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THE DISTRIBUTION AND STATUS OF WEDGE-TAILED SHEARWATERS ON KAUAI

by G. Vernon Byrd and David S. Boynton

Wedge-tailed Shearwaters (*Puffinus pacificus*) breed on islands in the tropical Pacific Ocean as far north as the Bonin and Hawaiian islands (Berger 1972, Shallenberger 1973). In Hawaii, the species reaches highest densities in the Northwestern Islands, particularly at Laysan Island, where over 200,000 birds occur (Ely and Clapp 1973). Undoubtedly Wedge-tailed Shearwaters nested on all the main Hawaiian Islands prior to the introduction of numerous predators. Only small remnant colonies are now known on the main islands, but large colonies occur on offshore islets along the windward shore of Oahu (Berger 1972).

In 1978 on Kauai, 18 areas where shearwaters were suspected of nesting were visited by the authors, Dan Moriarty and Youth Conservation Corp summer students. At each area the burrows were counted, and the status of each burrow was ascertained by either visual examination or reaching into burrows when nest chambers were not visible. We also noted presence of dead birds, broken eggs, or burrows dug out by predators. Colonies were visited during the incubation or nestling periods. Those counts conducted during the latter period provide an estimate of the maximum possible production for the colonies in 1978.

Nesting colonies were located along the entire coastline of Kauai covered during our survey (Fig. 1). Burrows were found in sandy banks, on hillsides with both shallow and deep soils, under tree roots, in crevices in limestone and sandstone, and between boulders. All burrows were found within 100 m of the sea or the edge of a sea cliff. Active colonies ranged

in size from 18 to 1344 burrows (Table 1). The estimated maximum possible production for colonies ranged from none at Weli Point to 53 percent at Kilauea Point.

It is unlikely that we found all the shearwater colonies on Kauai. Richardson and Bowles (1964) found a single bird on an egg west of Hanakoa Valley along the Na Pali Coast, where nesting colonies may occur. In common with our findings, Richardson and Bowles (1964) reported Wedge-tailed Shearwater colonies at Mokuiaee Island, Kilauea Point, Mokuia Point, and Paoo Point.

As we did, Richardson and Bowles (1964 p. 18) recorded predation by dogs: "We found at least 75 wedge-tailed shearwaters, a large proportion of the colony [at Mokuia Point], which in recent weeks had been pulled from their burrows and killed, perhaps by dogs." In 1978 dogs killed some birds in nearly every colony (Table 1).

Dogs have probably destroyed shearwaters for years on Kauai, and some colonies may have been totally eliminated. Cats and rats may also prey on eggs and chicks, but we have no evidence of it. Richardson and Bowles (1964) were unable to find a colony in the Kipu Kai Bay area that was known to have existed within the 20 years before 1960. We found the remains of a single shearwater which may have attempted to nest in the Kikiaola Harbor area, near Kekaha, where dogs decimated a colony in 1977 (Tom Telfer pers. comm.). Telfer (pers. comm.) also reported that in previous years the colonies at Mahaulepu were much larger than now.

Predation is not the only cause of de-

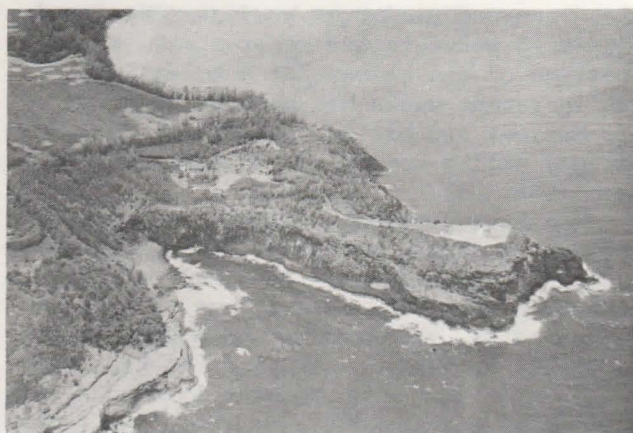
clines in shearwater populations on Kauai. In July 1971 Telfer (pers. comm.) found 86 dead shearwaters near Mahaulepu and 169 dead birds in the colony near Weli Point. He ruled out predation as the cause but was unable to learn the true mortality factor. Shearwaters are probably adversely affected by livestock. Overgrazing has caused erosion and loss of habitat in the Kepuhi Point area, and burrows have been trampled by cows and horses at Crater Hill, Kepuhi Point, and Barking Sands.

