Conservation Strategies for Navigating Hard Problems: Investigating and Planning a Conservation Translocation of ʻĀkohekohe (*Palmeria dolei*) to Minimize Extinction Risk

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Introduction

The ʻākohekohe (*Palmeria dolei*) once ranged across Maui and Molokaʻi, but the spread of avian malaria (*Plasmodium relictum*) has confined it to ~2,069 ha of wet montane forest above ~1,600 m on the northeastern slope of Haleakalā Volcano, Maui[1] (Fig. 1). With at most a few thousand individuals remaining and a population in rapid decline, the species is at risk of extinction within 10 years. Collaborating partners are actively suppressing southern house mosquitoes (*Culex quinquefasciatus*), which vector avian malaria, via the Incompatible Insect Technique (IIT) on East Maui. Given the uncertain future success or efficacy of this action, expert elicitation requested by State and Federal partners recommended that establishment of ʻākohekohe in high-elevation areas of Hawaiʻi Island via translocation be evaluated and planned. Herein we summarize our approach to ongoing planning of this potential action, which began in August 2024.

Goals of Planning Effort

- Determine the appropriateness and feasibility of a conservation translocation to Hawaiʻi Island for the ʻākohekohe.
- Produce a conservation translocation plan.
- Initiate Federal and State compliance (e.g., Environmental Assessment, Cultural Impact Assessment) and permitting.
- Determine and recommend a management action for the ʻākohekohe.

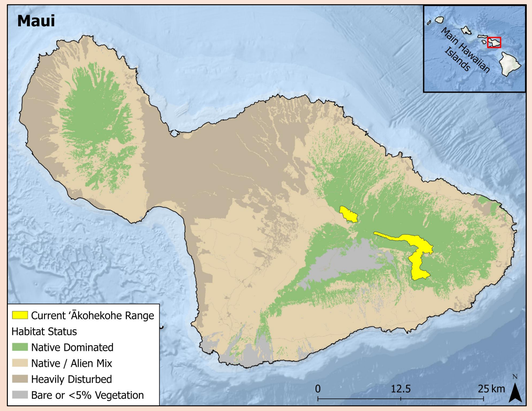


Figure 1. Current range of ʻākohekohe on Maui.

Key Elements of Planning

Planning Teams

All authors comprise a ***Core Planning Team***, recruited based on their species-specific or project-relevant backgrounds. A separate ***Review Team*** will provide critical input on project analyses and products.

Translocation Site Selection

We are evaluating 10 candidate release sites across five State and Federally managed areas for ʻākohekohe translocation on Hawaiʻi Island (Fig. 2) based on a previous forest bird assessment[2], recommendations of land managers, and a 2024 LiDAR based study[3]. A Strength, Weakness, Opportunity, and Threat (SWOT) analysis[4] is being employed to aid release site(s) selection (Table 1). We will complete this analysis by evaluating published and unpublished site-specific data gathered by the planning coordinator, and information gleaned during site visits. As part of the SWOT process, site specific indicators (Table 2) will be individually weighted to score areas for quality and suitability by late September (2025).

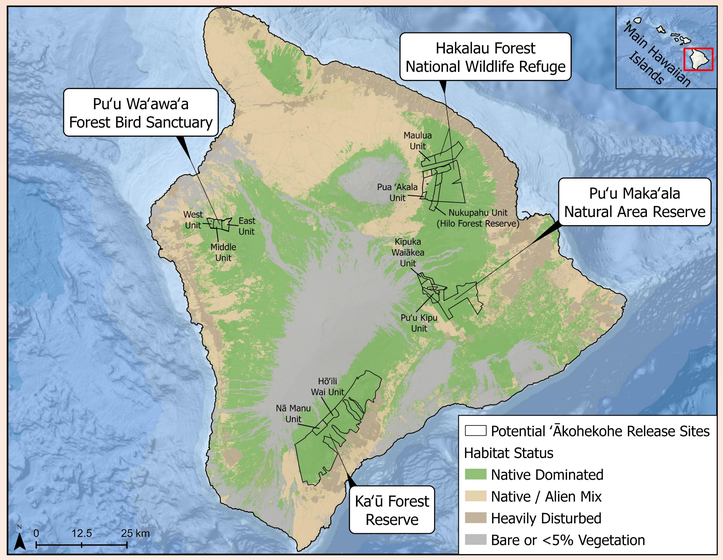


Figure 2. Candidate release sites for ʻākohekohe translocation on Hawaiʻi Island.

Table 1. Definitions of SWOT analysis and indictor categories.

