Restoring Hawaiian Endangered Bird Habitat: Investigating the effect of invasive plant removal on native forest birds on Kaua'i

Introduction

- Of the 13 species of songbirds that once occurred on Kaua'i, only eight remain, three of which are endangered (Figures 1 and 2). Over 140 different species of endangered plants and one
- endangered insect also occur in northwest Kaua'i.
- Suitable habitat for many native forest birds has been restricted to high elevations (>1000m) in the Alaka'i Plateau.
- Invasive weeds have been entering these high elevation areas, changing the structure and composition of native forests, with unknown, but likely negative, impacts on native fauna
- Invasive weed control has been deemed a high priority by USFWS recovery plans for endangered species on Kaua'i¹ to arrest the conversion of native forests to non-native vegetation.
- Created a Two-Year Before-After-Control Treatment (BACT) experiment to more precisely document effects of non-native vegetation on these species.



Figure 1. 'Akeke'e, Loxops caeruleirostris, one of the endangered native forest birds.



Figure 2. 'Akikiki, Oreomystis bairdi, one of the endangered native forest birds.

Methods

Study Plot Selection

Two 10-ha plots randomly selected in the Wainiha Pali region of the Alaka'i Wilderness Preserve and randomly allocated to treatment and control (*Figure 3*).



Figure 3. The two study plots in the Wainiha Pali region of northwestern Kaua'i.

Year One: Pre-treatment Surveys of Vegetation, Insects, and Birds

- Surveyed 150 1-m² plots on 12 transects for pre-treatment weed cover in treatment and control plots.
- Performed visual observation, baiting, transecting, host plant searches, and light surveys for invertebrate diversity in the area around Mohihi camp.
- Surveyed 130 ha (including and surrounding the two study plots) to determine abundance of two newly listed Endangered bird species ('Akikiki and 'Akeke'e), and five other forest bird species.
- Conducted first ever foraging observations of these bird species on Kaua'i.
- Conducted point count surveys to determine richness and abundance of forest birds. 15 points surveyed in treatment plot and 14 points surveyed in control plot.
- Located and monitored bird nests in study plots.
- Obtained fecal samples from forest birds to begin assessment of insect prey in their diet.
- After surveys completed, weeded treatment plot.

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Methods Weed Removal in Treatment Plot Eradicated three primary target weeds: Kahili ginger (*Figure 4*), Australian tree fern (*Figure 5*), and strawberry guava (*Figure 6*). of less and a set CARE AND A Figure 4. Kahili Ginger, Figure 5. Australian Tree Hedychium gardnerianum. Fern, Sphaeropteris cooperi. Year Two: Post-treatment Surveys of Vegetation, Insects, and Birds Measured abundance of endangered bird species in treatment and control areas. Located and monitored bird nests in study areas. Visual observation, baiting, transecting, host plant searches, and light surveys for invertebrate diversity will be conducted again during summer 2013. Success of weed removal will be monitored in summer 2013. **Preliminary Results Vegetation Survey and Weed Removal—Year One:** On average, 15.7% of plots/transects contained weeds (range: 0-38%), and some transects contained as many as 20 Kahili ginger. 5,758 total weeds were removed from the treatment plot including Kahili ginger. Insect and Foraging Surveys—Year One: Alien flora hosted very few food items for avifauna compared to the endemic flora Kaua'i 'Elepaio (Figure 7) were observed gleaning small insects (including moths and caterpillars) off Ohi'a lehua branches and catching gnats on the wing in the Ohi'a. Fragments encountered in 'Akikiki, Kaua'i 'Elepaio, and 'I'iwi fecal samples were small insect parts identifiable to the orders Arachnida, Araneae, Coleoptera, Insecta, Diptera, Heteroptera, Homoptera, Hymenoptera, Lepidoptera, Orthoptera, Pseudoscorpionida, and Psocoptera. Figure 7. Kaua'i 'Elepaio, Chasiempis sclateri, in its nest **Nest Monitoring—Year One:** Located and monitored 15 bird nests in study plots. Results suggest that there are no pre-treatment differences in nest numbers or success between the two plots (*Figure 8*). Two 'Akikiki territories and five 'Akeke'e territories were found; one 'Akikiki nest found near but outside the study plots. Nest Fate Grand Total 2012 North South 2013 18 North South **Grand Total** 33 19 14















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Figure 6. Strawberry Guava, Psidium cattleianum.



Figure 8. Nest fate by plot and year.

Preliminary Results

Nest Monitoring—Year Two:

- Three 'Akikiki and two 'Akeke'e territories were found.
- Located and monitored 18 nests in study plots.
- There were no significant differences in nest survival between plots or years (*Figure 10*); however, more nests were found in the control plot, indicating higher productivity.



Figure 10. Daily nest survival rate in both plots before and after treatment.

Discussion

- This study has increased our understanding of forest bird diet, and the role native plants play in supporting insect prey.
- Although there were no significant differences in nest survival posttreatment, the small drop in productivity may reflect temporary
- disturbance (e.g. less cover) in the treatment plot. Forest bird abundance and richness data has been collected but has not yet been analyzed. We anticipate this data will help explain the differences in productivity of the two plots before and after treatment.
- The sample size of this study has been too small and the duration
- too short to produce conclusive results. We anticipate that once native vegetation recovers in the treatment
- plot, nest survival and productivity will increase.

Future work

We have applied for funding for continuing to monitor the recovery of the treatment plot and to expand treatment area. We will look for other opportunities to study the effect of habitat restoration projects on forest birds, e.g. newly fenced areas



Literature Cited

1. U.S. Fish and Wildlife Service, 2006. Revised Recovery Plan for Hawaiian Forest Birds. Region 1, Portland, OR. 622 pp.

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