

What Threat Do Native Avian Predators Pose To Hawaiian Honeycreepers? Two Cases Of Predation By Pueo (*Asio Flammeus sandwichensis*)

Hanna L. Mounce¹

Habitat loss, disease and introduced predators are widely recognized for their negative effects on Hawaiian honeycreepers (Scott et al. 1986, Pratt 2005). Although it is often difficult to assess the relative importance of each of these threats, predation by non-native species is often cited as a key contributor to the loss of endemic Hawaiian forest birds (Atkinson 1977; Scott et al. 1986; Banko 1992). Overwhelming evidence indicates that rats (*Rattus* sp.) are key predators of island birds (Atkinson 1985; King 1985; Thibault et al. 2002; Veitch & Clout 2002) and the effect of invasive mammals on island populations and ecosystems is well documented (Coblentz 1990; Dowding & Murphy 2001; Levy 2003; Nogales et al. 2004). In Hawai'i the black rat (*R. rattus*), the Norway rat (*R. norvegicus*), the Polynesian rat (*R. exulans*), the small Indian mongoose (*Herpestes auropunctatus*) and the feral cat (*Felis catus*) are well-established and predators of native Hawaiian birds (Ziegler 2002). Conversely, there is relatively little information on the frequency or details of predation events by native predators on native birds. For example, there is only one documented observation of a Pueo, the Hawaiian Short-eared Owl (*Asio flammeus sandwichensis*), taking a native forest bird (i.e., Palila (*Loxioides bailleui*), S. Fancy, National Biological Survey, pers. comm., from Mostello 1996).

Historically, Hawai'i supported a number of avian predators (Ziegler 2002) although only three exist today, two native and one introduced: the Pueo, the 'Io or Hawaiian Hawk (*Buteo solitarius*), and the Common Barn Owl (*Tyto alba*). The Hawaiian Hawk is the only remaining native *Buteo* and is restricted to the island of Hawai'i. The Common Barn Owl was introduced in the 1950s to control rodent populations (Tomich 1962) but the history of the Pueo in Hawai'i is not as clear. The Pueo is considered a native subspecies of the globally distributed Short-eared Owl although sub-fossils indicate that its arrival post-dated that of humans (Olson & James 1982). During Polynesian settlement, the creation of more open landscapes through deforestation combined with the introduction of the Polynesian rat likely promoted the species' establishment (H. James, pers. comm.). Both owls are found on all the main Hawaiian Islands and on the island of Maui, the Pueo is the only extant native predator. Although, the competitive interactions of Pueo and other introduced avian and mammalian predators have been examined (Mostello 1996), the role of Pueo in native Hawaiian ecosystems is poorly understood.

During the past two breeding seasons (2006 and 2007) in the Hanawā Natural Area Reserve (NAR), researchers with the Maui Forest Bird Recovery Project (MFBRP) documented Pueo depredating honeycreepers on two occasions. In the early afternoon of 21 April 2006, while observing a Maui Parrotbill (*Pseudonestor xanthophrys*) nest containing a single chick, a Pueo was observed soaring over the area. Later that day, presumably the same Pueo was observed approaching the nest tree. The brooding female immediately flew off the nest suggesting a behavioral response to the aerial predator and the owl quickly perched in the top of the nest tree. The nest was confirmed to be empty immediately after the owl's visit, suggesting that the owl had depredated the Parrotbill nestling. This is the first observation of a Pueo taking a Maui Parrotbill. On 8 May 2007, a Pueo was observed flying toward and eliciting loud alarm calls from at least two adult 'Apapane (*Himatione sanguinea*). The two 'Apapane dispersed and the owl returned to a perch where it was observed consuming an 'Apapane. It could not be determined whether the depredated 'Apapane was a fledgling or a nestling but it appeared to be a young bird from the plumage characteristics that were visible.

