



Distribution of Cattle Egret Roosts in Hawaii With Notes on the Problems Egrets Pose to Airports

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In 1959, 105 Cattle Egrets (*Bubulcus ibis*) were released throughout the Hawaiian Islands by the State Department of Agriculture in an effort to control arthropod pests of cattle (Breese 1959). Subsequent information on egret proliferation is limited, but it is evident that egrets began nesting soon after they were released on Oahu (Rockafellow 1960, Thistle 1963). Large populations of egrets are now established on Oahu and Kauai (Byrd, et al. 1980), with smaller populations on Maui (M. Ueoka and C. Kepler pers. comm.), Molokai (Walker 1983), and Hawaii (this study). Although egrets have been recorded on Lanai (L. Hirai pers. comm.) and Niihau (T. Telfer pers. comm.), no permanent roosts have been documented on these two islands. We know of no records of Cattle Egrets on Kahoolawe.

Recently, egrets have become pests at prawn farms on Oahu, where the egrets prey on prawns, and at airports in Honolulu, Lihue, and Hilo. Several near misses between large egret flocks and airplanes resulted in the Federal Aviation Administration (FAA) contracting the U.S. Fish and Wildlife Service (USFWS) in January 1982 to initiate a study of the ecology of cattle egrets in the Hilo area. The baseline data gathered was to be used to postulate potential control techniques for egrets at the Hilo airport.

The primary objectives of the study reported here are: 1) the documentation of the distribution and abundance of Cattle Egrets throughout Hawaii; 2) quantification of the habitat correlates of roosts throughout the state; and finally 3) to report on the nesting ecology of egrets at Lokoaka Pond, the primary heronry in the Hilo area.

STUDY AREA AND METHODS

To accomplish our first two objectives of documenting the status of egrets in Hawaii, we analysed responses to questionnaires sent to 62 biologists in Hawaii (21 were returned) by the State Department of Health. Biologists were asked to report any known egret roosts, nesting records, site histories, and habitat characteristics. In addition, we attempted to locate and census birds at all roost sites on Hawaii Island, and the large roost at Kahuku on Oahu. We also reviewed the literature for information on egrets in Hawaii.

For the third objective, the primary study area was a small island in Lokoaka Pond, 1 km north of General Lyman Field. Egrets on the island occupied a dead 8-m tall Norfolk Island pine (*Araucaria heterophylla*) and an adjacent live 3-m high by 5-m wide banyan tree (*Ficus* sp.).

We determined numbers of active nests weekly (i.e. nests with visible young or incubating adults) from January to March 1982 by

using a 15-60× spotting scope. Paton censused the roost opportunistically from 1980 through 1982. From April to July 1982, we visited the roost site weekly by boat to count active nests, eggs, nestlings, and "branchers" (mobile chicks over 4 weeks old).

The terminology we use throughout this paper is based on three categories of roosts: (a) TEMPORARY ROOSTS — sites used for less than 2 years, with egrets eventually returning to a permanent roost or heronry; (b) PERMANENT ROOST — sites used daily for more than 2 years, but no nesting recorded; (c) HERONRY — a roost where nesting has been recorded.

RESULTS AND DISCUSSION

Status of Cattle Egret Roosts in Hawaii

The statewide Cattle Egret population was estimated to be 13,000 egrets in June 1982, approximately 120 times the number of birds initially introduced in 1959 (Table 1). This population

Table 1. Cattle Egret roost locations in Hawaii. Roost numbers correspond to roost locations in Figure 1.

Island	Roost number	Location	Pop. est. (year)	Nesting	Years occupied
Kauai	1	Lumahai	50(80)	no	T
	2	Crater Hill	4000(81)	yes	11
	3	Kapaa	800(80)	no	7
	4	Hanamaulu	N/A	no	1(A)
	5	Kailiiahinale	N/A	no	T
	6	Huleia	N/A(80)	no	2(A)
	7	Huleia River	N/A	no	1
	8	Omao	3000(82)	yes	6
	9	Aepoe Res.	N/A	yes	1
Oahu	10	Kahuku Point	3000+(82)	yes	25
	11	Heeia	1300(83)	?	2
	12	Kaneohe MCAS	1300(82)	yes	11(A)
	13	West Loch	150+(82)	yes	22
Molokai	14	Umipa'a	200+(82)	yes	?
Maui	15	Kanaha	407(83)	no	10
Hawaii	16	Aimakapa	6(82)	no	5
	17	Honokaa-1	8(82)	no	T
	18	Honokaa-2	50(84)	no	T
	19	Honokaa-3	44(84)	no	T
	20	Hilo Bay	20(82)	no	10(A)
	21	Naniloa Surf	150(82)	no	T
	22	Kionakapahu	150(82)	no	T
	23	Lokoaka	506(84)	yes	13
	24	Keaau Ranch	100(72)	no	T
	25	Kapoho	70(82)	no	T
	26	Punalu'u	20(82)	no	T

T = temporary roost.
(A) = abandoned roost.

estimate is subject to variation due to the uncertainty of census results at the larger roosts and the chance that some roosts were not found. For example, the heronry at Kahuku Point was difficult to census due to the size of arriving and departing flocks, egret behavior at this large heronry, and the physical location of the roosts. During our censuses, an unknown percentage of the birds at Kahuku Point departed and arrived while it was still dark making an accurate population estimate difficult (D.P. Fellows pers. observ.). Birds at smaller roosts, such as Lokoaka, did not usually move during periods of poor light conditions. Also, roosts may exist where extensive surveys were not conducted.

