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HAWAII'S SEABIRD ISLANDS, NO. 3: MOKU-HO'ONIKI AND KANAHA ROCK, MOLOKAI

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LOCATION: Moku-ho'oniki is located in the Pailolo Channel 2.9 km SSE of Cape Halawa, east Moloka'i, at 21°8'10" N latitude, 156°42'20" W longitude. Map: USGS Halawa Quadrangle, Molokai.

STATUS: Hawaii State Seabird Sanctuary, protected by the Hawaii Department of Land and Natural Resources (DLNR). Permission to land must be obtained in writing from DLNR.

PHYSICAL DESCRIPTION: Moku-ho'oniki ("pinch island") and Kanaha ("shattered") Rock are the remnants of a vitric tuff cone built from hydromagmatic explosions containing pieces of submerged basalt and coral reef, followed by spatter and lava flows once the cone had emerged from the Pailolo Channel (Macdonald and Abbott 1970). The cone has been deeply cut by wave erosion and split into two islets separated by an underwater shoal less than 4 m deep (Fig. 1). Moku-ho'oniki has an area of 5.71 ha. Its main axis, extending NE-SW for 400 m, has an average width of 125 m. The island's highest point (64 m) is displaced to the southern third of the island, and from it a plateau slopes seaward in all directions until abruptly terminated by sea cliffs that in places reach 50 m. A striking feature of the island is a narrow, wave-washed peninsula of basalt, less than 10 m high, that extends 160 m SE from the island's highest point (Fig. 1). The plateau can be reached with some difficulty by climbing the cliffs from the base of this peninsula, or from the SW or NE tips of the island. A series of wind- and spray-eroded shelves at the NE tip provide the easiest route to the top, although this point is not accessible from other sea-level locations on the island.

Kanaha Rock lies 50 m SW of Moku-ho'oniki, to which it was formerly connected, and is directly in line with the parent island's main axis. It is a square, steep-sided sea stack about 35 m high (Fig. 2). Its NE sloping plateau has an area only somewhat less than the island's 0.49 ha. The top can be reached with some risk by climbing the cliffs at the southern corner of the island.

Both islands were heavily bombed for military training during World War II. Shrapnel, bullets, and an assortment of projectiles can be found everywhere, including offshore waters. Cliffs show fracture lines, and there are impact craters on the summit. Bombing has weakened the cliffs, making climbing hazardous.

ACCESS: Moku-ho'oniki is best reached by boat from Moloka'i or West Maui. The SE peninsula provides excellent protection from the prevailing NE tradewinds, usually heavy in the Pailolo Channel, and boats can anchor in its lee. It is an easy swim from boat to shore at many points on the peninsula and the adjacent southern shore, and from Moku-ho'oniki to Kanaha's eastern corner. This area however, is reported to harbor many sharks.

Figure 1. An aerial view of Moku-ho'oniki (l.) and Kanaha Rock (r.), looking east toward the western sides of the islands.

Figure 2. Kanaha Rock as seen from the western cliffs of Moku-ho'oniki, its parent island. Note the numerous burrows on the plateau of Kanaha. Lanai frames Kanaha on the horizon; Moloka'i lies in the upper right.

VEGETATION: AKK and BH searched for plants in all accessible areas on both islands. Voucher collections were made of all species found except the endangered *Scaevola coriacea* (see below). We located 24 species on the two islands (Table 1). Plants were more abundant and diverse in areas where lava dikes, interrupting the windswept uniformity of the tuff cone, held pockets of deeper soil (Fig. 3). Compared to these areas, the exposed dome of the island was barren and infertile. We estimated only 5% vegetative cover on the island. Plant density increased near the summit, where vegetation covered nearly 25% of the ground surface (Fig. 3). Vegetation was denser on Kanaha Rock, with about 10% overall cover and nearly 40% cover on the deeper plateau soils. Because this survey was conducted near the end of the dry summer period, we would expect a somewhat higher plant diversity and a significant increase in ground cover during the wetter winter months (December-March).