In both cases, the behavioral response of the native forest birds indicated that the Pueo was recognized as a predator. On two other occasions in Hanawā NAR, native honeycreepers and

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Hawaiian Short-eared Owl (Pueo, *Asio flammeus sandwichensis*). This endemic race occurs on all main islands, but is most common on Kaua'i, Maui, and Hawai'i. It is listed as endangered on O'ahu by the State of Hawai'i. Photo by Tom Dove.

non-native passerines were observed mobbing a perched Pueo and alarm calling loudly for up to 10 minutes until the Pueo flew off, and on two further occasions a Pueo flying above the forest canopy was accompanied by alarm calls, though somewhat less raucous. In Kaua'i forests, fledgling Puaiohi, the Small Kaua'i Thrush (*Myadestes palmeri*) also exhibit behaviors that may reduce predation by avian predators (Snetsinger et al. 1999). Given that historically a long-legged bird-eating Stilt-owl (*Grallistrix auceps*), (Olson & James 1991; Ziegler 2002) did occur on Kaua'i and Maui the observed predator evasion behaviors are not unexpected.

Short-eared Owls consume a variable diet. In Hawai'i, pellet analyses indicate that mice, birds and rats, respectively are their most common prey (Snetsinger et al. 1994; Mostello 1996), and large insects also are taken (Mostello 1996). Birds depredated by Pueo have included passerines, seabirds and shorebirds (Pyle 1987; Snetsinger et al. 1994; Mostello 1996). Owls in general respond to regional differences in prey abundance. For example, owls in coastal regions depredate more birds than those occupying interior regions (Holt 1993). The Pueo relies more heavily on birds and insects than its continental relatives (Snetsinger et al. 1994), likely because of the low rodent diversity of the Hawaiian Islands (Mostello 1996). Despite this, the Pueo has not been considered a major threat to native forest birds as few honeycreepers have been identified in their pellets. For example, of 248 owl pellets examined by Snetsinger (1994) and Mostello (1996), only one 'Apapane, two 'Amakihi (*Hemignathus virens*) and five 'Iwi (*Vestiaria coccinea*) were identified. However, Mostello (1996) determined that 15% of the bird remains in Pueo pellets were juveniles, and could not be identified to species. Undoubtedly a portion of these bones were those of native birds, as Snetsinger et al. (2005) attributed 10% of nest failures of the Puaiohi to Pueo.

Observations indicate that Pueo are more common in Hanawā NAR during the honeycreeper breeding seasons than during the rest of the year, and Pueo may be shifting habitat in response to an abundant and easily captured food source (see Mostello 1996). If this is the case, they may be more of a threat to native species than previously appreciated. The Maui Parrotbill population is estimated at 500 individuals \pm 230 (Scott et al. 1986). Unlike other honeycreepers, Maui Parrotbill produce a

maximum of one young per year (Simon et al. 2000, MFBRP unpubl. data). Further, the Maui Parrotbill has very low nest success and is vulnerable to increases in nest predation. As part of our work, we control rats and small Indian mongoose, thus lowering the risk of nest predation. However, it is unknown if these activities (i.e., reduction of small mammal populations) result in cat and owl populations switching to diets comprised of more birds. More research is necessary to determine the effect of removing small mammals on Pueo abundance, and the Pueo's impact on honeycreeper nest success.

Acknowledgements

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HAS Program Meetings

Program Meetings are sponsored by HAS and the UH Biology Department, and are held at UH Mānoa's St. John lab building (Botany Building), in room 011 in the ground floor auditorium. The address is 3190 Maile Way. Attendance is free and open to the public.

April 21, Monday, 6:30 – 8:30 p.m.
Year of the Reef: Impacts of Alien Algae with Dr. Cynthia Hunter

Dr. Cynthia Hunter, Assistant Professor of Marine Biology at UH Mānoa, will discuss the impacts of alien algae on Hawaii's reefs. 2008 is the International Year of the Reef; let this be your year to learn more about Hawaii's precious coral reefs!

Attention: Middle School Students (Grades 6 to 8)

“My Hawai'i” Story Project

What makes Hawaii's environment special to you? Join the “My Hawai'i” writing contest by sharing your feelings about our environment and telling us about your Hawai'i. Stories should be typed, no longer than 1,000 words. Poems should be 150 words or less. Submit your story or poem online at www.hawaiiconservation.org/myhawaii.

DEADLINE: Your story or poem must be received by **5 p.m. Friday, April 18, 2008.**

This writing contest is sponsored by the Hawai'i Conservation Alliance and the Pacific Writers' Connection. For details visit www.hawaiiconservation.org/myhawaii or call (808) 586-0923.

