'ELEPAIO

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Observations on the Nesting of the Hawaii 'Akepa

by Mark S. Collins

The 'Akepa *(Loxops coccineus)* is a Hawaiian honeycreeper with four recognized subspecies. The endangered Hawaii island race *(L. c. coccineus)* is limited to the upper elevation (ca. 1500-2200 m) forests on the slopes of Mauna Kea, Mauna Loa, and Hualalai (USFWS 1975). Despite the growing concern for its survival, little has been reported on its ecology and behavior.

The nest of a Hawaii 'Akepa was first found by John Sincock on 12 May 1976 near the upper edge of the Kau Forest Reserve (Sincock and Scott 1980). During a U.S. Forest Service study on the slopes of Mauna Loa, the second and third Hawaii 'Akepa nests were found, and are the subject of this report.

STUDY AREA AND METHODS

The two nests were located in trees on the Keauhou Ranch study site, 15 km north of the headquarters of Hawaii Volcanoes National Park, on the edge of a wet, mature ohia *(Metrosideros collina)* and koa *(Acacia koa)* rain forest (Mueller-Dombois et al. 1981:217-220; 231-268). The forest has been recently logged and is now grazed by cattle. Sections of relatively undisturbed native forest occur in irregular stands, delineated by old logging skid trails, primarily in pasture grasses *(Microleana stipoides, Holcus lanatus,* and *Anthoxyanthum odoratum).* Prominent shrubs and small trees in the area include *Myoporum sandwicense, Cheirodendron* sp., *Ilex* sp., *Rubus hawaiiensis, Dryopteris* sp., *Cibotium glaucum* and *Sadleria cyatheoides.*

I observed these two nests by binoculars and spotting scope from secluded locations at least 25 m from the nest tree in order to minimize disturbance. I found one nest (Nest A) during the incubation period, and observed it for 11.45 hours over 26 days. Before the other nest (Nest B) was abandoned, I observed it for 1.38 hours on three separate days.

RESULTS

NEST AND EGGS

On 22 March 1978 at Keauhou Ranch I found a Hawaii 'Akepa nest with an incubating female (Nest A). On 11 May 1978, P. Pyle (USFWS) found another (Nest B) with one egg. On 24 May, I noted 2 eggs in Nest B.

Nest A was located 8 m above the ground in an 18 m ohia snag. The nest cavity was in the trunk along a section devoid of branches. Above the cavity, a slender strip of bark approximately 1 m long had been torn away, probably by wind, forming a vertical groove in the trunk. A circular opening at the base of this groove led to the interior of the cavity. The opening measured 3 cm in diameter, and the depth of the cavity from bottom to lower lip was 5.2 cm. The nest was larger than the cavity opening but could not be directly measured. A pair of 'Apapane *(Himatione sanguinea sanguinea)* were nesting simultaneously in the same tree 2 m above the 'Akepa nest.

Nest B was situated 6.1 m high in a branch cavity of a fallen koa tree. The limb of the downed koa extended up 10 m from the

TABLE 1.
Hawaii 'Akepa nest observations

Observer	Date of Nesting	Location	Tree Species	Description	Nest Height (m)	Tree Height (m)	Elevation (m)	Status
J. Sincock *	5/76	Kau Forest Reserve	ohia	Cavity in trunk	1	20	1860	Young fledged.
M. Collins* (Nest A)	3/78	Keauhou Ranch	ohia snag	Cavity in trunk	8	18	1730	Young fledged.
P. Pyle * (Nest B)	5/78	Keauhou Ranch	koa snag	Cavity in limb	10	19	1725	Eggs abandoned.
C. Barclay †	5/78	Kau Forest Reserve	ohia	Cavity in trunk	7	30	?	Male and female entered cavity.
P. Paton §	4/79	Kilauea Forest Reserve	ohia snag	Cavity in trunk	6	17	1850	Female placed nest material in cavity.
L. MacIvor §	4/79	Kilauea Forest Reserve	koa	Cavity in limb	11	19	1610	Female placed nest material in cavity.

*-Reported in Sincock and Scott (1980).
†-Outcome of nest unknown
§-Abandoned before incubation.

ground and was partially supported by the trunk of an ohia tree. The cavity was bowl shaped, with an open top measuring 8.8 cm by 11 cm. The outside diameter of the nest was 6 cm, the inside diameter was 4.7 cm, and the inside depth of the nest was 1.1 cm.

Both nests were cup-like, and built in natural cavities where limbs had rotted out, forming holes in the supporting branch or trunk.