The most noteworthy discovery was a small patch of *Scaevola coriacea* (Goodeniaceae) covering 3.75 m^2 of ground on Moku-ho'oniki summit. This species was listed as endangered on 16 May 1986 (Bender 1986, USFWS 1987). The Moku-ho'oniki population is the first discovered near Moloka'i and only the fourth known, extending its range 20 km west from the important population on Moke'ehia, Maui (Kepler et al. 1984). The few plants discovered on Moku-ho'oniki are a

Table 1. Plants of Moku ho oniki and Kanaha Rock

Species[1]	Common Name	Status[2]	Relative Abundance Moku ho oniki	Kanaha	Remarks
Cenchrus echinatus	common sandbur	X	U	--	Two patches near summit
Cynodon dactylon	bermuda grass	X	U	--	Three small patches near summit
Dactyloctenium aegyptium	beach wiregrass	X	R	--	Only a few plants seen
Digitaria ciliaris	Henry's crabgrass	X	U	O	Forming low compact mats
Eleusine indica	goosegrass	X	R	--	One small patch on east slope
Panicum fauriei var. *latus*	mau'u	E	U	U	Three patches on upper slope
Panicum torridum kakonakona		E	U	--	Two patches near summit
Fimbristylis cymosa var. *umbellato-capitata*	coastal sedge	I	R	--	A few plants on lower slopes
Atriplex semibaccata	Australian saltbush	X	C	C	Widespread on higher slopes
Chenopodium murale	nettle-leafed goosefoot	X	O	--	One large patch on south slope
Boerhavia repens	*'alena*	I	R	O	Plants slightly scabrous
Sesuvium portulacastrum	*akulikuli*	I	C	C	Plants slightly lower slopes
Portulaca pilosa	blue-seeded portulaca, *ihi*	X	O	--	Scattered plants near summit
Portulaca lutea	yellow-flowered *ihi*	I	O	O	Scattered plants on upper slopes
Portulaca oleracea	common purslane	X	C	O	Scattered plants on upper slopes
Chamaesyce celastroides	*akoko*	E	C	C	Small patches near summit
Sida fallax	*'ilima*	E	C	C	Widespread on mid- and upper slopes
Jacquemontia sandwicensis ovalifolia	*pa'u-o-Hi'iaka*	E	C	C	Widespread on mid- and upper slopes
Heliotropium curassavicum	*nena*	I	R	O	Three on Moku-ho'oniki several on Kanaha
Lantana camara	lantana	X	U	--	A few scattered near summit
Lycium sandwicense	*'ohelo-kai*	I	U	O	Scattered patches on middle slopes
Scaevola coriacea	*dwarf naupaka*	E	R	--	One 1.5 m x 2.5-m patch at summit
Lipochaeta integrifolia	*nehe*	E	R	U	Small patches at summit
Sonchus oleraceus	sow thistle	X	R	U	Two plants on upper slopes

[1]Wagner et al. 1990
[2]Status: E=endemic, I=indigenous, X=introduced
[3]Relative Abundance: C=common, U=uncommon, O=occasional, R=rare, --=absent (see remarks)

Figure 3. An aerial view looking northeast to the summit of Moku-ho'oniki, showing numerous Wedge-tailed Shearwater burrows, and the general increase in plant density near the summit. The area shown is leeward of a prominent basaltic ridge and has deeper soils.

valuable source of genetic diversity and have become increasingly important because Maui's Waiehu Pt., encompassing two-thirds of the total known habitat (Bender 1986), has been largely destroyed for residential development.

Since we began our surveys in 1977, we have found two island populations of *S. coriacea*. There is reason to hope for additional colonies on other islands off Moloka'i and Maui. Prime candidates would be Okala and Mokapu, off Molokai's north coast.

ORNITHOLOGICAL HISTORY: There is no previous published information on the avifauna of the island.

PRESENT SURVEY: We surveyed the island from 09:30 h on 8 September to 09:30 h on 9 September 1981.

BREEDING SEABIRDS AND THEIR STATUS

Wedge-tailed Shearwater (*Puffinus pacificus*). Shearwaters are the most abundant breeding species on the two islands. Most pairs nest in burrows, but nest scrapes and chicks were found in crevices, under boulders, and under ledges. One chick occupied an aluminum pipe near the north end of the island.