HAS Undergraduate Tuition Scholarship Available for the 2008-2009 School Year Applications Due May 1, 2008

Through a trust set up by Yao Shen in memory of Rose Schuster Taylor, the Hawaii Audubon Society annually awards a full tuition scholarship to an undergraduate student in the University of Hawai'i system. Applicants must be majoring in a field related to Hawaiian or Pacific natural history. Applications for the 2008-2009 school year are due on May 1, 2008. Application guidelines are available at www.hawaiiudubon.com under “chapter news,” or by contacting the HAS office.

Coconut Island Field Trip Report

By Arlene Buchholz

It was a beautiful sunny day on Monday, February 18, and 17 participants carpooled to the Windward Mall and then to the Lilipuna pier for a spectacular view of the bay and island. Coconut Island staff ferried our group across to the island in several groups in the shuttle boat. The water in the bay was very clear and there are healthy coral heads and reef fish visible around the island. When we arrived on the island we were greeted by the Coconut Island community education volunteer coordinator, Jennifer. Because our group was relatively large we were divided into two groups with volunteer docents. The tour guides explained some of the fascinating natural and human history and current activities on Coconut Island or Moku o Lo'e. Coconut Island is owned and managed by the University of Hawai'i. The boat called the "super sucker" used for removing alien algae with a large underwater vacuum is moored at the dock and used for projects in Kāne'ohe bay. We walked around the edge of the island and saw some of the Hawai'i Institute of Marine Biology laboratories, lecture rooms and research projects including black and white tipped reef shark research, coral, marine mammal and aquaculture projects. The views from the island of Kāne'ohe and the Ko'olau mountains are spectacular. We stopped for lunch with a view out over the ocean water swimming pool that was used in the past when the island was a private resort. Pacific golden plovers and ruddy turnstones were seen along the coastline.

For more information there is a recently published book on Coconut Island entitled: Moku o Lo'e: A History of Coconut Island by P. Christiaan Klieger, with contributions by Philip Helfrich and Jo-Ann C. Leong, published by Bishop Museum press. Thank you to Norma Bustos for coordinating the field trip and to the Hawai'i Institute of Marine Biology tour guides for a wonderful opportunity to visit Coconut Island.

Two HAS members add:

"We all enjoyed a lovely day, an informative time spent with docents and lunch with the best view in the world. Thanks to all who made it possible." Carol Loose

"Thanks so much for making the Coconut Island trip available last Monday. It was such a gorgeous windward morning made more spectacular by the tour set up by the Audubon Society. The shared information by the volunteers was interesting and contributed to a wonderful morning enjoying the special-ness of Coconut Island." Judy Richardson



The lighthouse dated 1935 welcomes visitors from the pier at Coconut Island with the majestic Ko'olau Mountains in the background. The island was inhabited long before 1935 and now serves as The Hawai'i Institute of Marine Biology. Sixty four acres of coral reef surround Coconut Island (Moku O Lo'e) with the island itself approximately 29 acres. Photo by Judy Richardson.



Tranquil pond at Coconut Island reflecting the tropical gardens at the visitor's cabana. This lagoon is part of 6 acres of lagoons used for keeping organisms in captivity for study. Photo by Judy Richardson.

HAS Field Trips

Contact the HAS Office at: (808) 528-1432, hiaudsoc@pixi.com

Saturday, April 5

Bird Walk at Ho'omaluhia Botanical Garden

7:30 a.m. – 9:00 a.m.

Discover wetland and urban birds within the gardens. Ho'omaluhia Botanical Garden is at 45-650 Luluku Road in Kāne'ohe. Bring binoculars and raincoat. Registration is limited; call (808) 233-7323 to sign up.

Saturday, April 19

Paikō Lagoon with Alice Roberts

7:30 a.m. – 9:30 a.m.

A chance to bid our migratory shorebirds goodbye, and to explore many other fascinating creatures along the shoreline. This is a wonderful treat of a field trip, and one that keiki will particularly enjoy! Wear old tennis shoes or reefwalkers, and bring binoculars, water, sunscreen, and a hat. Call Alice to register, (808) 864-8122.