Both nests were constructed primarily of *Dryopteris* sp. and *Cibotium glaucum* fern scales and fern rhizomes (Table 2). Fern scales were the predominant material lining both nests, in contrast to the nest described by Sincock and Scott (1980) which has a soft lining of mosses.

Three other attempted 'Akepa nests have been observed by U.S. Forest Service personnel (Table 1). All of these attempts were in natural cavities in mature trees or snags and at elevations above 1600 m.

I collected the two eggs from Nest B after it had been abandoned for several weeks. The eggs were dull white with maroon blotches concentrated on the large end, and measured 17.8 mm by 13.3 and 17.6 mm by 12.9 mm. The eggs weighed 1.4 gm and 1.3 gm respectively. In measurements and coloration they resembled the single Hawaii 'Akepa egg reported by Sincock and Scott (1980).

TABLE 2.
Hawaii 'Akepa nest construction materials in percent by weight.

Item	Nest A	Nest B
Dryopteris fern scales	34	36
Misc'l grass & sedge leaves	21	—
Cibotium fern scales	18	13
Cibotium fern rhizomes	12	44
Pinus needles	6	—
Misc'l. mosses	6	—
ohia twigs	3	—
wood pieces	—	4
other	—	3
Totals	100%	100%

BEHAVIOR AT NEST

'Akepa forage primarily in the upper canopy of ohia and koa trees, and are rarely seen in the lower strata of the forest, yet all six of the nests described have been situated well below the tree canopy in large branches or trunks devoid of foliage. When near the nest, both sexes crept along large branches and the trunk. The observation of an adult creeping on large branches below the canopy may thus indicate nesting nearby. In all such instances, in my experience, the bird is probably near its nest or is looking for a suitable nest cavity.

In Nest A, bouts of uninterrupted incubation by the female averaged 18.6 mins (range 5-40 min; n=7). The female left the nest during the incubation period for 1-16 min intervals (x=7.0 min; n=12). Because of the cavity's narrow aperture and position, I was unable to view the contents of the nest.

I estimate that incubation continued until 6 April, judging by the amount of new feather growth of a young briefly glimpsed on 11 April. On that day, I saw the female stand on the nest and feed the nestlings by regurgitation. She also removed a whitish fecal sac, flew to a nearby tree, and discarded it. During my observations of the care of the young, the average amount of time the female was away from the nest was 25.7 mins (range 19-42 min; n=4). At these times, she foraged in ohia terminal buds, leaf axils, and occasionally in flowers. Her visits to feed the young lasted less than 1 min (n=5).

Males visited both nest trees on four occasions, but I never saw a male 'Akepa enter a nest cavity, in contrast to the observations of Sincock and Scott (1980) who saw the male there several times. Each male stayed near his nest, calling the female off the nest for courtship feeding. During courtship feeding, the females displayed with rapid calling and quivering wings, reminiscent of the begging behavior of a fledgling. The males approached the females from above and regurgitated food to them.

DISCUSSION

Information presently available on nest site preferences of 'Akepa indicates that the conservation of mature trees and snags should be a key element in any management plans. In North America, wildlife biologists and foresters have begun to realize the requirements of snag-dependent wildlife such as woodpeckers, eagles, and squirrels, and have developed management schemes to minimize destruction of such sites (e.g. Zeedyk and Evans 1975). Similar management techniques may be necessary for the recovery of the Hawaii 'Akepa. Unfortunately, our knowledge of its site requirements is still limited. We cannot, at present, determine minimum requirement for mature trees and snags. Clearly, however, any harvest of mature trees or snags in the upper elevation forests on the island of Hawaii will reduce the number of potential nest sites for the 'Akepa.

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LITERATURE CITED

Mueller-Dombois, D., K. W. Bridges, and H.L. Carson (eds.). 1981. Island ecosystems: Biological organization in selected Hawaiian communities. Hutchinson Ross Publ. Co., Stroudsburg, Pa.

Sincock, J.L. and J.M. Scott. 1980. Cavity nesting of the 'Akepa of the island of Hawaii. Wilson Bull. 92:261-263.

USFWS (U.S. Fish and Wildlife Service). 1975. Listing of endangered and threatened fauna. Federal Register 40:44149-44151.

Zeedyk, W.D. and K.E. Evans. 1975. Silvicultural options and habitat values in deciduous forests. Proc. Sympos. Management Forest and Range Habitats for Nongame Birds. USDA Forest Service, Gen. Tech. Rpt. WO-1.