We counted 1,210 burrows on Moku-ho'oniki in a thorough check of all accessible areas and estimated a total number of 1,250 excavated burrows. Burrows were concentrated on the southern third of the island, which is protected from the full force of the northeast tradewinds by its location in the lee of the island's summit. Wind is further reduced by a prominent basaltic ridge running eastward from the apex of the island (Fig. 3). The reduction in windspeed traps soil particles borne over the summit by the prevailing tradewinds. Soils are deeper on the south facing slopes, and vegetation is more abundant. We found 839 (69%) of the Wedge-tailed Shearwater burrows in this area (Fig. 4).

Of 91 burrows examined in which the entire cavity was visible, 53 (58%) were empty. The remaining 38 (42%) contained downy chicks. The resulting estimate of 525 breeding pairs (active burrows) must underestimate the total population that attempts to breed on Moku-ho'oniki, as many nests undoubtedly failed, and deeper burrows may have contained a higher percentage of successful nests. Certainly more than 525 pairs were using the island. We counted departing adults before dawn on 9 September. On the east side of the island birds left at a rate of 60 per minute from 0545 until 0605 h, approximately 1,200 departing birds. Smaller numbers of shearwaters left before and after that interval, and undoubtedly birds also departed from the island's west side. We estimate that between 2,000 and 3,000 birds departed before sunrise. All birds headed northeast (normally upwind); none flew south.

All nests checked contained downy chicks slightly larger than those measured 12 days earlier on Hulu Island, 26 km to the east (Simons et al. 1985), suggesting synchronous egg laying and a fledging period beginning in early November. There was no significant difference in the frequency of burrows containing eggs or young between the two colonies (x^2=0.25, P<.05).

We counted the number of Wedge-tailed Shearwater burrows on Kanaha Rock from the summit of Moku-ho'oniki; counts of 90 and 96 burrows were obtained by CBK and TRS. BH climbed to the top of Kanaha Rock and found several burrows not visible from Moku-ho'oniki. We estimated a total of 110 burrows, approximately 46 (42%) of which should have been occupied by chicks.

Bulwer Petrel (*Bulweria bulwerii*). We found one nearly fledged chick in a rock pile near the island's summit, and a dead downy chick near the plateau's north end. Bulwer Petrels probably nest in suitable rock piles and crevices throughout the island, but such sites on Moku-ho'oniki are rare. We doubt that more than 25 pairs could nest on the island. None were located on Kanaha Rock during our short diurnal visit.

OTHER SEABIRDS SIGHTED

White-tailed Tropicbird (*Phaethon lepturus*). One adult circled the island at about 13:20 h on 8 September. This species may breed on the island.

Brown Booby (*Sula leucogaster*). Four adults were roosting on the western cliffs when we arrived on 8 September, and several others were seen less than one-half kilometer offshore twice during the day.

Great Frigatebird (*Fregata minor*). Four birds (1 male, 1 female, 2 juveniles) circled the island at dusk on 8 September and presumably roosted unseen overnight, for they were in the area again shortly after dawn on 9 September.

OTHER BIRDS

Black-crowned Night-Heron (*Nycticorax nycticorax*). One adult flew south along the east coast, landed for 5 minutes on the east peninsula, then flew out of sight around the south end of the island at 06:30 h on 9 September. Several birds foraged in the broad rocky intertidal flats on the east coast and adjacent peninsula.