Pu‘u ‘Ō‘ō Field Trip Report

Twenty one birders joined leaders Les Chibana and Dan Lindsey on this February 10 birding adventure off of Saddle Road on the island of Hawai‘i.

Report by Les Chibana: The long spate of rains finally broke to allow us a gorgeous day along the Pu‘u ‘Ō‘ō Trail from Saddle Road. Mauna Kea displayed why its name translates to “White Mountain.” Mauna Loa’s snowcap was less obvious from our vantage point. We had great sightings of ‘I‘iwi and ‘Apapane; ‘Elepaio and ‘Amakihi needed a bit more work to see, and ‘Ōma‘o were more heard than seen, although a few people did get a glimpse of some. All of these forest bird species were vocalizing. ‘I‘iwi

seemed to out-number all of the others, possibly because they were actively chasing and being more noticeable. The ‘Elepaio that we saw were the darker Volcano type. I’m not sure how many people got to see the gray-brown ‘Ōma‘o, as this unique singer can sit quite undetectably. Yellow-green ‘Amakihi were plentiful along with the similar sized and colored Japanese White-eye.

Great weather and abundant bird song caused me to keep the group at some stops for a while, shortening our time to spend looking for ‘Akiapōlā‘au. With a bit more time, we may have gotten a look at one, but we had to call it a day. Back at the parking area off Saddle Road while recounting our sightings, an ‘Io cruised in to land on a high spot in the ‘a‘a flow, giving us a nice opportunity to study this intermediate-plumaged individual. Part of the group headed over to Kīpuka 21 to look at the area from the outside, as the trail is still closed for construction. We saw a few of the common forest species,



The group enjoyed a spectacular day of birding along the Pu‘u ‘Ō‘ō Trail on the Big Island. Here, snow capped Mauna Kea stands majestically in the background. Photo by Carol Bebb.

but did not get any glimpse of the Hawai‘i Creeper or ‘Ākepa that were released by the Keauhou Bird Conservation Center late last year.

Anyone interested in volunteering to help with weed pulling and trail cleanup should contact Virginia Aragon <varagon@dofawha.org> of the Dept. of Forestry and Wildlife’s Na Ala Hele trail system division. Tell her that you’re a Hawaii Audubon Society member and that I referred you to her.

Thank you all for joining the walk; I enjoyed it!

HAS Board member Carol Bebb adds: *“It was a rewarding trip especially to hike with friendly like-minded folks and to see so many ‘I‘iwi, ‘Amakihi, ‘Apapane, and ‘Elepaio. It was apropos to be welcomed at the trailhead by the ‘Ōma‘o and to be bid farewell by the ‘Io. The surrounding snow-capped Mauna Loa and Mauna Kea were spectacular as well. A perfect day!”*

Mahalo To Volunteers At Freeman Seabird Preserve

Habitat restoration activities wrap up in anticipation of the Shearwaters’ return

Hawaii Audubon Society’s Freeman Seabird Preserve is a cleaner, more inviting breeding site for the returning Wedge-tailed Shearwaters as a result of volunteer efforts at Black Point, O‘ahu over the past four months. While the birds have been nesting there for many years, alien plant species have gradually covered some of the prime burrow sites and surrounding terrain. Beginning in November, when the last of the shearwater fledglings left Black Point for the open ocean, small teams of volunteers worked at the Freeman Seabird Preserve to improve conditions for the birds when they return to land in March. The hot and dirty tasks involved scrambling up and down lava boulders on the makai slope of the Preserve to gather

trash, pull weeds and cut out alien shrubs. Notable progress was made, and every volunteer experienced the satisfaction of uncovering suitable nesting sites that had become clogged with vegetation and rubbish. Members of the Board of Directors of the Hawaii Audubon Society were joined at the Preserve by the following volunteers whose hard work and dedication are greatly appreciated: Mark, Carolyn and Kuhane Blackburn, Jan Henderson, Dixon and Penny Smith, Minjeong Kim, Deetsie Chave, Ellyn Tong, Wayne Schaut, John Hall, Will Kawano, Kathleen and Marion Kelly, Lani Yamasaki, Linda Paul, Lydi Morgan, and Gary Johnson.