Clearly, shearwaters on Kauai are sustaining heavy losses. A modest effort to protect the birds would easily increase shearwater populations. We recommend the following actions:

- 1) Where possible, dog- and livestock-proof fences should be constructed around colonies.
- 2) Artificial nesting structures should be installed at colonies to enhance breeding (see Byrd in press).
- 3) Native beach plants, e.g. *Scaevola* and *Euphorbia* should be transplanted to eroded areas from Kilauea Point.
- 4) Annual censuses of colonies should continue. At present YCC and YACC participants could carry out these recommendations. Local conservation groups could also contribute to these efforts.

Acknowledgements

We gratefully acknowledge the helpful suggestions on the manuscript by Cameron



Kilauea Point, Kauai.

Photo by Greg Vaughn



Fig. 1. Map of colonies of Wedge-tailed Shearwaters on Kauai.

Kepler, C.J. Ralph, Carol P. Ralph, Robert J. Shallenberger, and Thomas C. Telfer. Daniel Moriarty and the 1978 YCC students helped conduct the field work. Heidi Russell prepared Figure 1.

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Table 1
LOCATION, DATE CENSUSED, STATUS AND CHARACTERISTICS OF COLONIES OF
WEDGE-TAILED SHEARWATERS ON KAUAI

Colony	Location	Habitat	Date(s) censused	Total Burrows	Active Burrows ¹	Dead Birds	Threats to Colony
1	Princeville	under boulders, roots of <i>Pandanus</i>	26 July	37	31 84%	1	dogs, development
2	Kilauea Est.	earthen burrows	17,26 July	47	25 53%	1	dogs, development
3	Kilauea Pt.	earthen burrows	8,9 Sept.	1344	523 53% ²	0	egg loss to Common Myna
4	Mokuaeae I.	earthen burrows, rock crevices	6 Oct.	341 ³	140 44% ²	0	egg loss to Common Myna
5	Kilauea Cove	earthen burrows	7,9 Sept.	327	115 47% ²	2	dogs
6	Crater Hill	earthen burrows, rock crevices	20,21 July	501	32 50% ⁴	2	horses cause erosion and trample burrows
7	Mokolea Pt.	earthen burrows	13 Sept.	239	70 37% ²	2	dogs, development
8	Kepuhi (w.)	earthen burrows near roots of trees and shrubs	26 Aug.	123	25 20% ²	41	dogs, cattle cause erosion & trample burrows
9	Kepuhi (e.)	earthen burrows on bare bank	26 Aug.	114	30 26% ²	30	dogs, cattle cause erosion & trample burrows
10	Papaa	under boulders	28 June	50	30 60%	2	dogs
11	Alakukui Pt.	under boulders	31 Aug.	18	4 22% ²	0	development
12	Maha'uilepu Haula, Paoo Pt.	under boulders, limestone crevices	18 July	28	10 36%	2	dogs, development
13	Maha'uilepu s. of quarry	under boulders, limestone crevices	18 July	231	119 50%	12	dogs
14	Maha'uilepu Makawehi	caves & crevices in sandstone along edge of dunes	12 July	128	26 20%	17	dogs
15	Spouting Horn	under boulders	12 July	213	49 23%	10	dogs
16	Weli Pt.	under boulders	25 July	23	1 4% ⁵	11	dogs
17	Kekaha	sandy bluffs	4 Aug.	0		1	reported near Kikia- ola Harbor, appar- ently destroyed
18	Barking Sands	sandy bluffs	4 Aug.	91	27 30%	9	dogs, trampling by horse
TOTALS				3855		144	

¹ Number of known-status burrows with eggs or chicks. In some colonies, a percentage of burrows was inaccessible to investigators.

² These counts represent estimated fledging success.

³ Counted by Byrd, John Sincock, and Tom Telfer.

⁴ Sample count made 16 Sept.

⁵ The single bird was later found dead.