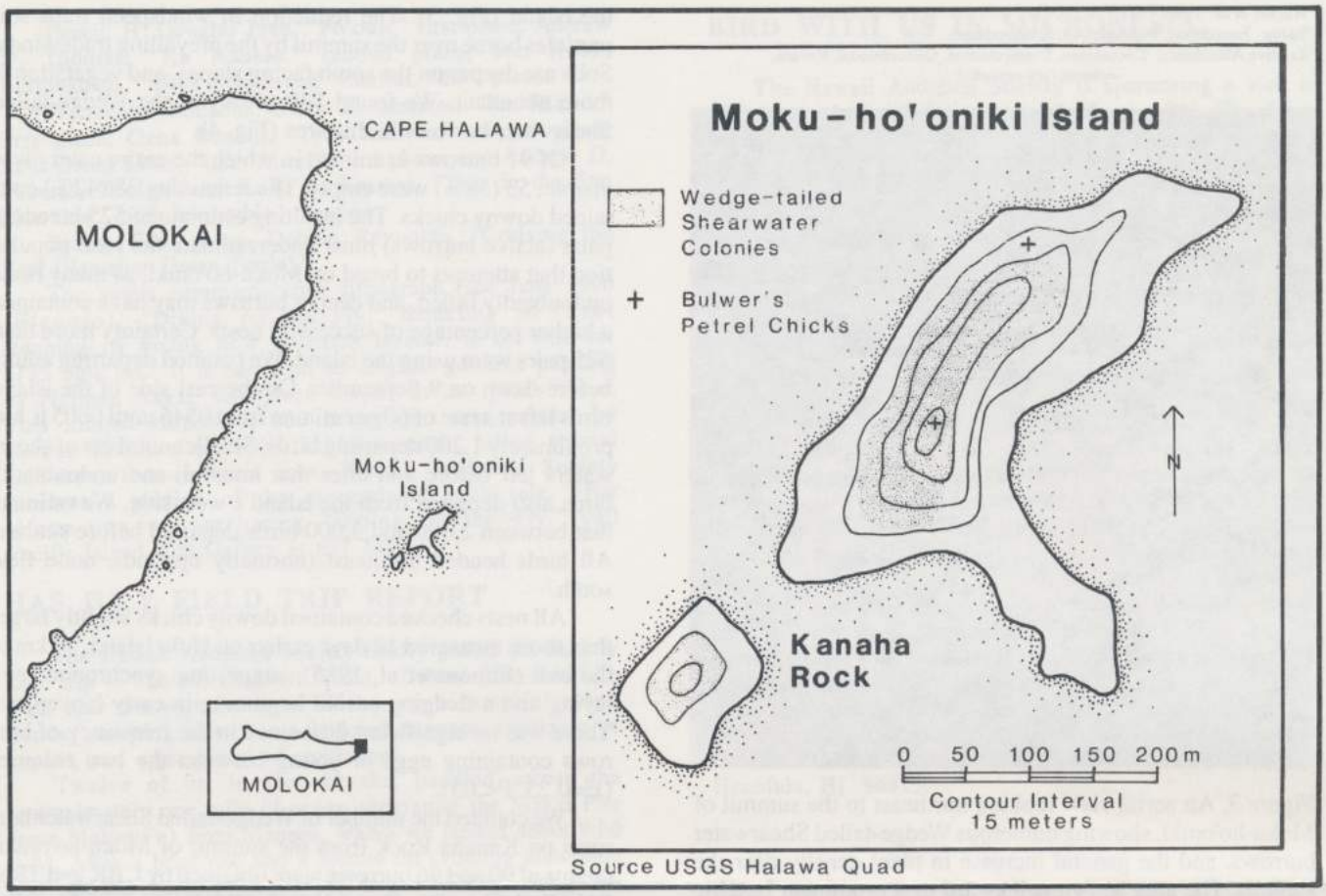

Figure 4. Moku-ho'oniki and Kanaha Rock, showing location of the major Wedge-tailed Shearwater colonies.

Table 2. Wedge-tailed Shearwater burrow density on islands in Maui Co.

Characteristics	Approx. Area (ha)	No. Burrows	Burrows/ha
Nearshore, sea stacks of basalt and ash			
Unbombed:			
Hulu Island[1]	0.49	750	1531
Moke'ehia[2]	3.24	1450	448
Far offshore, tuff cones			
Bombed:			
Molokini[3]	12.51	1500	120
Moku ho oniki	5.71	1250	219
Kanaha Rock	0.81	.110	136

References: [1]Simons et al. 1985; [2]Kepler et al. 1984; [3]Kepler & Kepler 1980.

Golden-Plover *(Pluvialis dominica)*. Small numbers (<6) were always present on the plateau of the main island and on the exposed tidal flats on the east coast.

Ruddy Turnstone *(Arenaria interpres)*. A flock of 21 occupied the plateau on 8 September, and smaller numbers, probably the same birds, foraged at low tide on the exposed tidal flats.

Wandering Tattler *(Heteroscelus incanus)*. One or two birds were regularly seen on rocky shorelines on the south and east sides of the island, and on the wave-cut terraces of Kanaha Rock.

