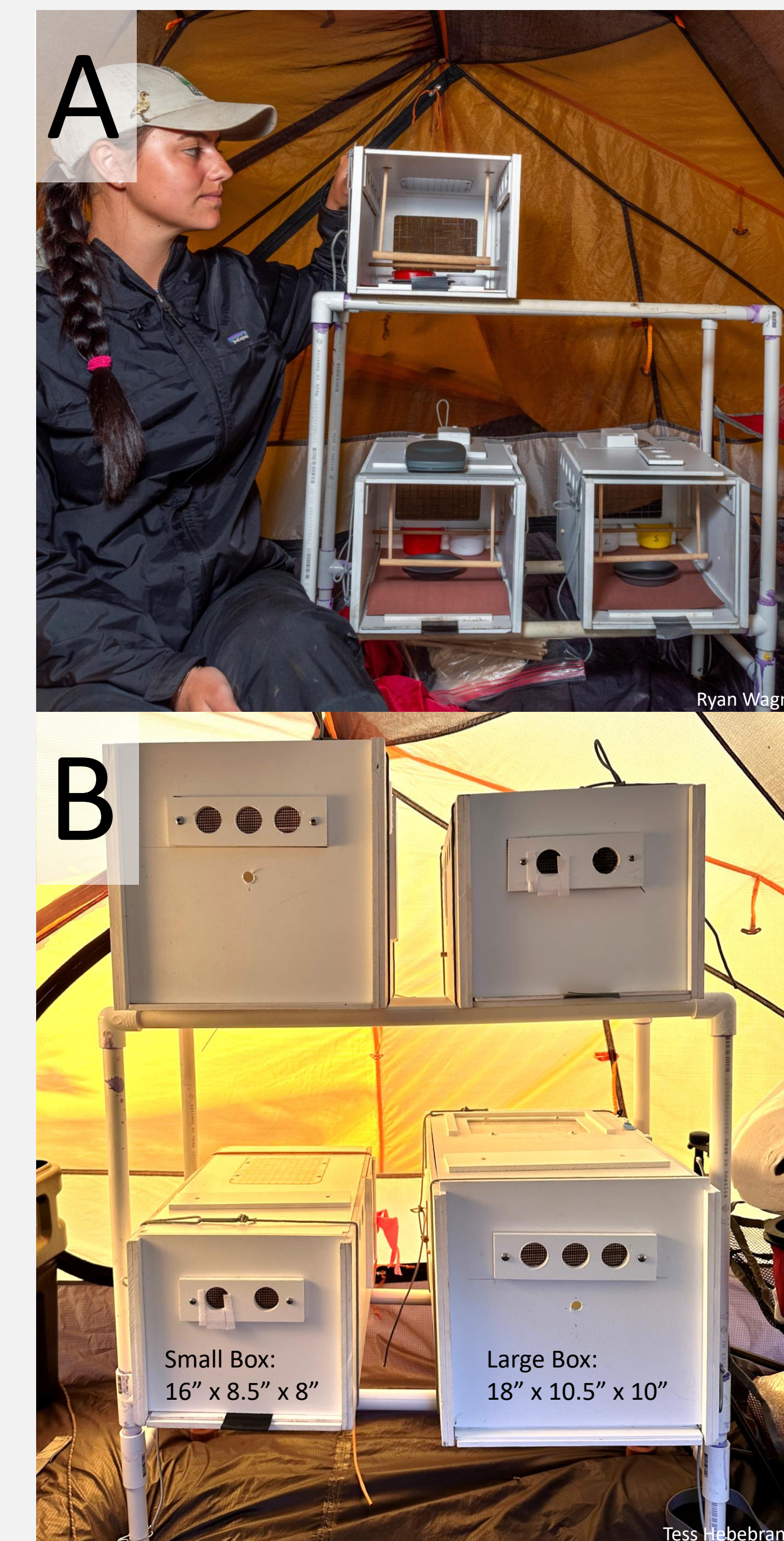
Figure 1: A - Captured kiwikiu following capture examination being transferred to the transport box. B - Holding box being carefully passed between trained hikers to transport bird to the captive holding area at camp.



### Holding

Diet and bird care protocols followed the 2019 MAPA translocation protocols (Warren et al. 2021). At camp, the birds were transferred into holding boxes situated within a bird care tent (Fig. 2). These holding boxes allowed the birds to move freely, feed, drink, and interact with native flora. Larger boxes were made to accommodate 'ākohekohe more comfortably. Skylight windows were added to the MAPA and AKOH holding boxes to allow a LED light strip to sit on top and shine through it. Aviculturists conducted regular checks on the birds to monitor their condition and used cameras to film remote observations.

Figure 2: Set-up in the bird care tent. A - Holding boxes with front sliding door removed to show perches, food dishes and remote weighing system. B - Holding box comparison of the smaller MAPA boxes and the modified, larger AKOH holding boxes.