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An Unusual Example of Basking by a Green Turtle in the Northwestern Hawaiian Islands

by Alan K.H. Kam

The Green Turtle, *Chelonia mydas,* is known to haul our regularly to bask on coral and beaches and lava rock ledges in the Northwestern Hawaiian Islands (Balazs 1976, 1977, 1980; Whittow and Balazs 1979, 1982; Sheekey 1982). This is unusual since, worldwide, basking behavior by sea turtles is a rare occurrence. Furthermore, of the seven marine turtle species, only the green turtle has been reported basking. In the Northwestern Hawaiian Islands (NWHI) most of the basking sites are isolated, uninhabited islands within the confines of the Hawaiian Islands National Wildlife Refuge.

In Hawaii basking has also been observed in captive-reared juvenile Green Turtles held in a tank (Balazs and Ross 1974). Green Turtles of all sizes at Sea Life Park on Oahu, Hawaii, regularly bask on a sloping concrete ramp in their outside display pool. Basking also takes place in captivity on a wooden ramp constructed in a tank at the University of Hawaii's Kewalo Marine Laboratory (Whittow and Balazs 1982).

On 30 October 1982, the author and a fellow field observer, C. E. Bowlby, saw an unusual example of basking at Pearl and Hermes Reef in the NWHI. A large Green Turtle was observed on the sloping steel plates of an old exposed shipwreck (Figure 1). We sighted the turtle at 0915 while motoring by small boat en route from Southeast Island to North Island. The shipwreck is situated within the barrier reef at the northeastern edge of Pearl and Hermes Reef. It is located 11.1 km from Southeast Island and 4.7 km from Little North Island, the nearest land mass (see maps in Amerson et al. 1974). The turtle was basking on the northern face of the hull on the largest section of the wreckage, about 1.5 m above the water. The winds were from the northeast at 25-35 km per hour, the air temperature was approximately 21-*C,* and the cloud cover was 80%. The low tide prevented us from motoring close to the wreckage. Consequently, the nearest point of observation was about 100 m.

Figure 1. Green Turtle basking on shipwreck, Pearl and Hermes Reef, NWHI, 30 October 1982.

Photo by Alan K. H. Kam

It is interesting to note that the sloping steel wreckage on the reef adjacent to Whale-Skate Island at French Frigate Shoals in the NWHI has never been recorded as a basking site (G.H. Balazs, pers. comm., October 1982). Apparently, turtles find the nearby sand beach to be more acceptable for this purpose. At Pearl and Hermes Reef, the wreck is located several kilometers from any available beach. It is a safe assumption that the temperature of dry steel surface on the wreck would be higher than that of sand (Whittow and Balazs 1982). Because the turtle was observed basking early in the morning, at a time when there was extensive cloud cover, and that it had selected a northerly aspect of the wreck, it can be supposed that basking on this wreck may be more frequent at night or under cool conditions (G. C. Whittow, pers. comm., January 1983).

This is the first record of a turtle basking on the wreck at Pearl and Hermes Reef or any man-made structure in the wild. The wreck's periodic use by turtles may have been overlooked by other visiting researchers and refuge personnel. The wreck is at a remote area of Pearl and Hermes Reef that is not easy to view unless special effort is made to motor close. Future workers in the area should, therefore, try to determine to what extent the wreck is used for basking.

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Literature Cited

Amerson, A.B., Jr., R.B. Clapp, and W.D. Wirtz II. 1974. The natural history of Pearl and Hermes Reef, Northwestern Hawaiian Islands. Atoll Res. Bill. 174:1-306.

Balazs, G.H. 1976. Green turtle migrations in the Hawaiian Archipelago. Biol. Conserv. 9:125-140.

_____. 1977. Ecological aspects of green turtles at Necker Island. Hawaii Institute of Marine Biology, University of Hawaii. Unpubl. Rep., 27 p.

Balazs, G.H. 1980. Synopsis of biological data on the green turtle in the Hawaiian Islands. U.S. Dep. Commer., NOAA Tech. Memo., NMFS, NOAA-TM-NMFS-SWFC-7 and University of Hawaii Sea Grant Cooperative Report UNIHI-SEAGRANT-CR-81-02, 141 p.

Balazs, G.H., and E. Ross. 1974. Observations on the basking habit of the captive juvenile Pacific green turtle. Copeia (1974) 2:542-544.

Sheekey, E.A. 1982. Green turtles basking on Tern Island, French Frigate Shoals. 'Elepaio 43(6):45-47.

Whittow, G.C., and G.H. Balazs. 1979. The thermal biology of Hawaiian basking green turtles *(Chelonia mydas).* Am. Zool. 19(3):981.