A TRIP TO KURE ATOLL, DECEMBER 21-22, 1977

by Ronald L. Walker

Introduction

The writer participated in a routine inspection trip to Kure Atoll, 1300 miles Northwest of Honolulu, on December 21 and 22, 1977. The purpose of the trip was to assess the current status of seabirds, monk seals, and other wildlife species that use Green Island and the adjacent sand spits. Similar trips have been made by other observers over the years, all of which have been dependent upon obtaining Coast Guard transportation to the atoll. Thus, the time of year, amount of time available on Green Island, and opportunity to fly over the sand spits varied considerably with the vicissitudes of Coast Guard operations. Also, there has been little standardization of the observers' techniques or emphasis on particular species or phases of life cycles. This has lead to difficulties in comparing data to determine wildlife and vegetational trends. As an example, I arbitrarily decided to attempt a total population count of the two species of albatross, as none had been attempted in recent years and a comparison with past estimates seemed propitious. This is not intended to be a detailed scientific treatise but rather a brief report of observations made during a rather limited visit to Kure. However, some comparison with previous findings of other observers will be made.

Approximately 28 hours were spent on Green Island with about 18 hours given over to actual field observations. During the flight in and out, there were brief opportunities to census seals on the sand spits from the air. Dr. George Balazs of the Hawaii Institute of Marine Biology arranged the trip and accompanied me. Dr. Balazs spent the majority of his time along the beach edges and in the water making observations on green sea turtles and collecting turtle food organisms.

Observations

Most of the seals (*Monachus schauinslandi*) sighted (Table 1) or seal-haul marks noted were on the northeast half or the extreme southwest tip of Green Island (Fig. 1). The northeast third of the island is posted "off-limits" to military personnel, which may have accounted for the concentration of seals in this part

of the island. The one pup noted was in excellent condition, fat and glossy of pelage. The seals were not disturbed during the census, but were observed from a distance. However, this prevented close checking for the presence of tags (None was noted). One adult seal (sex undetermined) was noted on 22 December on the northeast side (lagoon) beach with a small wound on its back which appeared to be healing. All of the other seals appeared unwounded and in good physical condition.

FIGURE 1.

**GREEN ISLAND, KURE ATOLL
MONK SEAL DISTRIBUTION
12/21-22/1977**

MAP 1

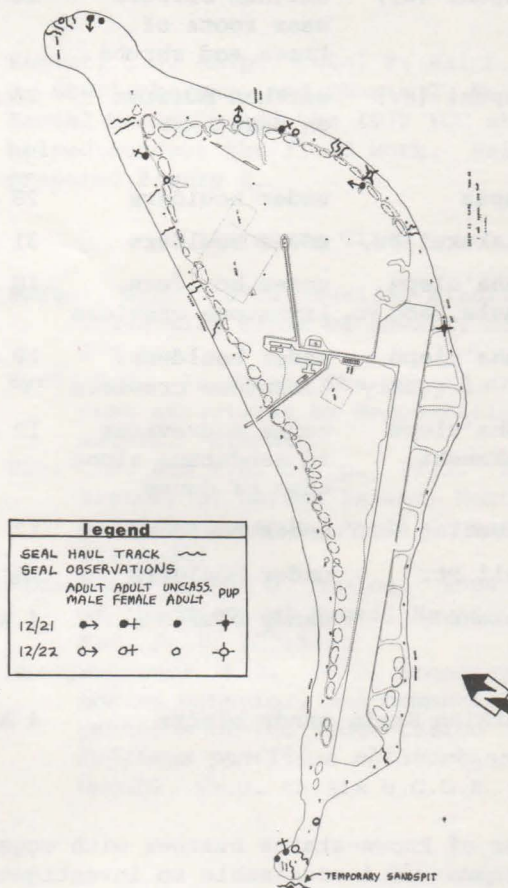


Table 1
AERIAL AND GROUND CENSUSES OF HAWAIIAN MONK SEALS, KURE ATOLL

DATE	LOCATION	TIME	CLASSIFICATION				TOTALS	COMMENTS
			Adult Males	Adult Females	Un-class. Adults	Year-ling Pups		
12/21/77	Sand Islands	1350			27		27	Aerial
	Green Island	1500	2	3	4	1	10	Ground
	TOTALS		2	3	31	1	37	
12/22/77	Green Island	0800	1		5	1	7	Ground
	Sand Islands	1800			21		21	Aerial
	TOTALS		1		26	1	28	

Woodward (1972) reported that the average number of seals on Green Island of Kure Atoll in December 1964 was 41. In December 1968 he stated that the average was only 4 seals, indicative of the trend of the population distribution away from Green Island and to the sand spits. The Division of Fish and Game, during routine surveys of Kure at various times of the year between 1961 and 1976, verified this trend (see Literature Cited). The average number of seals on Green Island during this period was 11 and on the sand islands, 44 (Table 2).

