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A Nest in Koa (*Acacia koa*) Successfully Fledged Two ‘Akiapōlā‘au (*Hemignathus munroi*)

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Introduction

The evolution of Hawaiian honeycreepers (Drepanidinae) provides an exemplary illustration of adaptive radiation in birds. Over time, this colorful group has evolved from a single common ancestor to fill numerous ecological and functional niches and thus now exhibits tremendous morphological diversity (Freed et al. 1987; James & Olson 1991; Pejchar & Jeffrey 2004). However, centuries of human presence across the Hawaiian Islands have had a devastating effect on the native avifauna, leading to the extinction of many species (Scott et al. 2001, Pratt et al. 2009b). Introduced predators and diseases are the leading causes of direct forest bird mortality, while habitat conversion and destruction by introduced ungulates have indirect, but similarly detrimental, effects on honeycreepers’ survival and productivity (Scott et al. 2001; LaPointe et al. 2009; Pratt et al. 2009b). Currently, many populations of the remaining honeycreepers are small and/or declining, while others are threatened with extinction (Reed et al. 2012).

Figure 1. One of two ‘Akiapōlā‘au juveniles fledged from a single nest placed in a koa (*Acacia koa*) on the Hawai‘i Island. Photo by Jack Jeffrey.

Natural History

A unique member of Hawai’i's extant honeycreepers is the ‘Akiapōlā‘au (*Hemignathus munroi*; Figure 1), the last of the “hetero-bills” that formerly included multiple species of Nukupu’u. ‘Akiapōlā‘au is a stout-bodied bird whose two-parted bill is designed to both drill into wood and probe gaps for hard-to-reach prey (Pratt et al. 2001; Pejchar et al. 2005). The species was first listed as endangered by the U.S. Fish & Wildlife Service in 1967 (USFWS 2006) and is also listed endangered by the International Union for Conservation of Nature (IUCN 2012). ‘Akiapōlā‘au are distributed in four disjunct populations on the Island of Hawai‘i with an estimated total population of 1,148 (± 33) individuals (Fancy et al. 1996; Pratt et al. 2009a). These sites are comprised of several habitat islands in a mosaic of degraded pastureland (Pejchar et al. 2005).

‘Akiapōlā‘au forages principally on woody vegetation from ground level to the upper canopy in search of wood-boring insect larvae (Fam. *Cerambycidae*, Pejchar et al. 2005). Although multiple plant species are utilized, ‘Akiapōlā‘au favor koa trees (*Acacia koa*) over all other species, even where koa is relatively rare (Ralph & Fancy 1996; Pejchar et al. 2005). In one study, ‘Akiapōlā‘au foraged on koa more than 80% of the time despite the fact that koa comprised only about 8% of cover by all woody plants (Pejchar et al. 2005).

In spite of its highly endangered status, little is known about ‘Akiapōlā‘au breeding biology. Although most often seen foraging in koa, 16 of the 17 documented nests were found in ‘ōhi‘a trees (*Metrosideros polymorpha)* in montane mesic forests (Pratt et al. 2001). The only successful nest in a plantation of koa trees was also placed in ‘ōhi‘a, despite its low prevalence (Pejchar et al. 2005). Only one nest is known from a koa tree, suggesting that ‘ōhi‘a are preferred over koa as nesting sites, regardless of the bird’s apparent preference for koa as a foraging substrate. In general, the species lays a single egg and fledges only one young per year, with juvenile dependency as long as 10-12 months after fledging (Munro 1960; Banko & Williams 1993; Ralph & Fancy 1996; Pratt et al. 2001). However, in three out of 217 observations of adults with young, the

number of fledglings was two (Pratt et al. 2001), indicating that a pair can produce more than one young per year, perhaps when conditions are favorable.