Excerpts from the Journal of George C. Munro December 1890 to August 1891

Contributed by Ron Walker

On December 13, 1890, George Campbell Munro arrived in Honolulu after a voyage aboard the steamship *Mariposa* which left Auckland, New Zealand on the 1st of December. He was to assist ornithologist, Henry C. Palmer in collecting birds in Hawai'i under the sponsorship of Lord Walter Rothschild for the museum collection in Tring, England. His small handwritten journal of 314 pages chronicling his ornithological and cultural experiences in Hawai'i was never published. Through the courtesy of the family of Richard C. Towill, the Hawaii Audubon Society was allowed to copy the journal and present it here in a series of excerpts in the *'Elepaio*. We acknowledge the assistance of Marti Steele, Steven Bunting, and Charlotte Walker in transcribing and editing the journal and Dr. Robert Pyle for coordinating the project with the Bishop Museum. Copies of the original journal and typed transcriptions are available at the Bishop Museum archives and the Hawaii Audubon Society office.

From 1935 to 1937, Munro started the first comprehensive survey of the birds of Hawai'i and in 1939 he helped found the "Honolulu Audubon Society" which eventually became the Hawaii Audubon Society.

Our series continues with this excerpt from the "Journal kept by George C. Munro while studying and collecting natural history specimens in the Sandwich Islands."

Part 7

Wednesday, March 11, 1891 (Mana, Kaua'i)

"We went out as far as the other lake today but there is very little water in it & not many birds, the near lake is completely dry only a stretch of cracked mud pretty soft in places. We saw a few of the two short-legged plover Hunakai & Akekeke, & got 1 of the latter, at one of the two pools at this end of the near lake we saw the goose with several Aeo, Aukuu & Koloa he flew before we could get within shot & lit in a pond by the windmill pump following him with the same result we found a Koloa with chicks little brown things just hatched the water being shallow & there being little cover, I went in & caught 4 of them, if they dived I could follow them & catch them under the water easy. P knocked over a Aeo here, going back to the other hole, the goose was there again with his usual attendants & but for them P could easy have got within shot behind a bunch of rushes in the middle of the pond, but the Koloa, Aeo, & Aukuu on the near side flew with loud cries & of course the goose went too, coming home he was there again with the same results, this time he came within shot & the cartridge missed fire, every time we rose him he would chase the ducks and stilts about in the air for a good while, P broke the legs of a Aeo in the morning & in the evening we found him helpless in a puddle, in this water hole P shot a young Koloa nearly full grown, but not full-fledged enough to fly..."

Saturday, March 14, 1891

"This morning we all three started out for Mana, the goose

was at the same hole, but to fly as usual, at the second lake there was a little water & P knocked over a pair of Koloa, the male is a fine bird, altogether different in color to the female, it has two curled feathers in its tail & and is nearly as large as the N.Z. gray duck which bird the female resembles in color, there were a number of Hunakai and Akekeke on this lake but too wary to shoot...where the lake was I saw numbers of doves feeding, past the 2nd lake there is an extent of soft and wet ground where there were numbers of Koloa & Hunakai. I managed to secure one of the latter by lying on my horse's neck & riding into the mob as it arose, but it was a very long shot. P and I knocked over a stilt each on this place; we rode on to within $\frac{3}{4}$ of a mile of the end of the island, & and here between the reef & the cliffs which came pretty close here there was another small lake, on which were a great flock of stilts, another of Akekeke & Hunakai, also a mingled flock of Koloa, the saddle-backed duck "Moha" & the pin-tailed duck "Mapu", the two latter of which we have not yet a specimen. P got 2 Akekeke, 1 Aeo, 1 Koloa, & a fine specimen of a gull I had not before seen it was a very pretty bird & the only one we saw..."

Monday, March 16, 1891

"Hunted today out as far as the farthest lake at Polehale, riding out to the coast along the inside of the sand hills & following the beach till opposite Mana. On arriving at the first water holes at Konolewa, the goose was there and as usual rose in time but there being no ducks or Aeo to chase on the wing he flew over the dry lake & lit among some dry reeds, we rode over & he got straight back to the water hole & settled, hurrying back P stalked him & there being no other birds there to give the alarm he got a long sitting shot the bird rose & lit in the pond beside him & another shot gave him his quietus, it is not a large bird with a very short bill, at the far lake there was a flock of fully 100 Aeo, but were very shy & made a great noise with their short sharp cries when they would rise, the Hunakai were there but too shy. ..."