_____. 1982. Basking behavior of the Hawaiian green turtle *(Chelonia mydas).* Pac. Sci. 36:129-139.

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Leach's Storm-Petrel from French Frigate Shoals: Victim of Pufferfish Toxin?

by Ted N. Pettit

On 18 January, 1982 a dead storm-petrel was found washed up on the south beach of Tern Island, French Frigate Shoals (23°52' N, 165° 18'W). It had a white rump, forked-tail, and brown crossbar on the wings. The specimen was found in relatively fresh condition and was later identified as a Leach's Storm-Petrel *(Oceanodroma leucorhoa)* by Roger Clapp of the National Wildlife Research Center, Natural Museum of Natural History. The petrel was confirmed as belonging to the nominate race, the one most common to Hawaiian waters. This specimen (USNM 599138) is apparently the first record of this species for French Frigate Shoals (R. Clapp pers. comm.).

A number of measurements were taken after drying the specimen at room temperature for 12 hours. These include: fresh mass (54.3 grams), culmen length (16.0 mm), middle toe length (21.6 mm), wing cord length (151 mm), tibia-fibula length (37.9 mm), and tibiotarsus length (27.9 mm). The specimen was then frozen for laboratory dissection upon return to the University of Hawaii Department of Physiology.

The sex of the bird was indeterminate upon gross examination due to atrophied gonads. Fat deposits were noted under the skin and in the abdomen. Examination of stomach contents revealed a slightly digested pufferfish weighing 5.3 grams with a fork length (beak to tail fork) of 67 mm. The fish was identified as an adult White-Spotted Pufferfish (Tetradontidae: *Canthigaster jactator)* by Michael P. Seki of the National Marine Fisheries Service, Honolulu. The presence of the pufferfish in an otherwise healthy-appearing storm-petrel suggested the bird may have succumbed to pufferfish toxin or tetrodotoxin. This toxic substance is present in the skin of the White-Spotted Pufferfish, although it is generally in higher concentrations in the liver and gonads (Halstead 1970). Normally, ingestion of tetrodotoxin results in convulsions and respiratory paralysis within minutes. Analysis of lipid extract from the pufferfish specimen by radioimmunoassay revealed high levels of poly-ether residues characteristic of tetrodotoxin and/or ciguatara toxin (Y. Hokama, Department of Pathology, John A. Burns School of Medicine, University of Hawaii, pers. comm.). However, additional pathologic studies were not performed to conclusively establish toxicosis.

In a recent survey of food habits of 18 Hawaiian seabirds (Harrison et al. 1983), including over 4,300 food samples, only a single specimen of pufferfish was retrieved from a live Red-tailed Tropicbird *(Phaethon rubricauda).* This specimen was not tested for tetrodotoxin and not all members of the Order Tetraodontiformes produce the neurotoxic substance. Most Tetraodontoidea (smooth puffers) are tetrodotoxic, however. Thus, *Canthigaster jactator* did not appear in the diets of Hawaiian seabirds.

Milstein (1971) has noted that pufferfish are avoided by Caribbean predator fish in pelagic, coral reef, and near-shore habitats. This observation is particularly striking because puffers are relatively inactive, slow-swimming, and conspicuous species. Although this would appear to make them likely prey for a number of marine predators, they may be avoided, perhaps by instinctual feeding habits. The death of the Leach's Storm-Petrel in this instance may have been due to inappropriate feeding instincts in a strange environment.

Leach's Storm-Petrel is not common to Hawaiian waters, and, being a pelagic (deep water) feeder, may not normally encounter adult reef fish such as puffers. Given the opportunistic feeding strategies of most seabirds, the Leach's Storm-Petrel found on Tern Island may have selected an unusual (and lethal) food item. If pelagic storm-petrels are normally ecologically segregated from feeding upon reef fish, one might ask how near-shore feeding seabirds discriminate against preying upon lethal pufferfish.

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Literature Cited

Halstead, B.W. 1970. Poisonous and venomous marine animals of the world. Vol. 3. Vertebrates. U.S. Government Printing Office, Washington, D.C.

Harrison, C.S., T.S. Hida and M.P. Seki. 1983. Hawaiian seabird feeding ecology. Wildlife Monographs. No. 85. 71 pp.

Milstein, C.B. 1971. Pufferfish of *Sphoeroides testudineus* (Tetraodontidae) in predator-pufferfish prey interactions. M.S. Thesis. Univ. of Puerto Rico, Mayaguez, Puerto Rico.