New Observations

On 15 April 2011, an ʻAkiapōlāʻau nest, containing two nestlings, was found in a koa tree within a heavily forested kipuka (forest patch surrounded by old lava flows) approximately 2,000 m elevation, on the northeast slopes of Mauna Loa volcano, Hawaiʻi Island. The nest was positioned near the terminal branch of a 20 cm diameter at breast height (DBH) koa, within the canopy, about 15 m above the ground. The area immediately surrounding the nest was obscured by koa leaves, making initial nest location and following observations difficult. However, we were able to find a nearby spot that offered a reasonable look over the nest rim with high-power optics. Following the confirmation that the nest belonged to an ʻAkiapōlāʻau male we have observed nearby earlier, we recorded a video of a feeding event that revealed the existence of two chicks (Figure 2). As the male landed by the nest, the nestlings (apparently close to fledging) extended their heads with clearly visible orange bill edges and begged for food. The female ʻAkiapōlāʻau appeared shortly thereafter with her contribution for the two young. We monitored the nest for several hours on the day of discovery, with both parents regularly feeding the nestlings, which vocalized noisily during each visit. Five feeding observations were witnessed: three by the male and two by the female. Subsequent observations revealed that both nestlings fledged the following day (16 April 2011). As of early June, both ʻAkiapōlāʻau fledglings could still be detected in the vicinity of the nest tree, with post-fledging observations typical of each adult attending to one fledgling. Seven months later, adults were still feeding both fledglings (J. Jeffrey pers. obs.).

Interestingly, on 24 June 2011 J. Jeffrey found another ʻAkiapōlāʻau nest in a 35 cm DBH ʻōhiʻa. This nest was positioned at the terminus of a side branch (8 m up), not far from the top, and about 200 m from the nest described herein. The nest was difficult to see, but both parents were witnessed to visit and feed at least one chick. The second week of July, two very young fledglings were observed near the ʻōhiʻa nest site (J. Jeffrey pers. obs.), which we assume to be from that nest. We suspect that the chicks had fledged a day or two earlier, as their "chip" call was not very loud, and they had a considerable amount of yellow on their undeveloped bills. For several months both families were regularly seen in the same kipuka.

Discussion

With disease and habitat loss as serious threats to its already small population, doubling of the reproductive output has clear benefits for ʻAkiapōlāʻau conservation. We provide evidence that this reproductive boost can occur in young koa stands without ʻōhiʻa as nesting platform. Our observation of an ʻAkiapōlāʻau nest, placed within a koa and successfully fledging two young, provides additional life history information for this poorly known species. This suggests that the species may be more flexible in its nest site selection than previously thought and can successfully use small diameter (20 cm or greater) koa for nesting. Moreover, a nearby pair producing another two fledglings suggests that this area provided high quality habitat for at least that breeding season. It is important to emphasize that the use of ʻōhiʻa for nesting does not appear to be essential for the species' nesting success, and in this instance, that ʻAkiapōlāʻau reproductive output can be high even if koa is used as a substitute nest substrate. However, it is not known whether a habitat devoid of ʻōhiʻa could successfully harbor breeding ʻAkiapōlāʻau. Although the species is rarely known to feed on invertebrates in ʻōhiʻa, it does drill holes in the tree to drink sap, which may be an important food source during periods of low invertebrate abundance (Pejchar & Jeffrey 2004).

Figure 2. Two ʻAkiapōlāʻau juveniles (arrows) a day before fledging from in a single nest placed in a koa (*Acacia koa*) on the Island of Hawaiʻi. The image is a screen capture from a video documenting a feeding event by the ʻAkiapōlāʻau male. The nest appeared to be constructed largely from koa twigs and lichen pieces, and was located near the terminal branch within the canopy about 15 m above ground. Photo by Jack Jeffrey.

ʻŌhiʻa and koa are the two native dominant canopy tree species on all of the high-elevation islands of the Hawaiian archipelago (Cuddihy & Stone 1990, Gagne & Cuddihy 1990), including the area where these nests were found. Here on the slopes of Mauna Loa, an active volcano, ʻōhiʻa is an early successional species on newly-deposited lava, with koa arriving at a later stage (Hatfield et al. 1996). Although ʻōhiʻa is generally first to establish on these volcanic substrates within ʻAkiapōlāʻau's range, koa grows at a much higher rate. Under optimal conditions, the growth rate for ʻōhiʻa is 6-10 cm in height per year (Burton & Mueller-Dombois 1984; Stemmermann 1986; Walker & Vitousek 1991), while koa grow 100-200 cm per year (Mueller-Dombois et al. 1981; Conrad et al. 1988; Whitesell 1990; Scowcroft et al. 1992). It has been shown that ʻAkiapōlāʻau home ranges in koa plantations (essentially, koa monocultures), are significantly smaller, more tightly packed, and overlap more than in forests with a reduced proportion of koa, such as an open forest with cattle grazing (Pejchar el al. 2005). This is an indication of more food

resources available to the birds, which in turn have higher densities, because they require less area to support themselves and can avoid energetically-intensive territorial behavior (Brown 1964; Gill & Wolf 1975; Myers et al. 1979; Frost & Frost 1980).

