Collapse of Endemic Hawaiian Honeycreepers on Maui

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INTRODUCTION

The Hawai'i Forest Bird Survey (HFBS) was originally conducted on East Maui in 1980. Those methodologies and results established a baseline for monitoring distribution, population density, and trends of native forest birds[1]. Agency partners have repeated surveys on East Maui approximately every five years since the 1990s. Surveys in 2017 resulted in the lowest density and abundance estimates for the three Maui Island endemic species in over 40 years[2]. The 2022 survey results reaffirmed an ongoing collapse in range and population density of 'ākohekohe, kiwikiu, and Maui 'alauahio.

METHODS

Twenty-nine transects were surveyed by trained observers between March and June 2022, using the point-transect distance sampling method. This method estimates density and abundance while adjusting for undetected individuals as a function of the distance between the observer and birds. Species, detection type, and horizontal distance from the station center to individual birds detected was recorded during each 8-minute count. The area was divided into four regions: Haleakalā National Park, Windward, Leeward, and Kula (Fig 1). The Kula and Leeward Regions are disjunct units from the climatically wet Haleakalā NP and Windward Regions, occurring on the drier southern and western slopes of Haleakalā Volcano. Species-specific density estimates were calculated for species with adequate detections to reliably model the detection probability using the R package DISTANCE.

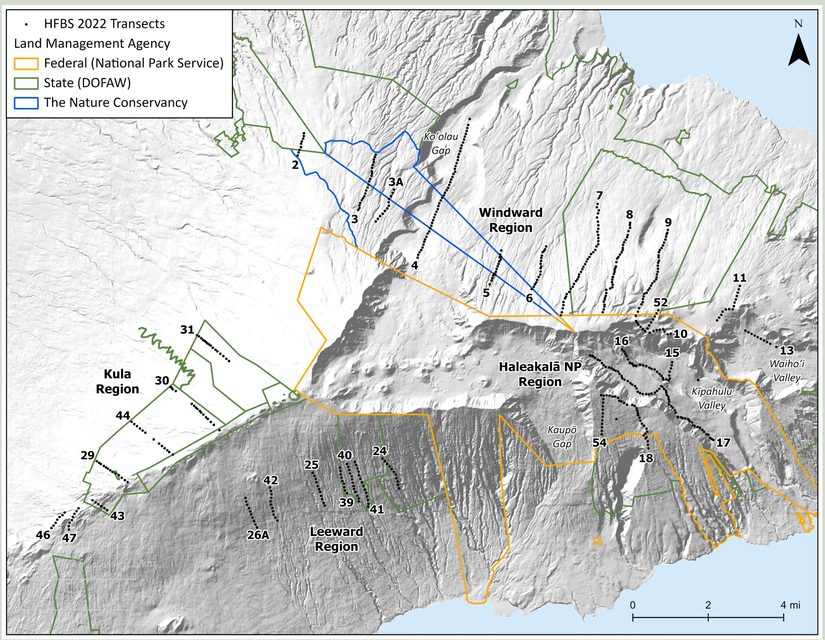

Figure 1: Transects surveyed during the 2022 Hawai'i Forest Bird Survey on East Maui. Point count stations are symbolized by grey circles. The area was divided into four regions: Windward, Haleakalā National Park, Leeward, and Kula. These regions include lands managed by the State of Hawai'i, National Park Service, The Nature Conservancy, and private landowners.