Rock Dove (*Columba livia*). A least 25 Rock Doves are resident at Moku-ho'oniki. A flock of this size took off and circled the island at 06:10 h on 9 September. At least 10 birds were seen briefly when CBK flew past the island on 5 September 1985. The birds roost (and breed?) on the eastern cliffs, including a deep cave found just north of the peninsula. Most birds showed white in their plumage, many predominantly so, as do other feral populations in Hawaii.

OTHER VERTEBRATES: We saw dozens of snake-eyed skinks *(Cryptoblepharus boutoni)* on the island's plateau. We saw no other vertebrates, nor signs of them, and detected no evidence of terrestrial predation on either island.

FACTORS AFFECTING THE ISLAND: Wedge-tailed Shearwater nest sites are severely limited by the lack of soil for burrowing. Nests were concentrated in those areas with good soil cover, especially on the southern (leeward) third of the island (see Fig. 1). Areas with shallow or no soil basically lacked burrows. Burrow density was less than one-third that on Moke'ehia and Hulu islands (Kepler et al. 1984, Simons et al. 1985), where soil pockets were deep. There is a consistent difference (Table 2) in burrow density between the two major island types so far studied in Maui County. Nearshore sea stacks with soil-forming ash harbor denser shearwater colonies than tuff cones in the Pailolo and Alalakeiki channels between Maui and Moloka'i, and between Maui and Kaho'olawe respectively. The tuff cones may have held larger shearwater colonies at one time but have been subjected to

military bombardment. The use of heavy ordnance on islands exposed to heavy tradewinds undoubtedly resulted in the loss of soil loosened or heaved up by the explosive impact of bombs. This suggests that past military activity has contributed to what appear to be reduced Wedge-tailed Shearwater densities on Moku-ho'oniki and Kanaha Rock.

We saw no other sign of disturbance on either island. The relative isolation, inhospitable cliffs, and legal protection of Moku-ho'oniki and Kanaha Rock should ensure their biological integrity well into the 21st century. We highly recommend that no commercial tour boats be allowed to anchor at these islands for the purpose of snorkeling.

ACKNOWLEDGMENTS

We are grateful to Mike Severns for boat transportation to the islands from Maui, to Tom Hauptman of Pacific Helicopter Tours, Inc., for providing an aerial view of the island and checking on our progress at the end of the first day, to the late Jits Kunioki for providing floats for ferrying our gear from the boat to the landing, to Derral Herbst (USFWS) for assisting with our plant identifications, and to the Hawaii Department of Land and Natural Resources for providing our landing permits. The manuscript benefitted from reviews by S. Fefer, C. Harrison, J. Jacobi, and C. Keller.

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ENVIRONMENTAL DIRECTORY AVAILABLE

The Hawaii Audubon Society recently published the *Hawai`i Green Pages*, a directory compiled in celebration of Earth Day 1990. The directory lists over 150 environmental efforts in Hawai`i. For a free copy, send a self-addressed stamped #10 envelope to Directory, Hawaii Audubon Society, 212 Merchant Street, Suite 320, Honolulu, HI.

EDUCATION COMMITTEE NEWS

Kanaha .... Natural Wonders to Discover, Resources to Explore!

Maui needs outdoor educational programs, especially for its young school children. Kanaha Pond Wildlife Sanctuary, one of Hawai`i's most significant remaining wetlands, provides a safe haven for endangered Ae`o (Hawaiian Stilts), `Alae Ke`oke`o (Hawaiian Coots), and several species of migratory birds, too. In addition to plentiful wildlife, Kanaha's accessible location on the northeastern outskirts of Kahului makes it ideal for environmental education. An entry permit from the Department of Land and Natural Resources is required.

Beginning in March 1990, Eda Kinnear and I started to guide children and their teachers through the Kanaha Pond sanctuary trails as a joint outreach of the Hawaii Audubon Society and the Native Hawaiian Plant Society. I concentrated on the sanctuary's history and bird life, while Eda discussed the native Hawaiian coastal plants that the Native Hawaiian Plant Society is working to establish at Kanaha.