From the questionnaires, literature, and our own observations, we learned of 25 roost sites in Hawaii (Fig. 1), and we obtained at least anecdotal information on most of them (Table 1). The following is an annotated list on the status of Cattle Egret roosts in Hawaii.

Kauai — The status of egrets on Kauai is summarized in 1980 (Byrd et al. 1980). A total of four roost sites were known to be used in 1980; the largest and only heronry was at Crater Hill. In 1982, there were 3 active roost sites on the island totalling approximately 8,000 birds (Table 1). Several hundred birds were noted at Omao reservoir in the spring of 1979, and by January 1982, 3,000 birds were estimated to roost there. Only the Crater Hill site was known to be used by nesting egrets in 1982 (T. Telfer pers. comm.).

Since 1982, the status of roosts on Kauai has changed considerably. The Omao Reservoir permanent roost has become a heronry, as has the roost at Lono Reservoir, so there are now 3 heronries on Kauai. A new roost site was discovered at Aepoeha Reservoir, and a relatively new roost adjacent to the Lihue airport at Hanamaulu was disrupted and moved to Kaliilahinale Reservoir (T. Telfer pers. comm.).

Oahu — The 25-year-old heronry at Kahuku is the oldest known roost site in the state. Over 3,000 birds were thought to be using Kahuku in 1982 (Table 1). Although birds have remained in the Kahuku area for 25 years, the exact roost site has shifted sporadically for unknown reasons. Egrets moved 2–3 km south to the initial roost site in the mid-1970s and then moved 1 km northward in early 1982 (R. Shallenberger pers. comm.).

A heronry existed near Kaneohe Marine Corps Air Station from 1971 to late 1981 or early 1982, then relocated to similar habitat 1 km away. The population then moved again, 6 km to the present Heeia site in late 1982 (R. Shallenberger and R. Coleman pers. comm.).

The number of egrets using the third reported egret roost site at Pearl Harbor's West Loch was probably underestimated due to access problems.

Maui — There has been no nesting of Cattle Egrets reported from Maui, although egrets have been on the island for at least 10 years. Forty egrets were first noted at Kanaha in 1975. By 1978, the Kanaha population had increased to 80 birds and continued to gradually increase to 120 egrets in January 1980, though no nesting was observed during this period (M. Ueoka pers. comm.). The birds roosted nightly for more than 3 years on emergent sedges 100 m from solid ground. In early 1982, the birds shifted their roost site 150 m to sedges closer to the edge of the pond, within 10 m of a dirt road (C. Kepler pers. comm.).

The Maui egret population increased dramatically from early 1982 to early 1983, from 120 birds to 407. Again, no nesting was observed during this population increase (M. Ueoka pers. comm.).

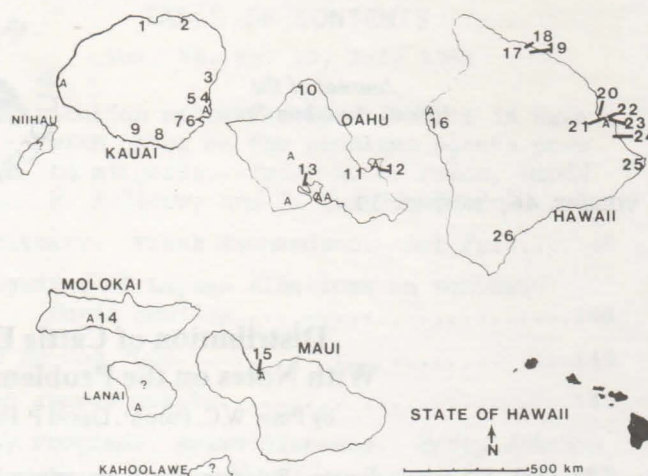


Figure 1. Location of Cattle Egret roost sites (numbers) and airports (A) in the Hawaiian Islands. See Table 1 for roost population sizes and present status.

Inter-island immigrants are the most plausible explanation to account for the large population increase.

Molokai — The Hawaii Division of Forestry and Wildlife semiannual waterbird surveys first noted Cattle Egrets on Molokai in the summer of 1974, but it wasn't until early 1983 that a heronry was found near Umipaa. Approximately 200 adult birds were counted at the heronry at 12:00 noon on 20 January 1983 with 90 nests structures, of which 30 were active (Walker 1983). Based on our censusing experience with Cattle Egrets at Lokoaka, a noon census would underestimate the number of birds actually using the roost by at least 2–3 times. Since we had no opportunity to visit the Umipaa roost, we left the population estimate at a conservative 200 birds.