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PROTECTION AND MANAGEMENT OF TERRESTRIAL HAWAIIAN ECOSYSTEMS: A SYNOPSIS

A symposium entitled Protection and Management of Terrestrial Hawaiian Ecosystems was held at Hawaii Volcanoes National Park, 5-6 June, 1984. There were 133 paid registrants at the meeting, which was convened by the National Park Service (NPS) and the U.S. Fish and Wildlife Service (USFWS). The purpose of the symposium was to: 1) Encourage cooperative efforts in resource planning, management, and research in Hawaii, 2) Identify successes and bottlenecks in working together, 3) Bring together people with diverse interests (e.g. ranching, timbering, educating, managing protected areas, hunting, legislating, and native Hawaiian culture) to learn and discuss what can be done for native Hawaiian ecosystems, and 4) Move forward with the job of wise stewardship of the natural resources for which we all share responsibility.

The sessions were structured to present overviews of the status, research, and management needs for native and alien (introduced) biota (vertebrates, invertebrates, plants, and diseases), and then to discuss concepts useful in managing for and against these components. Such topics as preserve design, genetic considerations, monitoring, and restoration were considered in this concept category. The final session of the Symposium was entitled Current and Future Roles of Agencies, Conservation Groups, Legislation, and the Public in Preserving and Managing Hawaiian Ecosystems. Representatives from the State senate, conservation groups, a native Hawaiian group, the ranching community, State and Federal agencies, and other organizations were heard from.

The usually-expressed needs for increased communication and education at nearly all levels were articulated, and it is vital that these be better addressed. Additional problem areas identified (and perhaps aggravated by insularity and shortage of trained researchers, managers, and educators, in relation to the magnitude of the problems) are: lack of adequate and comprehensive land use planning; a shortage of conservation advocates who are not scientists; conflicts between the advocacy and the scientific roles,and the loss of credibility for both with landowners and others; conservation "gadflies" who polarize issues too frequently and too soon; bureaucratic inertia and lack of effort; unprofessional behavior of resource personnel, as manifested in excessive pettiness, uncompleted, unpublished, and unrefereed reports, and lack of follow-through; lack of local training and education for resource specialists; and agency administrators/managers who choose not to protect, manage, and interpret the natural resources under their care, who are dominated by agency hierarchies and politics, and/or do not understand the needs for adequate and active stewardship in Hawaii, and/or do not place a high priority on doing so.

A number of current examples of resource management successes in Hawaii were also cited. These include: cooperative research on biocontrol for alien plants (Hawaii Div. of Forestry and Wildlife (DOFAW), U.S. Forest Service (USFS), NPS, University of Hawaii (UH), Hawaii Department of Agriculture (DOA), and others); the cooperative mongoose control project (USFWS, NPS, DOFAW); the Hawaiian Goose captive propagation and release project (DOFAW, NPS); endangered species recovery teams (USFWS and others); the Hawaii Forest Bird Survey (USFWS and other); and numerous activities of the Nature Conservancy (TNC) in Hawaii.

In response to questions from attendees, experts in the audience were prompted to volunteer to consolidate and make available short descriptions of ecosystems and vegetation types in Hawaii. All attendees were challenged to list the top ten resource problems in terrestrial ecosystem protection and management, and submit them for summary and evaluation. Dr. Frank Howarth, B.P. Bishop Museum, will report on this soon. Additional follow-up plans are being discussed, including prompt publication of the Symposium proceedings in an outlet such as Pacific Science, a B.P. Bishop Museum Bulletin, or an NPS publication.

C.P. Stone

JAMES CAMPBELL NWR TRIP REPORT -FEBRUARY 1984-

The field trip to the Kii Unit of the James Campbell National Wildlife Refuge, Oahu, on 12 February 1984 was attended by 33 people. We observed native Hawaiian birds along with introduced and migratory species. At 9:40 a.m. we started walking down the dike between pond C and B, then walked around pond A. Weather conditions were favorable for observing: light winds, partly cloudy, and the temperature in the low 80's.

Of the native Hawaiian waterbirds, the Hawaiian Stilts and Hawaiian Coots were abun-

dant in all ponds observed. The Hawaiian Stilts were beginning to set up territories for breeding. Approximately six to ten Koloa were seen, and four Hawaiian Gallinules were spotted. Black-crowned Night-Herons were present in all ponds. In pond C, a Bonaparte Gull (accidental straggler), and a Pectoral Sandpiper (regular migrant to Hawaii), were sighted. Other migratory shorebirds observed were Wandering Tattlers, large flocks of Ruddy Turnstones and Sanderlings, and Lesser Golden-Plovers. Some plovers were just beginning to acquire spring plumage.

Four waterfowl species which are regular winter migrants to the Hawaiian Islands were observed. Pintails and Northern Shovelers were most numerous, with most drakes in breeding plumage. A single American Wigeon and a flock of 17 Green-winged Teal were flushed. Several Mallards, probably feral birds, were with them.