Albatrosses

I attempted to estimate (Table 3) the total number of adult Laysan and Black-footed Albatross on the island during the day. Only "gooneys" seen on the ground were counted,

including those on nests, attending mates, and apparently unmated "walkers". Where possible, actual counts were attempted, although for large colonies, estimates were made. Due to time limitations, no attempt was made to enumerate the number of nest sites or viable eggs.

Assuming that an additional third of each species were in the air over the island or at sea feeding, the total estimated population would be Laysan Albatross, 2,711 and Black-footed Albatross, 1,124. The estimated total albatross would be 3,835 (ground, air and at sea-using island).

This may be a rather conservative estimate. Woodward reported estimates of albatross on Green Island (Table 4) during the period December 16-31 in 1963, 1964 and 1966. My 1978 population estimate apparently indicates a decrease when compared to 1963 and 1964 and an increase over the number given for 1966. However, this may be a function of different techniques employed (Woodward

Table 2
HAWAIIAN MONK SEAL POPULATION ESTIMATES
KURE ATOLL, ISLANDS
STATE DIVISION OF FISH AND GAME, 1961-1978

DATE	GREEN ISLAND	SAND SPITS	TTL	OBSERVER
Sept. 12, '61	25	23	48	R. Walker
March 15-16, '64	23	46	69	R. Walker
Sept. 30, '67	2	57	59	R. Walker
March 28, '68	15	54	69	E. Kosaka
April 10, '69	3	38	41	R. Walker
Sept. 5, '72	3	30	33	E. Kosaka
March 8, '74	6	19	25	E. Kosaka
March 8-9, '76	13	27	40	D. Woodside
Sept. 1, '76	20	21	41	D. Woodside
Dec. 21, '77	10	27	37	R. Walker
Dec. 22, '77	7	21	28	R. Walker
May 28, '78	6	12	18	T. Telfer



Laysan Albatross on Nest, Kure Atoll

Photo by Ronald Walker

Table 3
ALBATROSS GROUND CENSUS, GREEN ISLAND, KURE ATOLL
December 21-22, 1977

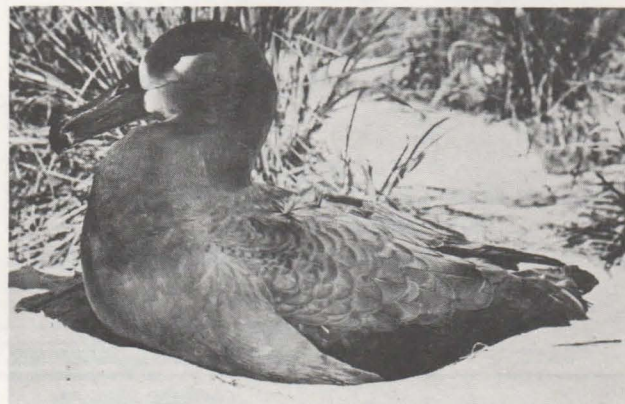
DATE	METHOD	AREA	TIME	LAYSAN	BLACK-FOOTED	TOTAL
				ALBATROSS	ALBATROSS	
12/21	Total Count	Beach Edges	1455-1650	181	435	616
12/21	Total Count	Runway Edges	1700-1745	457	237	694
12/22	Total Count	Antenna Lanes	0945-1015	380	0	380
12/21	Estimate	Antenna Field	1745-1815	707	55	762
12/21	Estimate	Buildings Area	1815-1830	108	16	124
12/22	Estimate	Interior Scaevola	1015-1045	200	0	200
12/22	Estimate	Elsewhere	1045-1115	0	100	100
TOTALS				2,033	843	2,876

reports that the censuses were made using total counts and the Lincoln Index method) or vegetative changes. In the latter case, openings were bulldozed in the scaevola along the perimeter of the Island in 1959, creating additional nesting habitat. Since then the majority of the openings have grown back to dense scaevola and this may have reduced the use of the island by breeding albatross, particularly the Laysan.

Both species were in the egg-laying and incubation phase of the life cycle which conforms to the phase of breeding described by Richardson (1957) and Woodward in 1972 for the month of December.