Lanai — Like Molokai, Lanai is seldom visited by birdwatchers. The status of egrets remains uncertain. Several egrets were observed north of Lanai City in 1975–76, feeding with grazing horses (L. Hirai pers. comm.).

Hawaii — The history of the Lokoaka roost is poorly documented.



Location of the Lokoaka Pond heronry relative to General Lyman Field in Hilo.

Photo by Peter Paton



Lokoako Pond roost site in Hilo.

Photo by Peter Paton

The egret population is presumably descended from 32 egrets released on the island of Hawaii (12 at Keaau Ranch, 20 at Mahukona) in 1959 (Breese 1959). Lokoako Pond was used at least as early as January 1972, when Berger (1972) noted six egrets there. By February 1973, 30–40 egrets were roosting in the then live Norfolk Island pine at the present site (*Hawaii Tribune Herald* 2/11/73). In January 1978, at least 78 egrets were using the site (Pyle 1978). No nests were mentioned in any of the above accounts, and none were evident in the *Hawaii Tribune Herald* photo.

The first documented records of egrets nesting on Hawaii Island were in July 1980, when Paton (unpubl. field notes) counted 185 birds and 20 nests at Lokoaka. In December 1980, Paton counted 300 egrets and 32 nests. The population at Lokoaka had nearly doubled by the time the present study was initiated.

In mid-June 1982, 67 egrets were seen in a pasture adjoining Green Lake. Although the birds were roosting at Kapoho, birds that we had dyed confirmed that some, and possibly all, of the egrets had come from Lokoaka. No adequate census of the Kapoho population was obtained due to limited visibility and access problems. During the third week of July, the Lokoaka population increased by 130 birds and a subsequent check showed that the Kapoho roost had been abandoned. Discussions with area residents indicated seasonal (spring and summer) presence at Kapoho, suggesting that birds disperse from Lokoaka (possibly after breeding?) and return later in the year. This was the only evidence we had of possible seasonal movements of Cattle Egrets in Hawaii. The seasonal dispersal pattern of this sort could have been responsible for the large June to December increase noted in 1980.

All but one of the temporary roosts reported were on Hawaii Island (Table 1). This may only reflect our intensive survey and control efforts on that island. The temporary roosts at Kionakapahu and the Naniloa Surf Hotel were definitely established in response to egret control techniques initiated at Lokoaka, and the birds returned to Lokoaka when control ceased there. Destruction of the Shipman ranch roost tree in the early 1970s led to abandonment of the site. The Shipman Ranch birds then moved 11 km to Lokoaka and Hilo Bay. Egrets now only use the Shipman Ranch area occasionally as a temporary roost, staying for 1–2 nights and then leaving (R. Blackshear pers. comm.).

Status of the Hilo Bay roost is uncertain. Egrets roosted on

one or more of the navigational buoys in the bay from the early 1970s through at least 1980. Whether the buoys are still used and whether they were used continuously or intermittently is not known.

The relationship between the Punalu'u and Lokoaka population is unknown. Punalu'u was colonized in February 1982, when egrets were disappearing from Lokoaka. However, whereas Punalu'u was abandoned in August 1982, no additional egrets appeared at Lokoaka until December, when the population increased by 40 adults.

The origin of the Honokaa, Hawaii, birds is also unknown. The first Honokaa roost (Fig. 1, No. 17) was observed in December 1982, but the flock of eight birds remained only about 2 weeks. In the third week of December 1983, egrets again appeared at Honokaa where some 50 birds established a roost in mature sugarcane, 2 km east of the 1982 site. At the end of January 1984, the roost site changed to a second location in sugarcane 2.2 km to the east. The flock dwindled from about 40 birds in February and March to 27 on 16 April 1984. Four flew over the site on 24 April 1984, but roosted elsewhere, and no egrets were seen in the Honokaa area after 5 May 1984 (P.Q. Tomich pers. observ.).

Inter-island transients are a possible explanation for the origin of such birds, although they could have come from the Lokoaka heronry. Cattle Egrets are strong flyers and have been recorded on Midway, 2,000 km from the nearest roost on Kauai (P. Pyle pers. comm.).

Roost Habitat Correlates

Information reported here only includes data on 22 roosts found in the state; 4 roosts reported from Kauai (Hanamaulu, Kailiilihahinale, Huleia River, and Aepoeha Reservoir) were found after 1984 and not included in these analyses. Roosts throughout the Hawaiian Islands exhibited a number of similarities. Roosts tended to be situated at low elevations, averaging 30 m above sea level (s.d.=76.3), topographically level (85 percent of the total roosts), within 0.5 km of the ocean (80 percent, mean=1.2, s.d.=1.7), and adjacent to water (95 percent). Seventy percent of the roosts were adjacent to fresh or brackish water. Only one roost, Lumahai, which is a temporary roost, was near a fresh water stream; natural or



Egrets with cattle on the Big Island in deep grass.

Photo by Peter Paton

man-made impoundments (reservoirs, fish ponds, sugar mill settling ponds) characterized the remaining roost sites. Recent research on Kauai suggests that roost site selection is not as uniform as the above data indicates (T. Telfer pers. comm.).