ACKNOWLEDGEMENTS

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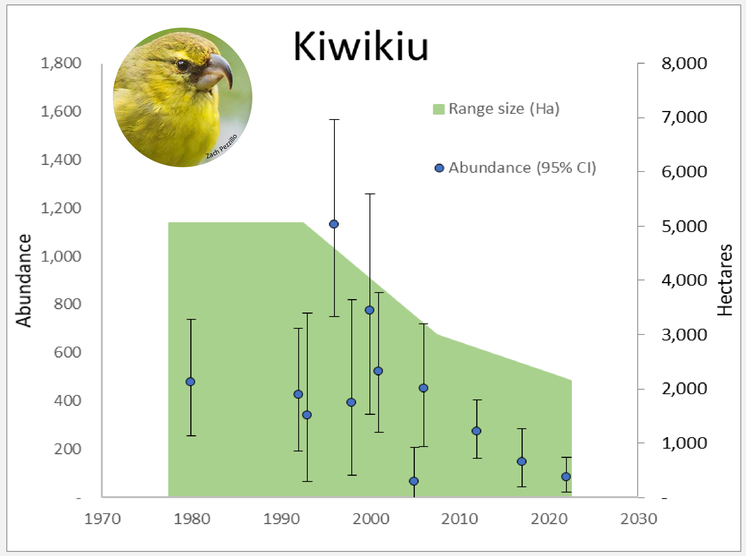
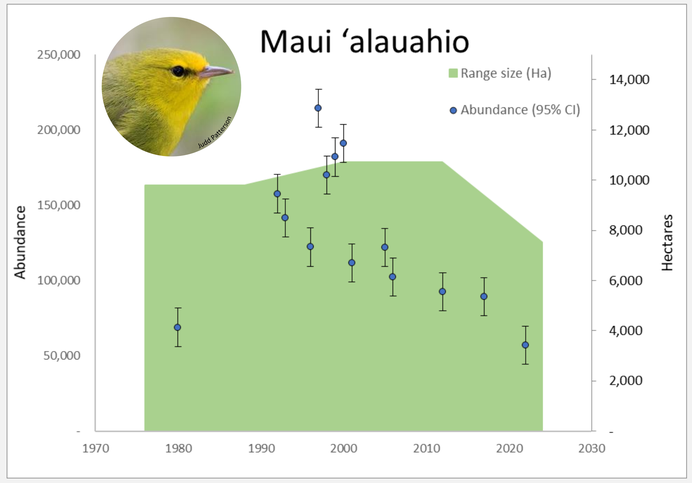
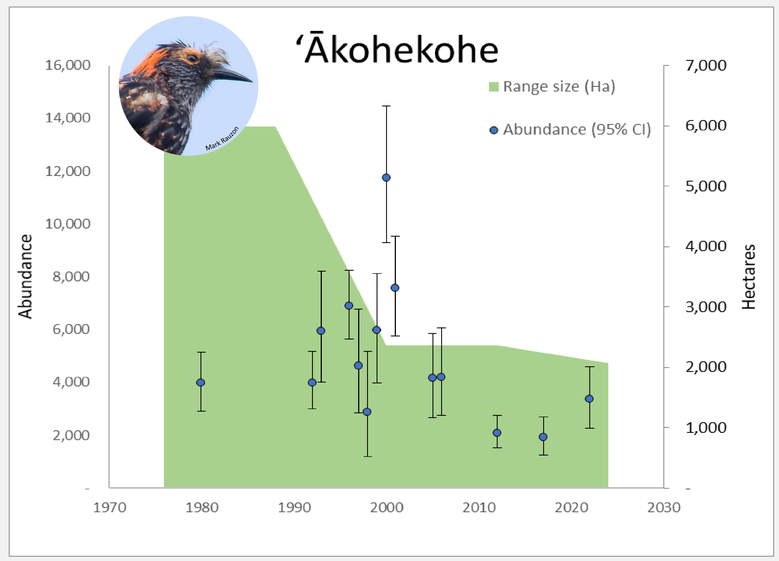
RESULTS & DISCUSSION



The critically endangered kiwikiu (*Pseudonestor xanthophrys*) suffered a significant population decline in the last decade and is now only found in Haleakalā NP and the Windward Region. Its population size was estimated to be fewer than 168 individuals (20 – 168; 95% confidence interval). Mean population estimates indicated a ~44% decline since 2017 and its range continues to contract within mid- and upper elevations where the threat of avian malaria worsens because of warming climate trends. If downward trajectories continue, the species could go extinct within 5 years[3].



The Maui 'alauahio (*Paroreomyza montana*) population was approximately 200,000 birds in the late 1990s and subsequently declined 250% to a 2022 estimate of 57,123 ± 7,715 (SE) birds. Downward trends were particularly alarming between 2017 and 2022, when both population densities and range declined due to increasing pressures from disease, predators, and habitat degradation.



'Ākohekohe (*Palmeria dolei*) total abundance increased since 2017 despite a 12% range contraction. The species' range is fragmented, and most individuals now occur in Hanawī and Eastern Haleakalā NP. Increases may be because of shifts in range and 'ākohekohe's high fecundity, which can result in high annual recruitment and sudden increases in population density. Research and ongoing range contractions indicate the species is especially vulnerable to avian malaria and population models predict the species may go extinct within 10-years if disease cannot be reduced[3].

CONCLUSIONS

The 2022 HFBS results reaffirmed an ongoing collapse of Maui's endemic avifauna. Range contractions and population declines inversely correlate with climate change and expansion in range of the cold intolerant avian malaria parasite (*Plasmodium relictum*) and its vector, the Southern house mosquito (*Culex quinquefasciatus*). Landscape control of mosquitoes through the Incompatible Insect Technique and aerial application of a target larvicide have been implemented to reduce disease transmission and reverse downward trends of Maui's endemic avifauna. Without these urgent actions, the kiwikiu and 'ākohekohe are predicted to go extinct within the next decade[3].

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