Laysan Albatross were found throughout the island in a variety of habitats varying from open, exposed areas on the beaches to dense scaevola thickets. Along the border of the vegetation on the beaches, Black-footed Albatrosses were concentrated on the southwest lagoon side and the northeast ocean side of the island (see Fig. 2). Many "goonies" of both species were noted with bands, but no attempt to read those on live birds was made. Bands were recovered from the carcasses of three dead Laysan Albatross as follows: (1) 697-90203, (2) 697-22278, (3) 667-39083. The

latter bird was banded at Kure by a Lt. J.F. Hunt of Corpus Christi, Texas on April 16, 1961, which would make it approximately 16 years old on dying, assuming it was a chick when banded. Many other dead albatross were noted, but considering the large number using the island, the percentage was probably normal. Fresh carcasses were actively fed upon by the Polynesian rat (*Rattus exulans*). It is not known whether this habit reflects a need for food or moisture (blood, or body fluids) or both. There was no evidence of rats feeding on live nesting birds as reported in the past (Kepler 1967, also Walker, unreported pers. obs.).



Black-footed Albatross.

Photo by Ronald Walker

Table 4
POPULATION ESTIMATES
OF ALBATROSS ON GREEN ISLAND
(Woodward 1972)

	1963	1964	1966	Average
Laysan Albatross	3,600	4,000	1,450	610
Black-footed Albatross	650	700	500	3,016
TOTAL	4,200	4,700	1,950	3,626

Wedge-tailed Shearwater

None were seen on the ground, in burrows, or at sea, as would be expected given their normal breeding period of March through November. (Woodward reported that all Wedge-tails leave Kure by mid-December.) Numerous burrows were noted throughout the island on the interior, mostly under or adjacent to the heavy scaevola.

Bonin Petrel

Based upon searches of burrows during the day and observations of birds returning to the island at night, it was estimated that 500 were using Green Island. This may be a very conservative estimate in view of the difficulties of observation at night. Woodward estimated the number of Bonins on Green Island at 500 (1963), 1,500 (1964), and 2,000 (1966) for the period December 16-31.

One burrow was dug up and determined to be approximately 6 feet long with a slight "snaking" curvature and a bulbous nest cavity at the end. For the most part the Bonins seemed to prefer sandy, dune-like areas covered with prostrate vegetation, particularly in the central antenna area and around the Coast Guard facilities (see Fig. 2). In the pre-dawn hours on December 22, large numbers of Bonins were noted leaving for the sea. No eggs or young

were found, but the birds were actively "house-cleaning" the burrows. This conforms to Woodward's observation that egg-laying does not occur until late January.

Blue-faced Booby

Approximately 80 adults and flying immatures were noted on the island or flying over (Woodward reported an average of 113 for late December of 1963, 1964, and 1966). The adults were paired whistlers (males) and squawkers (females), but no nest sites or eggs were noted, which confirms the breeding cycle described by Woodward. The greatest number of this species were in the central antenna field, which provided the open areas they prefer. One dead booby with a band was found [767-54202], but the species could not be determined, as it was skeletal.

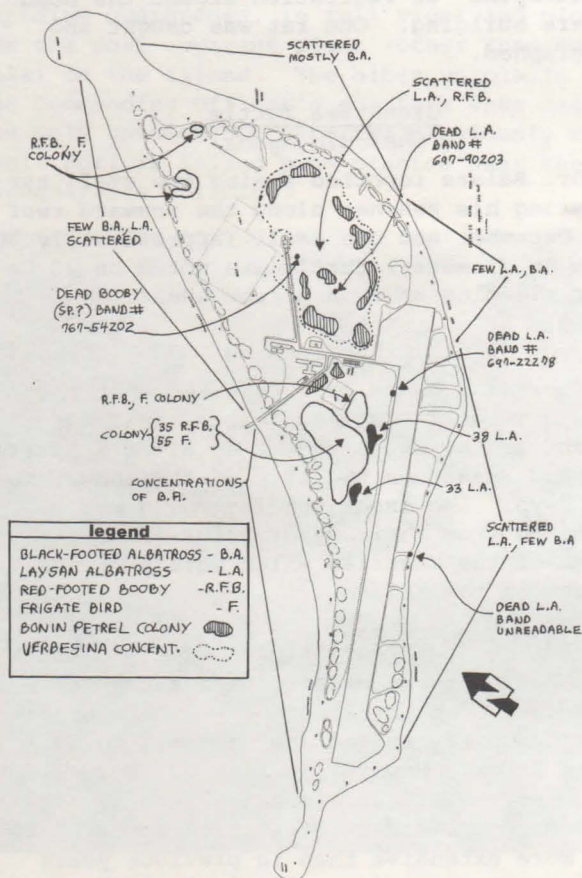


Blue-faced Booby (on Laysan Atoll).