Some unusual migratory waterfowl were seen, including two Blue-winged Teal, two Fulvous Whistling-Ducks, and a female Garganey in pond A. The facial patterns of the Garganey were clearly visible. The pale stripe above the eye, dark eye line, and the small pale stripe below the eye could be seen. Also, the diffuse white lore spot was noticeable. We observed the Garganey feeding with its head below the water, and also flapping its wings occasionally. The pale area in the forewing was observed once when the Garganey flew.

A male and a female Ring-necked Pheasant flew over us while we were observing pond C. A group of six Red Avadavats (Strawberry Finches) were seen, along with the usual common urban birds. We returned to our cars and left the refuge at 12:45 p.m.

Robin Hanford

HAWAII AUDUBON AWARDS

April 10, 1984, marked the opening of the 27th Annual Hawaiian Science and Engineering Fair at the Neal Blaisdell Exhibition Hall. The Fair is jointly aponsored by the Hawaii Academy of Science, U.H. Manoa College of Education, and the Hawaii State Department of Education. Science projects exhibited at the Fair represent the best of projects from statewide school and district fairs.

Each year Hawaii Audubon Society presents awards for student work promoting the preservation of Hawaii's native wildlife. This year's awards were presented to Heidi Kawahara, Robyn Toy and Tanya Nomura.

Heidi's project, entitled "The Hawaiian Stilts Wanted: Alive!", was a study of behavioral patterns of Hawaiian Stilts, *Himantopus mexicanus knudseni*, at Kanaha Pond on Maui. In addition to identifying and categorizing specific behaviors, she also charted the areas and times of each pattern.

Robyn and Tanya's project, "Pueo", was a study of Hawaii's native owl, *Asio flammeus sandwichensis*. Their research included observations of both field and captive owls, and interviews with people knowledgeable of the Pueo's habitat, handling, and care.

The awardees each will be receiving a plaque, Hawaii Audubon Society's book Hawaii's Birds, and a year's membership in the National Audubon Society.

Linda Ogata

MANANA ISLAND FIELD TRIP REPORT

-JUNE 1984-

"Go away, go away", protested the multitude of nesting Sooty Terns, as 28 Audubon Society members and friends approached Manana (or Rabbit) Island on 17 June. Their calls and swirling masses constituted the most conspicuous natural aspect of the island. In mid-June, the white-speckled black young are nearly fully grown and learning how to fly. It was a good time for humans to visit the colony, as the risk of causing parents to abandon or become separated from young is very low.

A sunny day, slight trade winds, and reduced swell created ideal landing conditions as our group was ferried out to Manana, a State Seabird Sanctuary, accessible by permit only.

After becoming acquainted with the Sooty Tern colony (estimated at 25,000 pairs), we commenced a short stroll along the beach to the east. Jack Swenson, an Oceanic Institute researcher, was spotted on the hillside poking his head into Wedge-tailed Shearwater burrows. He came down, and after explaining his shearwater research to the group, pointed out an incubating Wedge-tailed Shearwater in a shallow, sandy burrow.

Continuing along the beach, we located several Bulwer's Petrels on eggs in rounded holes. The holes are thought to be the result of mortar-fire practice on the island during the 1940's. Is this a rare case of military target practice benefitting the target area's wildlife? Perhaps. But when one also considers that the Sooty Tern population had fallen during that time to 1,000 birds (down from 50,000), a new perspective is shed on the rela-

tive benefits to the petrels.

In a gully about ten feet above the beach we found a Red-tailed Tropicbird shading its egg from the warming sun. Jack reports finding eight or nine nests on the island this year, an encouraging record count. The glistening white bird with red beak and 12" long tail streamers seemed unconcerned as members of the group approached to within ten feet.

Because of the appropriate timing in the Sooty Tern nesting cycle, we were able to carefully traverse the south slope to the crater rim. We proceeded in single file around the west end of the colony, where the occupied Wedge-tailed Shearwater burrows were sparsely distributed. Once on the rim, we proceeded to hike up the east ridge to the island's highest point, noting a few Brown Noddies on eggs along the way. Some of us also noted an adult Black-crowned Night-Heron sitting in one of the crater's two dozen palm trees.

We paused at the top to enjoy the sunshine, scenery, and birdlife. Six to eight more tropicbirds were spotted displaying over the island, and a Red-footed Booby lazily soared above the group. A couple of White Terns flapped in the distance. A Ruddy Turnstone flew by, patrolling the fortress while most of its brethren chose to attempt breeding in Alaska, far away. The noddies, a few of which were noted below, were found in higher numbers near the top. While many of us contented ourselves with the view from the top and a bite to eat, about half the group opted to return the long way, via a hike around the crater's north rim.