Appropriate koa reforestation may be a promising tool for ʻAkiapōlāʻau conservation (Pejchar et al. 2005). Koa is the most valuable native hardwood in Hawai'i (Jenkins 1983; Loudat & Kanter 1997), and while market prices for koa timber have fluctuated over the past decades, demand remains high relative to limited supply, suggesting future price growth (Goldstein et al. 2006). Although only about 10% of historical koa forests remain, these forests were once a key feature of the landscape that ʻAkiapōlāʻau inhabited (Wilkinson & Elevitch 2003). Over the past 150 years much of the upper-elevation koa and ʻōhiʻa-koa forest has been converted to pastureland. However, in recent times ranching has become marginally economical and some landowners are considering other land uses (Pejchar el al. 2005). Valuable timber such as koa has the potential to serve as long-term ʻAkiapōlāʻau habitat because individual trees can be harvested selectively, retaining the forest as viable habitat (Lamb 1998). Low-intensity logging has been shown in one study to have minimal impacts over the long-term on native bird populations (Sekercioglu 2002). Consequently, reforesting areas damaged by introduced ungulates with fast-growing koa may be economically beneficial to landowners, as well as advantageous to ʻAkiapōlāʻau.

Interestingly, there is recent documentation of three ʻAkiapōlāʻau family groups with two young each near Keauhou Forest on the southern slopes of Mauna Loa (Pratt 2012). Perhaps then, the two-chick phenomenon is a recent trend, resulting from a changing land cover that includes more koa stands on Hawai'i. Although this is speculative, more attention should be devoted to understanding the reasons behind high reproductive output if we are to improve ʻAkiapōlāʻau's conservation status and preserve its role as a unique representation of Hawai'i's evolutionary history.

Acknowledgements

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Shearwater Soiree – Mahalo!

July 24, 2013

See more event photos on our Facebook page at www.facebook.com/HawaiiAudubonSociety

Over 100 guests attended the Hawai'i Audubon Society's 3rd Annual Shearwater Soiree and enjoyed pupus, music by *Live Aloha*, a silent auction, and presentation on the latest at the Freeman Seabird Preserve.

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Field Trip Report: Waikamoi Preserve

By Lance Tanino, HAS Board Member

On Saturday, June 15, 2013 at eight o'clock in the morning, 12 participants from Maui and Oahu including the Society's new Coordinator, Marisa Watanabe (originally from Maui) gathered in the parking lot of Hosmer's Grove Campground – named after Hawai'i's first territorial forester, Ralph Hosmer – at Haleakala National Park in upcountry Maui. The crisp air and sunny conditions were hopeful signs for the first Hawaii Audubon Society field trip to The Nature Conservancy's Waikamoi Preserve in many years. Participants were alerted to the field trip from a variety of sources: 'Elepaio journal, Hawai'i Public Radio, Hawai'i Birdwatching page on Facebook, and a Maui online calendar of events.

The trip was successfully and expertly led by Laura Berthold (Ornithological Research/Logistics and Outreach Technician) from Maui Forest Bird Recovery Project – an organization formed by the State of Hawai'i's Division of Forestry and Wildlife and U.S. Fish and Wildlife Service. The project's purpose is to investigate and prevent the further decline of Maui's endemic forest birds, such as the endangered Kiwikiu (Maui Parrotbill) and 'Akohekohe (Crested Honeycreeper).

During our hike through the preserve and onto the boardwalk, we were surrounded by mostly native trees and plants, while a majority of the bird species were native honeycreepers. We were fortunate to have excellent views of at least seven endangered 'Akohekohe, including three juveniles perched together at the top of a koa tree. We also were able to hear their songs and calls. Unfortunately, we were not able to see the critically endangered Kiwikiu; however, on our way out of the forest we heard an adult male sing his song without giving away his location. Other bird species we encountered within Waikamoi Preserve included: Maui 'Amakihi (Hawai'i 'Amakihi subspecies), Maui 'Alauahio (Maui endemic), 'I'iwi, 'Apapane, Chinese Hwamei, Japanese Bush-Warbler, Red-billed Leiothrix, and Japanese White-Eye. The trip ended at approximately 12:30 p.m.

Figure 1. Field trip participants pose for a group photo before the trailhead. Photo by Lance Tanino.