Photo by Ronald Walker

MAP 2

FIGURE 2. GREEN ISLAND, KURE ATOLL
SEABIRD DISTRIBUTION
12/21-22/1977

Brown Booby

Adults and flying immatures were seen, mostly flying over the lagoon and near reef areas. A few were paired on the ground, but no eggs were noted, confirming that egg-laying occurs during all months except December (Woodward). It was conservatively estimated that 15 Brown Boobies were using Green Island. Woodward reported an average of 66 for December 16-31, 1963, 1964 and 1966.

Red-footed Booby

An estimated 60 adults and flying immatures were using the island, concentrated in colonies on trees or shrubs (heliotrope and scaevola) at the northeast and south-central roosts (see Fig. 2). This was considerably less than described by Woodward (mid-hundreds) for the month of December in the middle of the 1960s. No eggs were noted, which conformed to known

breeding cycle (Woodward 1972 and Richardson 1951).

Great Frigatebird

Frigates were generally concentrated at the same locations as the Red-footed Boobies (see above) and numbered about 85, adults and flying immatures. Woodward reported considerable variability in late December populations, varying from 700 in 1963, to 197 in 1964, to only 15 in 1966. No eggs or young were seen during this survey, as was expected from Woodward's description of the breeding cycle.

Black Noddy

Adults were seen in colonies at night in the ironwood trees around the headquarters buildings. An estimated 150 were present. Woodward describes this species as being absent from Green Island from late December through mid-March but that 300 were present during the period December 16-31, 1963. They favored three particular trees shielded by the "H" shaped building and ignored entirely other ironwoods more exposed to the wind and weather. No eggs or young were noted, which follows Woodward's observation that this species does not breed at Kure.

Shorebirds

During a circumnavigation of the island on the beach (12/21, 1455 to 1650), 6 Golden Plovers, 26 Ruddy Turnstones, 2 Wandering Tattlers, and 3 Sanderlings were noted. Later in the survey (12/22, 0915 to 1045), one Long-billed Dowitcher and one 3rd-year Herring Gull were seen on the beach. The dowitcher was actively feeding along the beach edge on the lagoon side, and the gull was "roosting" on the extreme end of the sand spit forming the southwest point of the island. Woodward reported all of these species from Kure Atoll.

Polynesian Rat

The rat was common on the island, but the population was not in "irruption". They were seen more frequently at night, but even during the day an occasional rat could be noted scurrying in the vegetation, usually under the scaevola bushes. They were very obvious around the garbage dump and kitchen area and apparently are a chronic problem for the Coast Guard. Population estimates were impossible, but certainly they were in the hundreds and possibly in the low thousands. As previously noted, they were feeding on the remains of dead birds, and tracks were commonly seen along the edge of the scaevola on the beaches. Control techniques by the Coast Guard personnel included trapping with



Polynesian Rat.

Photo by Ronald Walker

snap traps, shooting with shotguns (at the dump), cans of oil or kerosene buried to ground level, and "stomping" as recreation around the headquarters building. One rat was caught and photographed.

Green Sea Turtle

(*Chelonia mydas*)

Dr. Balazs reported seeing one small turtle during his seaches along the seaward reef on 21 December and one small (approximately 30 inches in diameter) turtle was noted on 22 December sleeping under a narrow shelf.

Other Species

The Coast Guard crew reported that they had seen several "mallards" and "teal" the previous month, which showed up after a severe storm and rested on the edge of the runway for a few days. The exact species could not be determined from their description. There was no sign of the Canaries which were previously released on the island.