Since we did not do any detailed vegetation analysis of roosts throughout the state, only general trends can be discussed. Trees less than 10 m high served as substrate for heronries (mean height=6.7 m, s.d.=2.0, Table 2). Heronries on islands other than Kauai tended to be in habitat patches consisting of more than one substrate species (Table 2). The heronries at Omao, Lono reservoir, and Kaliliiahinale are in 100 percent Hau (*Hibiscus tiliaceus*) (T. Telfer pers. comm.).

Permanent roosts and temporary roosts, on the other hand, were situated in uniform habitat patches. Much of the substrate used by birds in permanent and temporary habitat was not suitable for nest building. Nesting on Maui would require the birds to relocate out of the sedges. Sugarcane (Honokaa 2 and 3) is another substrate that is unsuitable for nesting, as it offers no support for nesting material. No obvious differences could be noted between heronries and permanent roosts in terms of substrate used, except on Maui. The only roosts located in trees over 10 m high were temporary roosts.

Breeding Biology

It is evident from Table 3 that egrets breed virtually year-round at Lokoaka. There was no period from January through June 1982 without young and/or eggs at the heronry tree. The 1982 nesting cycle at Lokoaka exhibited sharp peaks in January and June. Nesting ceased from July through September 1982, as a result of eradication efforts, though the atrophied gonads of egrets collected during this period suggest nesting might have been low without control. Egrets nested at Omao, Kauai from July to at least September 1985, showing that some egrets in the state nest during the late summer months. (T. Telfer pers. comm.).

Table 2. Roosting substrate of Cattle Egrets in Hawaii. Each number represents an individual roost. Numbers less than one are for the proportion of a roost in a particular habitat.

Species	Roost type		
	Temporary	Heronry	Permanent
Hau (<i>Hibiscus tiliaceus</i>)	2	0.3	3
Koa haole (<i>Leucaena glauca</i>)		1.8	
Ironwood (<i>Casuarina</i> sp.)	1	0.5	
Christmas Berry (<i>Schinus terebinthifolius</i>)		0.3	1
Mangrove (species unknown)		1.5	1
Kiawe (<i>Prosopis pallida</i>)		0.5	
Unidentified emergent sedges			1
Shower Tree (<i>Albizia</i> sp.)	1		
Coconut Palm (<i>Cocos nucifera</i>)	2		
Norfolk Island Pine (<i>Araucaria heterophylla</i>)		0.5	
Banyan (<i>Ficus</i> sp.)		0.5	
Cecropia (<i>Cecropia peltata</i>)	1		
Sugarcane (<i>Saccharum officinarum</i>)	2		
Harbor Buoy	1		

Table 3. Maximum number of Cattle Egret nests observed by month at Lokoaka Pond.

Month	Number of active nests			
	1980 ¹	1981 ¹	1982	1983 ⁵
January	— ²	8	66	34
February	—	34	57	52
March	—	—	57	56
April	—	0	23	36
May	—	—	59	46
June	20	—	70	45
July	—	21	70 ⁴	31
August	—	—	0 ⁴	
September	—	—	1 ⁴	
October	1	+ ³	15 ⁴	
November	32	+	38 ^{4,5}	
December	—	36	25 ^{4,5}	

¹1980–81 data from Paton, unpub. field notes.

²Dashes indicate no data.

³Plus indicates nests present but not counted.

⁴Ongoing adult control at roost.

⁵Chicks being removed at 2–4 week intervals.

In September 1982, one pair attempted to nest at the Lokoaka heronry, but trapping efforts caused nest abandonment. To attract the population back to the heronry, birds were allowed to start nesting again in October 1982. Within 3 weeks, 38 nests, containing an average of 2.58 eggs each, were built.

Clutch size ranged from two to six, with a mean of 3.32 eggs per nest (s.d.=1.06, n=41). The mobility of "branchers" precluded direct estimation of fledging success from individual nests. Instead, we compared the numbers of young "branchers" present on each visit with the numbers of 1-week-old young counted 3 weeks previously. Based on this, an average maximum of 0.6 chicks per nest reached the "brancher" stage in the spring of 1982. True fledging success was much lower due to extensive nest failure during incubation and moderate loss of older branchers. Taking these factors into consideration it appears unlikely that production exceeded 0.1–0.2 young per nest during the study period.

The percentage of the total Lokoaka population engaged in breeding activities varied throughout the study. Because egrets were not individually marked it is not known if the same adults were nesting more than one time per year or if different adults were nesting during different months of the year. Cattle Egrets are unique among the Ardeidae in that they are the only species able to breed when they are 1 year old (Kohlar 1966). In January 1982 an estimated 64 nests were active; that is, 23 percent of the total Lokoaka population (128 of 540 birds) were engaged in breeding activities. By 1 June, part of the Lokoaka population had dispersed to Kapoho, leaving 350 birds, of which 50 percent were nesting (70 nests). On 1 November 1982, the Lokoaka population was 175 birds and 38 nests were recorded (43 percent).