HAS Seeking Nominations for 2014 Board of Directors

The 2014 HAS Board elections Nominating Committee made up of Wendy Johnson, Melissa Sprecher, and Thorne Abbott is seeking Society members who are willing to serve on the Board of Directors for an initial one year term. A handful of seats will become vacant and open for nomination. Running for re-election to two-year terms are President Linda Paul, 1st Vice President Elizabeth Kumabe-Maynard, Secretary Melissa Sprecher, and Directors Talia Ogliore, Lance Tanino, Mary Roney, and Rachel Fukumoto. Director Talia Ogliore is being nominated to the open 2nd Vice President position. Incumbents continuing to serve through 2014 are Directors Thorne Abbott and Phil Bruner.

The HAS Board is a dynamic group of committed individuals whose energy and expertise involve many aspects of environmental protection in Hawai'i from fundraising and education to birding and habitat restoration. All members of the Board are expected to attend five two-hour meetings per year and a weekend Leaders' Retreat in January. If you are a Society member and interested in becoming a candidate, please submit a letter of interest and brief resume of your background and activities to the attention of the Nominating Committee at the Hawai'i Audubon Society's address by Friday, October 4th, 2013.

PRESENTATION ON MAUI FOREST BIRDS & WALKING TOUR AT THE LYON ARBORETUM

Saturday, September 21st
1 – 3:30 pm
Lyon Arboretum, Oahu

Free and open to the public.

"Maui Forest Bird Recovery Project: The past, present and future of Maui's native forest birds and the work toward establishing a second population of Kiwkiu (Maui Parrotbill)"

Enjoy an afternoon talk by Hanna Mounce, Project Coordinator for the Maui Forest Bird Recovery Project. Please RSVP by emailing hiaudsoc@pixi.com and specify whether you will be attending both the presentation and walking tour portions, or just the presentation. Space is limited to 35 guests.

HAS RESEARCH GRANTS

OCTOBER 1ST APPLICATION DEADLINE

The Hawai'i Audubon Society offers grants for research in Hawaiian or Pacific natural history. Awards are oriented toward small-scale projects and generally do not exceed $500.00. Proposals are reviewed semi-annually, with the next deadline falling on **OCTOBER 1ST**. Email hiaudsoc@pixi.com for an application or visit the "Programs & Projects" section of our website at www.hawaiiaudubon.org.

DONATE!

September 1st to 30th

CODE: 77189

September is *the* time to make a contribution to the Hawai'i Audubon Society through the annual *Give Aloha* campaign! Head on down to any Foodland, Sack N Save, and Foodland Farm locations throughout the state to make a donation to HAS at the cash register using your Maika'i Card. Designate your donation to the Hawai'i Audubon Society with our code# 77189 and up to $249 per individual will be matched. Mahalo nui loa for your continued support!

Lecture: "Kōlea Biology Update 2013 -- They Continue to Amaze Us!"

Speaker: Dr. Wally Johnson

Monday, October 21st
7:00 - 8:30 pm

Windward Community College
Hale Akoakoa 105

Free and open to the public

Dr. Wally Johnson will be discussing new insights (including a few big surprises) about the remarkable trans-Pacific journeys of the Kōlea (Pacific Golden-Plover). These new findings are from tracking studies completed over the past several years. Wally will also describe some biological features of plovers such as plumage, nesting, life span, and how to identify males, females, and juveniles.

Longtime ploverphiles and newbie plover lovers alike will enjoy this exciting, special opportunity to learn about the latest research regarding Hawaii's favorite migratory bird.

Dr. Johnson is an Affiliate Professor of Ecology at Montana State University and a world-renowned expert on the Pacific Golden-Plover. For more than 30 years, he and his late wife Patricia have been traveling to Hawaii, other Pacific islands, and Alaska to study Kōlea. Sponsored by the Hawaii Audubon Society and Windward Community College. Contact hiaudsoc@pixi.com for more info.

Hawai'i Audubon Society Membership Renewal/Donation Form

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Upcoming Field Trips, Volunteer Opportunities & Events

Foodland's *Give Aloha* Campaign, Code #77189
September 1st – 30th
Make a donation to HAS at the cash register using your Maika'i Card and our code #77189. See page 6 for full details.