Once in the field, students learned the Hawaiian history of the royal fishponds, birds, and plant life. The first student group to visit Kanaha in March was able to see overwintering birds, `Akekeke or Ruddy Turnstone, Hunakai or Sanderling, `Ulili or Wandering Tattler, and Kolea or Pacific Golden Plover. Later groups missed seeing as many different bird species but were treated to the sight and sounds of stilt chicks and their doting parents. An especially favorite scene: stilt parents protecting their young by chasing away the `Auku`u or Black-crowned Night-Heron with persistent aerial dives and raucous squawks.

Our experience with the 150 students (mostly first and second graders) who participated has been rewarding. Teachers and students have responded favorably, word-of-mouth news has traveled fast, and it looks like there will be many more Kanaha Pond outings in the future. Our goal is to build a long-lasting, worthwhile program that introduces all Maui students to the natural world at Kanaha Pond. Tips or suggestions for this project, and your participation, are solicited and welcome.

Renate Gassmann-Duvall
572-1584 (Maui)

ART SHOW WINNERS

Sally R. Simmer's transparent watercolor "Ke Kia` i (The Guardian)" won first prize in Hawaii Audubon Society's annual art contest on 16 June 1990. Ms. Simmer took home $250. Other overall winners were H. Douglas Pratt, $150 for his second place pencil drawing "Po`ouli," and Les Honda, $100, for his oil "Songs in the Wind--The Hawai`i `O`o."

Other prize winners were:

Photography: "Japanese White-eye on Banyon" by David Millard, first place; "`Ohi`a at Steaming Bluff, Volcano, Hawai`i" by Glenn K.M. Chang, second place; and "`Io Hawaiian Hawk" by Jim Snyder, third place.

Print: "Kona's `Alala," monotype by Gayle Anderson.

Oil/Acrylic: "Songs in the Wind--The Hawai`i `O`o," oil by Les Honda, first place; Michael Gonsalves' "The First Fish," acrylic, second place; and Lynn Boyer's "View from Hale`iwa," oil on canvass, third place.

3-D/Mixed: Honorable mentions to North Shore Glass' 71/2" and 10" hand blown glass "Seashells" and Jane Wyatt Fullerton's "Turtle, Hawai`i Petroglyph," mixed.

Pencil: H. Douglas Pratt, "Po`ouli," first place; Andrew D. Thomas, "Ka Nahele," second place; and Robin Burningham, "Black Mamo and `Ohawai," third place.

Watercolor/Gouache: Sally R. Simmer, "Ke Kia` i," first place; Gena Bentall, "True Natives," second place; Ruth Glenn Little, "Late Riser," third place; and Andrew D. Thomas, "Kolea" and Sally R. Simmer, "Two in the Sun Plus One," both honorable mention.

Pastel: First place, Debbie Reynolds, "Cruising the Reef (Hawaiian Green Turtle)."

The year's commemorative lithograph (see June 1990 *`Elepaio*), "Dining on the Fly," depicting an `I`iwi teaching its young how to catch insects, is on sale for $135 plus tax. It is based on an original gouache painting by Norman Nagai, first-place winner in last year's show. This limited edition of 950 lithographs was printed by Harbor Graphics on 100% acid-free paper, using special acid-free, fade-resistant inks. Hawaii Audubon Society receives a portion of the proceeds of each sale. For information on purchasing "Dining on the Fly," call Pacific Island Arts Gallery at 637-7880.

HAS JULY FIELD TRIP REPORT

The Hawaii Audubon Society finally pulled off its July field trip to Manana (Rabbit) Island, offshore from Sea Life Park near the eastern tip of O`ahu, on a beautiful sunny Sunday morning after two scheduled changes, shortages of kayaks, and a great deal of confusion.

Twelve of us, in five kayaks, paddled across the approximately one mile of ocean separating the Makai Pier (near Makapu`u) from Manana, where we landed about 9:00 A.M. After a brief rest and a lecture on avoiding disturbing the island's nesting birds, we began hiking along the western shoreline.

Resident Sooty Terns appeared to have nearly completed nesting. Although thousands of the birds were still on the island, we observed very few black-plumaged fledglings. Brown Noddy nesting was in full swing, with eggs, chicks, fledglings, and many hundreds of adult birds.

Wedge-tailed Shearwaters were seen in burrows; several were found incubating eggs. No chicks or fledglings were observed. We made little effort to examine burrows, however, so as not to disturb the birds unnecessarily.