DISCUSSION

One of the primary purposes of this paper is to provide baseline data on roost locations throughout the Hawaiian Islands for researchers doing work with egrets. Cattle Egrets will undoubtedly continue to conflict with human interests if egrets keep

using airports as feeding grounds. Recently, egrets began to pose a serious airstrike hazard at the airport in Lihue, Kauai.

Population increases of Cattle Egrets are cause for concern to airport managers throughout the islands, due to the propensity of egrets to forage in grasslands associated with airport landing strips. Kauai has four large roosts within Cattle Egrets' normal daily flight range of the Lihue airport, with up to 200 birds feeding at the airport at one time (T. Telfer pers. comm.). The West Loch roost is relatively close to Honolulu International Airport (HON). HON was experiencing small congregations of egrets (10–50 birds) during the second half of 1982, though no egret-airplane collisions were reported during the study period. The permanent roost at Kanaha is within 1 km of the Kahului airport, the second busiest commercial airport in the islands. Though no congregations of egrets have been reported at the Kahului airport, the recent influx of egrets to Kanaha has increased the probability of an airstrike.

The heronry at Lokoaka still has a high probability of an egret-airport collision. A control program initiated in June 1982 diminished the Lokoaka population from 540 to 150–160 by August 1983 (Fellows et al. in press). The control program ceased due to the closure of the Hilo U.S. Fish and Wildlife Service animal damage control office. The egret population subsequently built up rapidly and was estimated at 506 birds on 20 January 1984 (P.Q. Tomich pers. observ.). Due to the proximity of this heronry to General Lyman Field and the location of the egrets' primary feeding areas on the opposite side of the airport from the heronry, the Lokoaka population will continue to pose a serious threat to Hilo air traffic.

Year-round reproduction by a substantial proportion of individuals within each heronry is a possible reason for the dramatic increase of this species in the islands. Although fledging success was relatively low during our study at Lokoaka, the Lokoaka population rapidly increased during the second half of 1983. Reasons for the poor nesting success at the Lokoaka heronry are uncertain, but some causes might have been: 1) predation by Black-crowned Night-Herons (*Nycticorax nycticorax*), which we observed on 3 occasions; 2) wind destruction of exposed nests on the bare branches of the roost tree; 3) our constant visits to the nest tree.

Based on roost habitat correlates, potential roost sites would be hard to identify with precision. The geologically older islands, Kauai and Oahu, have proportionally more standing water and therefore more potential roost sites. Egrets in South Africa and Texas also have the same attraction to areas near water for roost locations (Ramsey 1977, Seigfried 1971).

RECOMMENDATIONS

Cattle Egrets can be highly transient and results of population reduction programs at specific roost sites will probably be short-lived. Egrets are now well established on 5 of the main islands, and attempts to eradicate egrets on one island will only provide a short term solution to pest problems. Inter-island movements are likely to be a common occurrence which cannot be prevented.

Roost relocation is probably not a viable solution to help alleviate problems caused by egrets. Information gathered during our study suggests that relocations will only be temporary, with the egrets eventually returning to their old roost site. In addition, our studies of egret feeding patterns, together with work done on Kauai in 1985, show that egrets will travel over 15 km daily to reach a feeding site (Fellows et al. in press, T. Telfer pers. comm.). The

feasibility of moving an egret roost great distances are minimal.

Although lethal control measures may be necessary to alleviate problems caused by Cattle Egrets in some cases, the ultimate solution for long-term control lies in development of behavioral modification techniques which repel egret flocks from airports. Cattle Egrets are now another member of the list of "biological control agents" introduced to Hawaii which have gone astray from their intended mission, and humans today must learn to cope with them.

ACKNOWLEDGMENTS

We would like to thank all the biologists throughout Hawaii who took the time to fill out the questionnaires. R. Pyle and G.V. Byrd made many valuable suggestions. T. Telfer critically reviewed the manuscript and provided useful information about egrets on Kauai. L. Pank started this study and helped with all the initial stages of the project. This work was funded by FWS/FAA Interagency Agreement No. 14-16-009-81-988.

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FRANK RICHARDSON

Dr. Frank Richardson, one of the main pioneers of the "recent" resurgence in Hawaii ornithology, died in Seattle in October 1985 after a short illness. Although he lived in Hawaii only for brief periods at a time, each of these visits resulted in a study and scholarly publication on some important aspect of Hawaii's birdlife. These each represented a new exploration for its day, and stimulated others to follow the new avenues that he had opened.

Frank was born in Paia, Maui in 1913. His parents were relative newcomers to Hawaii, having met and married while both worked for Alexander & Baldwin. The family left Hawaii two years later, and Frank grew up and received his schooling on the mainland. His career was devoted to teaching and research in zoology, particularly at the University of Nevada where he was a professor of zoology until the mid-1950's. In 1955, he joined the University of Washington at Seattle, where he served as zoology professor and director for natural history of the Burke Museum.