Kawainui Marsh Restoration
Saturday, September 7th from 9 am – noon

Volunteer at the monthly Kawainui Volunteer Day led by DLNR/DOFAW. Support some of Hawaii's most endangered waterbirds and contribute to the success of the new restoration ponds behind Castle Medical Center in Kailua (at the end of Ulukahiki St.) *Please note: this workday is not led by Hawai'i Audubon Society, but by DLNR/DOFAW. For more information, contact james.m.cogswell@hawaii.gov or (808) 266-0911.

Paiko Lagoon "Welcome Home Shorebirds" Tour
Saturday, September 7th at 10 am

Meet at 10 am on Kuli'ou'ou Road at the water's edge for a guided tour of the birds and their habitat. RSVP to Alice by leaving a message with your name, number of people attending, and phone number at 808-864-8122.

Moku'auia Island (Goat Island) Habitat Restoration
Saturday, September 7th from 9 am – 2pm and
Saturday, October 5th from 9 am – 2 pm

Spend the day off the coast of Malaekahana Beach Park with DLNR removing invasive species to restore habitat for nesting seabirds. The group will be walking to Goat Island from shore, so please wear reef safe shoes and clothing. MUST BE ABLE TO SWIM. *Please note: these trips are not led by/exclusive to the Hawai'i Audubon Society, but are coordinated by DLNR. To RSVP, email Offshore Island Biologist Amarisa Marie at amarisa@hawaii.edu.

Bishop Museum Vertebrate Collections Tour
Monday, September 9th at 2 pm

Take a tour of the Bishop Museum's Vertebrate Zoology Collection, including the Hawai'i bird collection of approximately 7,200 specimens of extinct native species, native breeding species, non-breeding visitors, and introduced species. Please RSVP to Alice by leaving a message with your name, number attending, and phone number at (808) 864-8122. Space is limited.

Maui Forest Bird Presentation + Walking Tour at the Lyon Arboretum
Saturday, September 21st from 1 – 3:30 pm

See full description of talk and tour on page 5. Please RSVP by emailing hiaudsoc@pixi.com and specify whether you will be attending both the presentation and walking tour portions, or just the presentation.

Pouhala Marsh Wetland Restoration
Saturday, September 28th from 8:30 – 11:30 am

Lend a hand during the Hawai'i Nature Center's monthly service project at Pouhala Marsh, which is the largest of the remaining wetland habitats in Pearl Harbor and of vital importance for the endangered Hawaiian stilts. Work may involve going into the water and mud (at least up to your knees) to remove pickleweed, cattail, and mangrove as well as outplanting and weed removal. *Please note: this workday is not led by the Hawai'i Audubon Society, but by the Hawai'i Nature Center. To RSVP or for more information, email volunteer@hawaiinaturecenter.org.

Seed Collecting and Palila Viewing (Big Island)
Saturday, September 28th

Join the Mauna Kea Forest Restoration Project and Hawai'i Nei Art Contest for an inspiring day collecting seeds for restoration efforts, bird watching, and sketching. A $10 donation to the Contest is required for the afternoon guided Palila hike. *Please note that this trip is not led by the Hawai'i Audubon Society. To RSVP, email Jackson Bauer at puumali.kaohe@gmail.com.

HAS Research Grant Application Deadline
Tuesday, October 1st

Email hiaudsoc@pixi.com for an application or visit the "Programs & Projects" section of our website at www.hawaiiaudubon.org.

HAS Board of Directors Nominations Deadline
Friday, October 4th

See full description on page 5.

Kōlea Lecture by Dr. Wally Johnson
Monday, October 21st from 7 – 8:30 pm

See full description on page 6. Free and open to the public. Held at Hale Akoakoa 105 at Windward Community College. Contact hiaudsoc@pixi.com for more information.

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Calendar of Events

Kawainui Marsh Restoration
Saturday, September 7th from 9 am – noon

Paiko Lagoon "Welcome Home Shorebirds" Tour
Saturday, September 7th at 10 am

Moku'auia Island (Goat Island) Habitat Restoration
Saturday, October 5th from 9 am – 2 pm

Bishop Museum Vertebrate Collections Tour
Monday, September 9th at 2 pm

Maui Forest Bird Presentation + Walking Tour at the Lyon Arboretum
Saturday, September 21st from 1 – 3:30 pm

Pouhala Marsh Wetland Restoration
Saturday, September 28th from 8:30 – 11:30 am

Kolea Research Presentation by Wally Johnson
Monday, October 21st from 7 – 8:30 pm

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