Bulwer's Petrels were nesting in good numbers and several were heard calling. Eggs and downy chicks of this species were seen in holes and crevices in the island's western cliffs. Three Red-tailed Tropicbirds flew along the island's western ridges, and Great Frigatebirds and Red-footed Boobies were flying offshore, between Manana and O`ahu. No rabbits and not a single shorebird was observed during the outing.

The day was a scorcher, but lunch and a refreshing swim revived us. We began the paddle back to Makai Pier about 12:30 P.M. and landed about half an hour later without incident.

The Hawaii Audubon Society gratefully acknowledges the cooperation of Ralph Saito, Division of Forestry and Wildlife, and Pacific Outdoor Adventures. The 15 July outing was a great one!

Bruce D. Eilerts

HELP WANTED

Computer-knowledged volunteer to assist in establishing a Society membership address and mailing list in the Society's MacIntosh Plus computer. Please contact Robert Pyle at 262-4046.

BIRD WITH US IN MICRONESIA

The Hawaii Audubon Society is sponsoring a visit to Micronesia from 15 February to 3 March 1991. The focus is on birds.

Koror, Yap, Truk, Saipan, and Pohnpei are among the thousands of coral atolls and volcanic islands scattered across nearly 12,000 square miles of the Pacific Ocean and known as Micronesia.

The Pohnpei Flycatcher, Fantail, Lory, Cicadabird, Long-billed White-eye, Oceanic Flycatcher, Blue-faced Parrotfinch, Great Truk White-eye, Palau Fruit-Dove, Micronesian Pigeon, Palau Ground-Dove, Nicobar Pigeon, Nightingale Reed-Warbler, Golden White-eye, Rufous Fantail, Mariana Fruit-Dove, Mariana Crow, and Black Drongo are among the birds the group can hope to see.

Dr. H. Douglas Pratt, an authority on the natural history and bird life of Hawaii and the Pacific, will lead the HAS group. Pratt, a talented artist as well as a zoologist, illustrated the *Field Guide to the Birds of Hawaii and the Tropical Pacific*. His work is on display at the Bishop Museum.

The tour will cost $3,895 a person, including round-trip air fare from Honolulu. If there are fewer than 13 participants, the cost will be $3,995 each. Hawaii Audubon will receive $150 per participant. As of press time, eight people were signed up.

For more information and a detailed itinerary, contact Hawaii Audubon Society, 212 Merchant Street, Suite 320, Honolulu, HI 96813.

HAS DUES SET FOR YEAR 1991

The Hawaii Audubon Society Board of Directors has approved the following membership schedule for the calendar year 1991. The basic $6 rate is unchanged from 1990. Surcharges for postage have been added for certain classes of mail to compensate more adequately for certain mailing costs.

HAS DUES FOR 1991
Includes delivery of *`Elepaio*

U.S. Zip Code Addresses (Bulk mail, not forwardable to new address)	$ 6
Mexico	11
Canada	12
All other countries, surface mail (Delivery in 6 weeks to 3 months)	13

Optional Airmail Delivery

U.S. Zip Code Addresses (1st Class)	12
All other countries except U.S., Canada and Mexico	24
Life Membership (May be paid in three equal installments)	150
Junior Membership (age 18 and under)	3

The foregoing dues schedule is based on current U.S. Postage rates. An increase in U.S. rates is possible in 1991. However, the Society will maintain the above dues level through 1991.

THE ENVIRONMENT IN SONG AND ACTION

"The ocean is not a dump," was the message delivered to a Honolulu audience in a program by Puppets on the Path at the McCoy Pavilion in Ala Moana Park, sponsored by the Hawaii Audubon Society in celebration of Earth Day 1990. (The program was in lieu of the April HAS general meeting.)

Puppeteers Dina Kageler, Jo Diotalevi, and Kate Schuerch, of the Big Island, appeared as the Anthurium Sisters. Accompanying themselves on the guitar and using Hawai`i as their theme, they offered environmental songs and puppet action relating to both land and sea, but not restricted to Hawai`i. Their performance was directed to all age groups and involved audience participation.