Frank's first visit to Hawaii for ornithological study was in 1947-48, as an exchange professor with Dr. Harvey Fisher who went to Nevada. During that year he studied the breeding cycles of seabirds on Moku Manu and Manana Islands off Oahu, a subject that had received little or no attention to that time. He returned again with his family in 1953-54 on a Yale-Bishop Museum fellowship, and extended his work to the seabirds of all of the Northwestern Hawaiian Islands. This provided baseline information for the intensive seabird studies by the Smithsonian Institution ten years later. While in Hawaii then, he took time for two other ornithological pursuits: hiking into Haleakala Crater with David Woodside to rediscover nesting Dark-rumped Petrels, and identifying a vagrant seabird found at Aiea Sugar Refinery on Oahu as a Newell Shearwater, the first report of this species in many decades.

He and his family returned again in 1960 to make his most significant and far-reaching contribution to Hawaiian ornithology. During a summer-long survey of the forests of the Alakai with John Bowles, they found every species of native forest bird known from Kauai. Some were thought to have been extinct for decades, and others were of very uncertain status. Richardson's pioneering work on this survey led others to explore the forests of Maui, and was followed ultimately by the U. S. Fish & Wildlife Service's intensive 5-year survey in the late 1970's of the forests of the main Hawaiian Islands.

In 1972, Frank retired from the Burke

Museum and moved to "Raven-Ridge," a fine rustic home in the woods on Orcas Island in the San Juan Islands, overlooking Puget Sound and the Canadian islands. He continued his strong interest in birds, skiing, and the out-of-doors, and enjoyed back-packing in the high country of the Cascades and Rocky Mountains.

Frank was long a member of Hawaii Audubon Society and contributed numerous items to the 'ELEPAIO over the years. He was a gentle, inquiring, articulate, and effective investigator whose contributions to Hawaiian ornithology during brief visits to the islands have been substantial indeed.

R. L. Pyle

SIGHTING OF LAYSAN ALBATROSS ON MOLOKAI

On the morning of 22 March 1986, Phillip Shiels and I spotted a pair of Laysan Albatross (*Diomedea immutabilis*) nesting on a coastal bluff above Kawakui Nui Bay, Molokai. We were walking along the shoreline trail from the Sheraton Molokai Hotel to 'Ilio Point when we came upon the albatrosses, just 200 m past an old deserted army barracks.

As we slowly approached the pair they became very attentive. The female remained seated on her nest, and the male stood to his full height and began flapping his wings in warning. He did not move from her side or make any overt signs of attacking, as long as we kept our distance. His assertive display of possession over the territory was very convincing, as he stood about three feet tall with a six foot wing span.

The area in which they were nesting was a wind blown coastal bluff with a few native coastal shrubs and kiawe bushes. The exact site on which they sat was mostly barren sandstone about 20 m back from the cliffs. There did not appear to be any sign of nesting material under the female. However, she made no movement from her seated position, making it hard to tell just what she was sitting on.

We eventually continued on to 'Ilio Point, returning to observe them again on our way back to the Sheraton. They had not moved from the site, so we watched for a few minutes, then continued on our way.

It was not until later when I spoke with Alan Holt at The Nature Conservancy that I discovered this was an unusual sighting for Molokai. It was a privilege to have seen such a novel phenomenon, and I hope it is a sign of an increase in albatross on the Island.

Maris Sculley

NO NA LEO 'OLE

CONSERVATION NEWS

MONK SEAL CRITICAL HABITAT

The National Marine Fisheries Service designated Critical Habitat for the endangered Hawaiian Monk Seal (*Monachus schauinslandi*) under legal pressure from Greenpeace Hawaii and the Hawaii Chapter of the Sierra Club, represented by attorney Mike Sherwood of the Sierra Club Legal Defense Fund. The habitat designated includes all beach areas, lagoon waters, and ocean waters out to a depth of 10 fathoms around Kure Atoll, Midway Atoll (except Sand Is.), Pearl and Hermes Reef, Lisianski Is., Laysan Is., Gardner Pinnacles, French Frigate Shoals, Necker Is., and Nihoa Is. Because the Hawaiian Monk Seal Recovery Team recommended a critical habitat drawn at a minimum of 20 fathoms, the environmental groups mentioned above are continuing to pursue an enlarged critical habitat through legal channels. The Critical Habitat designation became effective on 30 May 1986.

HELICOPTERS OVER THE WILDERNESS

Field hearings are being held on Maui and elsewhere on proposed Congressional legislation that would mandate studies of the growing helicopter overflight problem in Haleakala and Hawaii Volcanoes National Parks (as well as several other areas on the mainland). Environmentalists argue that studies will delay action, at least as far as encroachment on wilderness quality is concerned, and that the Federal Aviation Administration should be directed now to take legal action and at least keep aircraft 2000 ft above the ground. Congressional Representative Cec Heftel has proposed that the 2000 ft level be observed immediately. This action was prompted in part by the tragic air collision of a small plane and a helicopter over Grand Canyon National Park. Here in Hawaii there is concern about the impact of overflights on endangered forest birds as well as on the wilderness experience and safety of hikers.

WAIKOLOA ANCHIALINE POND LAWSUIT

Hawaii Audubon Society's case involving the destruction of anchialine ponds at Waikoloa on the Big Island has been settled. In a sense we may have "lost the battle" (i.e., losing the ponds), but "won the war" in that

we helped establish procedures which are intended to give the public more assurance than they presently have that federally permitted development activities in Hawaii will not violate State water quality standards. Hopefully the State will aggressively implement these new procedures.