Back on the beach, a few went for a quick swim as the boats returned to rescue our sun-drenched and satisfied group. As we departed for Oahu, the "Sooties" continued to issue their distinctive cries, as they had throughout our visit. But their calls had taken on a different sound. After our care in respecting them within their sanctuary, we were confident they recognized us as friends and supporters to their continued existence. "Come again, come again".

Peter Pyle

ALOHA TO NEW MEMBERS

We welcome the following new members and encourage them to join in our activities!

Local: Jean Bancroft, Winnipeg, Manitoba; Mary Lou Bryan, Albuquerque, NM; Maxine L. Clason, Danville, CA; Robert D. Ehrlich, LaCanada, CA; Meleana Graham, Kekaha; Douglas J. Gray, Newfane, NY; Lynea Hinchman, Michigan City, IN; Catherine Hirsch, Kealia; Helen F. James, Washington D.C.; Laurance T. Jordan, Maunaloa; Patricia Kelly-Lee, Honolulu; Doug Newby, Dallas, TX; Gwendolyn O'Connor, Captain Cook; Laura H. Perkins, Kula; Scott E. Perkins, Kula; Ian Rasor, Waimanalo; Thomas Roland, Oxnard, CA; Cathy Roper, Ewa Beach; Anne Slocum-Main, Honolulu; Ernie Tamashiro, Kapaa; Linda Walden, Auburn, WA; Desmond White, Pearl Harbor; Susan Wirtz, Makawao; Alvin Y. Yoshinaga, Honolulu.

Joint (National and Hawaii): Amemiya, Hilo; Norlene Brewer, Kailua-Kona; Robert S. Burgess, Jr., Honolulu; Koko Crews, Honolulu; Mrs. Jane B. Dunaway, Hanalei; Ms. Lisa Elson, Honolulu; Mr. Donald M. Goldsberry, Honolulu; R.M. Gooding Biol., Honolulu; Mrs. Frank K. Greenwell, Kihei; Capt. Randall Harvey, Kaneohe; Kathi Kreinik, Kaneohe; John Lee, Kaneohe; Mr. Reg Marshall, Honolulu; Norman Matsuawa, Honolulu; Shirley E. McGeoghegan, Kailua; Mr. Smokey R. Newton, Lahaina; Mark Nikas, Santa Ana, CA; James A. Ogg, Honolulu; Mrs. P. O'Neill, Hilo; Holly K. Hager Payne, Hawaii Nat. Park; John W. Pegg, Jr., Olympia, WA; Lillian D. Scanlan, Kailua; Wade T. Shaffer, Kamuela.

Susan Schenck & Kammy Wong

VOLUNTEER NEEDED

Kathy Harrington, the person who patiently reserves the room for our general meeting each month (yes, it must be done on a month-to-month basis!), is leaving very shortly for the Mainland. A heartfelt mahalo to Kathy for her "behind-the-scenes" work.

We now need to find someone to do this job. It would be ideal for someone to talk with Kathy about the procedure before she leaves. It is not a time-consuming job, but it does require someone who is very dependable. Please call Kathy at 941-8323 if you are interested in finding out more about it.

JULY FIELD TRIP: MANANA ISLAND

On 15 July (Sunday) Sierra Club is leading a field trip to Manana (Rabbit) Island. Hawaii Audubon members are invited to go along.

Access to Manana is by permit only, and the permit restricts each field trip to an upper limit of 30 people.

Manana is a small island near Makapuu Beach; it can be reached only by swimming or wading ashore from a small boat. There is no fresh water and no shade on the island. If you are not comfortable with the idea of riding in a small boat, making your way in the surf to a rocky beach, spending several hours in the hot sun, or swimming from the boat to the shore, then this trip is not for you! But, if you are willing to risk these hazards, Manana is a good place to get close-up looks at seabirds on this State Sanctuary.

You must know how to swim in order to go on this trip.

There is a nominal fee to pay for the boat ride. Interested persons must call either Mark Rauzon (955-0993) or Denby Fawcett (734-7017) in order to get on the list and to find out where the meeting place is.

Participants should cover optical equipment with several waterproof layers of plastic, and wear sneakers or other appropriate protective footwear. Be assured, you are guaranteed to get wet!

WAIKIKI AQUARIUM: SIX-LEGGED WILDLIFE

The Waikiki Aquarium is sponsoring a series of Natural History lectures. The July lecture will be given by Steve Montgomery of the U.H. Entomology Department. His talk is entitled "Carnivorous Caterpillars and the Secrets of Six-legged Wildlife". He will describe the variety, lifestyles, and adaptations of "killer caterpillars" and other amazing insects.