SWOT Analysis			
A quantitative assessment of site suitability based on site-specific indicators (see Table 2) that may positively or negatively affect the results of translocation[4]			
Strength	**Weakness**	**Opportunity**	**Threat**
Natural or inherent aspects of site habitat quality	Natural factors that reduce site habitat quality	Conservation management actions that may increase suitability	Anthropogenic factors that reduce site habitat quality

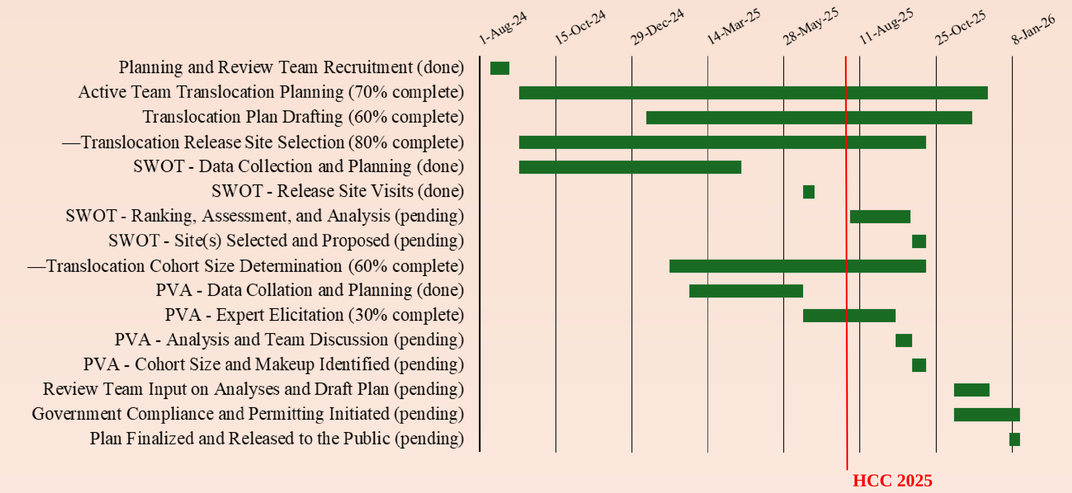
Translocation Cohort Size Determination

We will use a Population Viability Analysis (PVA)[5] to estimate the minimum number of ʻākohekohe and age classes to release on Hawaiʻi Island. Existing demographic field data for the species are limited and relatively old. Given the changing conditions on Maui because of the ongoing spread of avian malaria, these data may not reflect current population dynamics of the ʻākohekohe and may inadequately inform a PVA. We will therefore employ "expert elicitation" following the "Delphi" method[6] to refine vital rates estimates and secure more robust values for demographic parameters. Six experts will be provided the latest known parameters to review and revise based on their knowledge of ʻākohekohe or other honeycreepers. These revised parameter estimates will be averaged and used to run PVA's necessary to estimate the most successful translocation cohort size.

Table 2. Specific indicators (gleaned from previous studies[2,4]) used for SWOT analysis.

ʻĀkohekohe Translocation SWOT Indicators	
1	**Strength**
1.1	Area of suitable native forest above 5,500 ft (1,675 m)
1.2	Trends of malaria-susceptible honeycreepers
1.3	ʻĀkohekohe specific habitat criteria
1.4	Climate
2	**Weakness Indicators (Natural Factors)**
2.1	Predation by native species (i.e., 'io & pueo)
2.2	Competition with other native species
2.3	Hurricanes
2.4	Habitat fragmentation
2.5	Volcanic eruption
3	**Threat Indicators**
3.1	Risk of avian malaria
	a) Presence / prevalence of *Culex* sp. mosquitos
	b) Presence / prevalence of mosquito breeding habitat
	c) Presence / prevalence avian malaria
3.2	Density / presence / prevalence of intro. small mammals
3.3	Presence of ungulates
	a) Pigs
	b) All other ungulates (sheep, cattle)
3.4	Presence of habitat modifying invasive plants
3.5	Fire risk
4	**Opportunity Indicators**
4.1	Habitat protection status / legal protection of area
4.2	Existing management plan
4.3	Existing conservation / active restoration programs
	a) Small mammal control (ongoing, long-term)
	b) Invasive plant control
	c) Ungulate control (incl. fence inspection / maintenance)
4.4	Access
	a) Access to the site (all project activities)
	b) Ease of access for field work (topography, veg. density)
	c) Ease of independent public access to the site
4.5	Public outreach programs (incl. community involvement)
4.6	Long term support from landowner / land manager
4.7	Support of neighboring landowners
4.8	Support from local / native Hawaiian Community
4.9	Existing supporting infrastructure (cabins, water)

Project Timeline and Next Steps



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