HAS AWARDS TWO GRANTS FOR NATURAL HISTORY RESEARCH

At its June meeting, the HAS Board of Directors voted to award research grants to Karen Falkenmayer and Susan W. Mill. Falkenmayer, a Master's student in the Geography Department at the University of Hawaii, will be studying the ecology and distribution of estrildid finches on Oahu. Mill's research on the composite genus *Lagenifera* will be taking her to the mountain tops of Kauai and Maui in the search for these native plants.

Congratulations to both, and we wish them the best of luck in their research!

MAY PROGRAM: AVIAN DISEASES

Dr. Robert Nakamura, our speaker for the evening, was introduced by Peter Luscomb. Nakamura, a graduate of Washington State University in veterinary medicine, also has an M. S. and a Ph. D. from the University of Wisconsin, and joined the staff of the University of Hawaii in 1970. His subject (with some surprising conclusions) was "Avian Diseases," dealing mostly with avian malaria. His research was assisted by Diana Berger and Dr. Wally Hansen of the University of Wisconsin.

Much of his research was carried out on camping expeditions to Kauai and Hawaii; coping with such variables as hurricanes and earthquakes added variety to these trips. Amakihi, Apapane, and Japanese White-eye were the birds mostly used by him in his experiments, as these birds were found on both Kauai and Hawaii.

Nakamura noted that stress is a factor in avian diseases, as increased stress can precipitate or enhance diseases. Stress can be artificially induced by use of immuno-suppressant drugs. Nakamura illustrated his talk with slides and charts, which showed how a

disease peaked in 25 days when drugs were used, but gradually subsided until the 50th day once drugs were removed. He found few parasites in native Hawaiian birds and concluded that most were healthy. Of a total of 314 birds captured, only 15 had malaria. He took blood and cloacal smears upon capture of birds and did the same after death of birds. Many did not die from malaria. Many birds which recover live a long time, but are carriers of malaria to others in the wild.

Malarial infection occurs in high altitudes, with few mosquitoes at 1400 m or higher. Birds living at lower altitudes where mosquitoes abound can be infected, and birds can become infected as they migrate from higher to lower altitudes with the change of seasons.

Among his conclusions was that birds in the low lands are carriers of malaria. A second conclusion was that malaria may not be a major cause of decimation of Hawaii's native birds. Destruction of habitat could be more important. According to Nakamura it takes a high concentration of mosquitoes to transmit malaria, but such a concentration does not exist in the Hawaiian Islands.

Betty L. Johnson

ALOHA TO NEW MEMBERS

We welcome the following new local members and subscribers, and encourage them to join in our activities.

A. Binion Amerson Jr., Dallas, TX; William G. Baldwin, Wenatchee, WA; Susan Barrier, Anchorage, AK; Charlotte B. Hubert, Eau Claire, WI; Monte S. Hull, Honolulu, HI; Harrison L. Karr, San Anselmo, CA; Lucinda King, Honolulu, HI; Beverly Dang Lee, Honolulu, HI; Stephen Maroney, Honolulu, HI; Jean M. McCoy, Greensboro, NC; Arthur McEwen, Wayne, NJ; Rose L. Moreno, Kaunakakai, HI; Linda Pearsall, Honolulu, HI; Robert Petersen, Belmont, MA; Jeanne Schmidt, Kapalua, HI; W.A. Smith, Hilo, HI; John R.W. Stott, London, England; David M. Takeuchi, Vallejo, CA; Conrad Tsukayama, Kailua, HI; Mary Watt, San Diego, CA; Alice Zacherle, Kaneohe, HI; Barry Zacherle, Kaneohe, HI.

SUMMER NATURE ADVENTURE AND FUN

If you are between 8 and 11 years old and looking for a week of adventure and fun, we will be hiking mountain trails, exploring a fresh water stream and sharing nature stories and games at the Hawaii Nature Center this summer. Three sessions will be offered from August 4-8, 11-15, and 18-22, from 8:30 a.m. to 2:00 p.m. The fee for a one week session is \$45. To register indicate the adventure week you would like to attend and enclose the registration fee with a self-addressed envelope to Hawaii Nature Center, 2131 Makiki Hts. Drive, Honolulu, HI 96822. Scholarships are available. For more information call 942-0990.

PUPPETS ON THE PATH

CHARTER MEMBERSHIP DRIVE

Hawaii Audubon Society is happy to help publicize the charter membership drive (June through August 1986) of the "Puppets on the Path" Fan Club. Puppets on the Path is a group of environmental entertainer-educators based in Volcano, Hawaii, and dedicated to nurturing a growing general awareness of the uniqueness and fragility of our island ecosystems. Their work is delightfully original, eye-opening, educational, and just plain fun; their performances have been enjoyed by over 75,000 people in audiences aged two to ninety-two and are available to schools and organizations throughout the State.