In the beginning, the puppeteers described the Pacific region without its familiar islands. But the sea bottom cracked and an undersea volcano erupted with a big flow of "pillow" lava. This piled up, layer on layer, until it broke the surface of the sea. Today's islands, led by 14,000-foot Mauna Loa, are products of this process.

The puppet characters included "Melody," the baby humpback whale, born one winter off Maui but migrating in the spring to Alaska. "Honu," the sea turtle, another Pacific native, had a few lines to sing about having to wear scientists' identification tags. Moray eels, lobsters, Moorish idols, crabs, and sea urchins crossed the stage, each with his own message. They lament that "eat or be eaten" is the rule of the sea.

Picnickers and other humans, as well as ships that dump trash in the ocean, got a bad name from all the actors. "Rubbish is nasty," they sang," and it doesn't disappear."

The Anthurium Sisters concluded with a song telling the audience to "Get the drift and bag it.

Betty L. Johnson

WILDLIFE REFUGE SCALED BACK

Bishop Estate apparently has refused to sell the 23,000 acre Keauhou Ranch on the Big Island to the U.S. Fish and Wildlife Service. This acquisition is USFWS' highest priority in the state of Hawaii, ranking 18th on the Service's "Land and Water Conservation Fund National Priority List (amended)" dated 15 December 1989. Hawaii's entire congressional delegation supported the purchase of Keauhou Ranch and Kilauea Forest, and persuaded Congress to appropriate $7 million for this purpose. The funds now sit idle.

According to USFWS draft Environmental Assessment (April 1989), the Keauhou-Kilauea Forest area is at a critical juncture linking the island of Hawaii's wetter windward forest habitat with the drier forest habitat to the west. This forest has been identified in recovery plans for the endangered Hawai'i Island forest birds and the endangered *nene* (Hawaiian goose) as containing habitat that needs protection and enhancement. The forested Keauhou-Kilauea regions provide critical habitat also for several endangered forest birds in the honeycreeper family, including the Hawaii creeper, the 'akiapola'au, the 'akepa, and possibly the very rare 'o'u. At upper elevations this forest contains scrub habitat essential to the nene.

The service has rescinded its 1989 environmental assessment and now proposes to purchase only Kilauea Forest (2,955 acres), 11 percent of the original proposal. USFWS could ask the Department of Justice to begin condemnation proceedings to acquire the remaining 23,000 acres it has identified as crucial to the survival of these birds. The service's record in acting swiftly to ensure the survival of endangered birds and an economical purchase of property is not encouraging however. USFWS waited a decade before it filed suit to purchase Kealia Pond, Maui, a suit that still drags on.

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Arlington, VA 22209

FILING CABINET NEEDED

Once again we are looking for a new or used four-drawer filing cabinet. Please call the office, 528-1432, and leave a message if you can donate one. All contributions are tax deductible to the extent allowed by law.

The *'Elepaio* welcomes expressions of opinion from readers on matters that are germaine to the concerns of the Hawaiian Audubon Society.

This column is not intended as a medium for the publication of field observations. Please do not exceed 250 words. Remember to include your name, address and professional/organizational connections. The editor may elect to condense your message.

CALENDAR OF EVENTS

Sept. 10 (Mon.) HAS Conservation Committee Meeting: HAS office at 6:00 P.M. Call Marjorie Ziegler for details, 528-1432.

Sept. 10 (Mon.) HAS Board Meeting: HAS office at 7:00 P.M. Call M. Casey Jarman for details, 263-6396 (hm), 956-7489 (wk).

Sept. 16 (Sun.) HAS September Field Trip: `Ewa Limestone Sinkholes. Dr. Alan Ziegler will lead this trip and speak on geology, archaeology, and fossil Hawaiian bird bones. Participants will also have the opportunity to dig for bones in one of the sinkholes. Wear shoes and bring hat, gloves, sunscreen, and water. Meet in front of the State Library on Punchbowl Street at 7:30 A.M. Call Dr. Ziegler for details, 247-5318.

Sept. 20 (Mon.) HAS General Meeting: Atherton Halau, Bishop Museum, 7:30 P.M. Call M. Casey Jarman for details, 263-6396 (hm), 956-7489 (wk).

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ADDRESS CORRECTION REQUESTED.