The lecture is Wednesday, 18 July, at 7:30 p.m. in the Waikiki Aquarium foyer. Phone 923-4725 for more information. A $1.50 donation will be appreciated.

PUBLICATIONS OF THE SOCIETY

HAWAII'S BIRDS by the Society (1981). This is the best field guide to our birds, and includes colored illustrations of all native and well-established exotic species..... $3.95 plus postage: 70¢ (surface mail) or $1.03 (air). Hawaii residents only: add 16¢ for tax.

FIELD CHECKLIST OF BIRDS OF HAWAII by R. L. Pyle (1976). A pocket-size field card listing 125 species found in Hawaii with space for notes of field trips. (Postpaid).....$ .25
(ten or more, 10¢ per copy)

GUIDE TO HAWAIIAN BIRDING by members of the Society and edited by C. J. Ralph (1977). Where to go and some idea of what you are likely to see. For the islands of Kauai, Oahu, Lanai, Molokai, Maui and Hawaii (Postpaid).....$1.50

CHECKLIST OF THE BIRDS OF HAWAII by R. L. Pyle (1983). An authoritative compilation of all species naturally occurring in Hawaii as well as those introduced by man which are currently established as viable populations. Gives each species' status. (Postpaid).....$2.00

HELP WITH 'ELEPAIO

The August issue of the *'Elepaio* will be pasted-up 21 July (Saturday) at 1415 Victoria St. beginning at 12 noon. The entry phone number can be obtained by calling Marie at 533-7530 after 5 p.m. Everyone welcome to come and learn! Help is always needed.

'ELEPAIO BY AIRMAIL

Members and subscribers wishing to have the *'Elepaio* sent by airmail to addresses outside Hawaii may now obtain this service by remitting the additional amount needed to cover airmail postage costs. These amounts for 12 monthly issues are:

U.S. and territories and Canada.....$4.50
Central America, Carribean.....$12.50
S. America, Europe, Africa, Pacific and Asia.....$14.50

JULY PROGRAM:

LAST OF THE GREAT WHALES

The guest speaker for the Monday 16 July Hawaii Audubon general meeting will be Thomas Richards, a Research Affiliate with the Coconut Island Aquaculture Project. His talk, "The Last of the Great Whales", will feature slides of the Pacific Gray Whales. Although not a whale researcher per se, Mr. Richards considers himself to be a "student of whales".

The meeting will be held at the McCully-Moiliili Library at 2211 S. King St. at 7:30 p.m. If you have friends that are interested, bring them along! The meeting promises to be interesting and informative.

IF NOT A MEMBER, PLEASE JOIN US

JOINT MEMBERSHIP
(National and Hawaii Audubon Societies)

Individual	$ 30.00
Family	38.00
Sustaining	50.00
Supporting	100.00
Contributing	250.00
Donor	500.00
Life (single payment)	1500.00
Dual Life (single payment)	2000.00

Special rates for full-time students and Senior Citizens (65 years of age or older) are available. Please write for application form.

LOCAL MEMBERSHIP
(Hawaii Audubon Society only)

Regular	$ 6.00
Junior (18 and under)	3.00
Subscriber (non-Hawaii residents)	6.00
Life (payable in three equal annual installments)	150.00

All Local Memberships and Subscriptions are for a calendar year January through December. New Local Members and late-renewing members who send in dues through September may obtain all previous issues of 'Elepaio in that calendar year, upon request and reimbursement to the Society for mailing costs. Dues received after September are applied to membership extended through the following calendar year, but do not include previous issues of 'Elepaio in the current year.

HAWAII AUDUBON SOCIETY

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'ELEPAIO

Editors.....Marie Morin, Peter Galloway
(Send articles to Marie Morin, 1415 Victoria St. #1515, Honolulu, Hawaii 96822)

Production Committee.....Anne Conibear, Kathy Harrington, Audrey Newman (Conservation Editor), Susan Schenck, and Joel Simasko.

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Hawaii	Sheila Doyle	
Maui	Mary Evenson	
Lanai	Peter Connally	565-6242
Kauai	Dave Boynton	335-5008

CALENDAR OF EVENTS

THERE WILL NOT BE A BOARD MEETING IN JULY DUE TO LACK OF QUORUM OF BOARD MEMBERS.

July 15 (Sun.) Sierra Club field trip to Manana Island. See page 8 of this issue for more information.

July 16 (Mon.) General meeting at the McCully-Moiliili Library at 2211 S. King St., Honolulu. Speaker will be Thomas Richards on *The Last of the Great Whales*. Meeting starts at 7:30 p.m.

By-laws available by request.

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