A twenty-dollar membership in the Puppet Fronds Fan Club will help Puppets on the Path cover the set-up costs of new productions, managerial expenses, and the communications costs involved in producing flyers, posters, and newsletters to keep interested folks up-to-date on the group's activities. In addition, charter members will each receive an "I am a Frond of the Forest" T-shirt; a year's subscription to the group's quarterly newsletter; updates on performances, workshops and special projects; and discounts on all Puppets on the Path products, including T-shirts, photos, postcards, audio and video cassettes, and activity books. Checks should be sent to the Puppets on the Path, P. O. Box 810, Volcano, HI 96785. Be sure to specify your T-shirt size (child's S, M, L, or adult's S, M, L).

The Puppets are always looking for ways to improve their terrestrial show and are launching a marine show soon. Now's the time to lobby for your favorite sea critter or concept. All suggestions are welcome.

SLIDES NEEDED FOR KAUA'I MUSEUM

Hui O Laka, the support group for the Koke'e Museum of Natural History is looking for slides to include in an educational slide-tape presentation on birds in the Koke'e area. Although they have a number of slides of the native species, they are lacking slides of some of the exotics. If you have slides of the following birds that you would be willing to donate to the cause (copies of slides would also be appreciated), contact Winona Sears, c/o *Hui O Laka*, Koke'e Natural History Museum, 190 Lulo Road, Kapaa, HI 96746. Japanese White-eye, White-rumped Shama, Melodious Laughing-thrush, Common Myna, Zebra Dove, Ring-necked Pheasant, Erkel's Francolin, Northern Cardinal, Red-Crested Cardinal, House Finch, and Nutmeg Mannikin are the species needed for the presentation.

ATTENTION ASPIRING JOURNALISTS! CONSERVATION COLUMNIST WANTED!

The Hawaii Audubon Society has a dedicated Conservation Committee whose members prepare and present testimonies for public hearings, review a wide variety of documents, including environmental impact statements, and endangered species recovery plans, and generally serve as enthusiastic advocates for the protection of Hawaii's native wildlife. These demanding tasks leave no time for committee members to prepare a news column to keep members abreast of conservation activities. The '*Elepaio*' seeks a person willing to receive written testimonies, letters and reviews from committee members and summarize them in a monthly or bi-monthly column for the membership. The person need not be a conservation expert, in fact, this would be an excellent way to learn the issues.

Help Hawaii Audubon help Hawaiian wildlife! Call Thane Pratt (524-8464) if you're interested.

FREE ICE CREAM

Will again be provided to those volunteers who help out with the typing, proof-reading or paste-up of next month's '*Elepaio*' at Thane Pratt's house, 954 Spencer St., on 19 July and 26 July. Phone 524-8464 for more information. Authors of articles, notices, etc. are reminded that these must be received by 15 July.

Many thanks to Sheila Conant, David McCauley, Bob Pyle, and Joel Simasko for helping with the July issue's paste-up.

LIBRARIANS BEWARE!

LEAP YEAR FOR THE 'ELEPAIO'

The '*Elepaio*' Committee has decided to extend the current Volume 46 through the 1985 calendar year, and to begin Volume 47 in January of 1987. The decision was prompted by the fact that most journal volumes begin and end with the start and finish of the calendar year. The Committee anticipates that this change will make citation of articles in future issues simpler and less confusing. So when you see Number 13 of the current volume, it's a good sign.

JULY 1986 PROGRAM

MARQUESAS ISLANDS ARCHAEOLOGY

"Marquesans Overseas: Archaeological Evidence for the Origins of Hawaiian Culture" is the title of Barry Rolett's program for the July HAS meeting. Excavations at a new archaeological site have provided further evidence tracing the origin of the Hawaiians to the Marquesas Islands on the eastern margin of Polynesia.

Barry Rolett recently completed a year of field work at a new archaeological site that he discovered along the shoreline of Tahuata, one of the heavily forested, mountainous islands of the Marquesas.

Rolett, who lived with a Marquesan family during his field year, will present slides of the excavation and of village life on Tahuata, an island rarely visited today by foreigners but vividly described in the journals of Captain Cook and other explorers.

JULY 1986 FIELD TRIP

A July field trip to the Honolulu Zoo is being planned, but the final arrangements have not been made. Those interested in participating should contact Andy Engilis (848-4155 - work) or another member of the Field Activities Committee.

NEW T-SHIRTS

Hawaii Audubon Society has printed a limited edition of T-shirts showing the emblem of our society. Colors are yellow, pink, green, and silver; sizes range from small to extra large. The T-shirts cost \$8; \$10 if ordered. Buy yours at our general meeting or order one via the HAS address.

CALENDAR OF EVENTS

- July 14 (Mon.) Board Meeting at Bishop Museum at 7:00 PM. Call Allen Allison at work, 848-4145.
- July 21 (Mon.) General Meeting at McCulley-Moilili Library at 7:30 PM.
Program: Marquesas Is. Archeology.
- July 26 (Sat.) 'Elepaio paste-up at Thane Pratt's house (524-8464) at 1:00 PM.

Reprinting of material from the 'Elepaio is permitted if credited to " 'Elepaio, the journal of the Hawaii Audubon Society".

By-laws available by request.

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