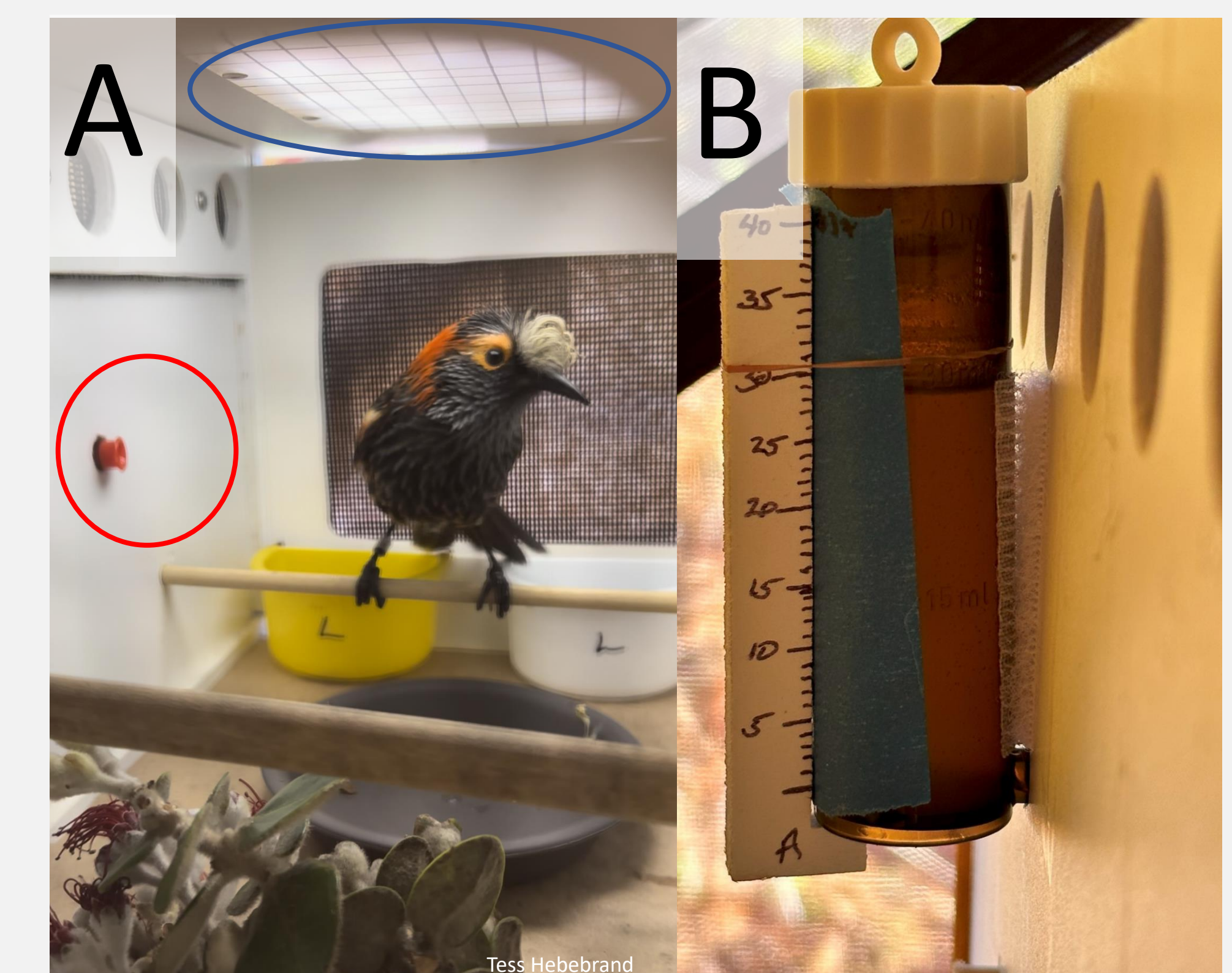
### Diet

MAPA primarily favored waxworms and small mealworms, but also fed on black soldier fly larvae. Birds were also offered Quiko® Classic Egg Food Daily Supplement and Mazuri® bird diet.

Prophylactic treatment for avian malaria and fungal infection were started in the field for MAPA and treatment was continued in the captive facility. Doses were prescribed by a veterinarian for the species' weight range. Given MAPA's preference for waxworms, and their larger size and softer exoskeleton, waxworms were injected with the antimalarial (Chloroquine and Primaquine) and antifungal (Itraconazole) drugs.

The AKOH captive diet consisted of waxworms, mealworms, black soldier fly larvae, and NEKTON's Nektar-Plus Complete Diet. Holding boxes were modified to be able to hold a feeding tube for the Nektar-Plus Diet (Fig. 3). Birds favored the Nektar-Plus Diet and 'ōhi'a lehua (*Metrosideros polymorpha*) blossom clippings, to the insects.

Figure 3: A - AKOH in holding box with the feeding tube's red nozzle circled in red. Skylight window is circled in blue. B - Feeding tube attached on the outside of the holding box with Velcro®. Measurement instrument attached to the feeding tube which can be used measure approximate consumption.



## REFERENCES

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