Tuesday, March 17, 1891

"Skinned up the birds; the goose measured 22 $\frac{2}{8}$ in, bill 1 $\frac{1}{4}$, tail 3 $\frac{3}{4}$ & spread of wing 47 in. it was a male & its stomach contained small seeds; bill & legs black, iride, brown, its color was mostly light brown, head, neck, & rump & tail black, with a white patch on each cheek nearly meeting on the throat, belly, behind legs & a thin strip over rump white, it was in poor condition. The snipe had a crab completely filling its stomach, it measured 11 $\frac{5}{8}$ in, the Hunakai measured 8 in., the Koloa 10 $\frac{1}{4}$ & the Akekeke 5 of them would average about 9 $\frac{1}{4}$ in. several of them had a number or reddish rusty feathers on the back and wings one especially, its head also was lighter than the rest being almost gray. I got out at daylight to see if I could get an Alae, shot a heron of the light species..."

BOOK REVIEW

By Ron Walker

Rare Birds Yearbook 2008: The World's 189 Most Threatened Birds

Birdlife International, 2007 www.rarebirdseyearbook.com 237 Pages with Color Photographs and Paintings

This softbound volume was produced not only to advertise the plight of rare birds worldwide, but to solicit support for their preservation. A percentage of the profits from the sale of the book goes to support conservation, and readers are invited to donate through www.birdlife.com, become a "Birdlife Partner", or join their Rare Bird Club. Birdlife International, the sponsor of the book, is described as a "Global Alliance of Conservation Organizations" numbering some 100 groups of approximately 2.5 million members. This is an important international effort.

As would be expected, the book includes many of Hawaii's endangered birds; eleven to be exact. The 'Akikiki is also listed but a notation states that "The U.S. Fish and Wildlife Service announced in 2005 that the 'Akikiki should be officially designated an endangered species, but decline to move forward with the listing for budgetary reasons."

One might question their selection of Hawaiian species covered in the book. The editors include the Laysan Duck and Nihoa Finch which other authors consider common in their present habitats. Six species (O'ahu 'Elepaio, Palila, Akiapōlā'au, Hawai'i Creeper, Hawai'i 'Ākepa and Hawaiian Petrel) which are considered "scarce" or "very scarce" by some authorities are not included.

The 189 "Critically Endangered" birds are treated by describing for each: (1) History, (2) Range and Population, (3) Threats, (4) Conservation Action to Date, and (5) Conservation Actions Required. As such, this is an important reference book for those interested in an up-to-date, global perspective on rare birds. Hawai'i researchers and managers may find new insights by reading about conservation actions implemented elsewhere.

The book also includes a chapter on the lives and adventures of four field ornithologists entitled "Species Finders". Other special sections cover selected individual bird species, climate change, migration studies, ecotourism, tour operators and extinct species. Another chapter entitled "Threats to Critically Endangered Species" lists all the species by category of threat leading to their rarity. As examples, "Natural System Modifications" is listed for the Nihoa Finch, "Invasive Non-Native Alien Species" for the Laysan Duck and "Climate Change and Severe Weather" for the 'Akikiki.

This is an important reference book written in an authoritative and entertaining manner. It will appeal to practicing ornithologists, conservationists and birders as a concise update on the plight of rare birds, worldwide.

Membership in Hawaii Audubon Society 2008

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Calendar of Events

Saturday, April 5
Bird Walk at Ho'omaluhia Botanical Garden *See page 22*

Friday, April 18
“My Hawai‘i” Story Entries Due *See page 21*

Saturday, April 19
Paikō Lagoon with Alice Roberts *See page 22*

Monday, April 21
Program Meeting: Impacts of Alien Algae *See page 21*

Tuesday, April 22
EARTH DAY!

Friday, April 25
ARBOR DAY!

Saturday, April 26
John James Audubon’s Birthday!

Thursday, May 1
HAS Undergraduate Scholarship Applications Due
See page 21

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