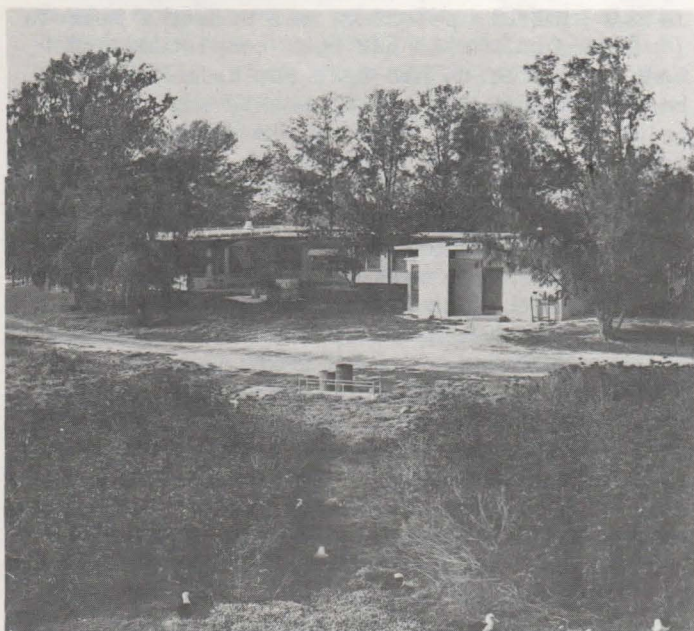
Vegetation

No attempt was made to make a comprehensive survey of plant life due to the abbreviated stay on the island and emphasis on surveys of birds. However, a list of those plants which were obvious is given in Table 5. The *Verbesina encelioides* infestation appeared to be no more extensive than in previous years and was concentrated around the central antenna field area (see Fig. #2). It was not particularly vigorous, and in fact another species,

Table 5
CHECKLIST OF PLANTS NOTED
GREEN ISLAND, KURE ATOLL
December 21-22, 1977

APOCYNACEAE, periwinkle <i>Nerium oleander</i>	Around buildings	GOODENIACEAE, Goodenia <i>Scaevola taccada</i>	Abundant, dominating
ARAUCARIACEAE, pine <i>Araucaria sp.</i>		GRAMINEAE, Grass <i>Cenchrus echinatus</i>	Occasional
BORAGINACEAE, Borage <i>Messerschmidia argentea</i>	Several large trees	<i>Eragrostis variabilis</i>	Occasional
CASUARINACEAE, Ironwood <i>Casuarina equisetifolia</i>	Around buildings	MALVACEAE, Mallow <i>Hibiscus tiliaceus</i>	Now dead, near buildings
COMMELINACEAE, Spiderwort <i>Rhoeo spathacea</i>	Decorative planting near buildings	<i>Thespesia populnea</i>	Near buildings
COMPOSITAE, Composite <i>Conyza bonariensis</i>	Occasional	NYCTAGINACEAE, Four O'clock <i>Boerhavia diffusa</i>	Common
<i>Emilia javanica</i>	Occasional	PALMAE, Palm <i>Cocos nucifera</i>	A few present
<i>Sonchus oleraceus</i>	Occasional	SOLANACEAE, Nightshade <i>Solanum nigrum</i>	Common
<i>Verbesina encelioides</i>	Abundant	TERMINALIACEAE, Kamani <i>Terminalia catappa</i>	Near buildings
CONVOLVULACEAE, M. Glory <i>Ipomoea indica</i>	Common	ZYGOPHYLLACEAE, Caltrop <i>Tribulus cistoides</i>	Common
CRUCIFERAE, Mustard <i>Lepidium o-waihiense</i>	Abundant		

Lepidium owaihiense, in full vigor and blooming was the most apparent plant (other than scaevola) on the island. The hibiscus plants near the Commanding Officer's quarters were dead. The only species not reported previously was a small Norfolk Island pine planted near the headquarters building.



Living Quarters on Kure Atoll.

Photo by Ronald Walker

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INFORMATION SOUGHT ON R.C.L. PERKINS

AND FAUNA HAWAIIENSIS

Bishop Museum Registrar, Anita Manning, is researching the Museum's involvement in the work of the Sandwich Islands Joint Committee, 1890-1913. The thrust of Ms. Manning's research is the Bishop Museum's contribution, the influence of the project on the Museum, the attitudes of the Museum's founder, first director, and Trustees. Also of interest is the contribution made by island residents who aided Perkins during his field work (1892-1902). Islanders credited with helping Perkins include Francis Gay, "Mrs. Greenwell and her sons," Valdemar Knudsen, Otto Meyer, George C. Munro, Brother Matthias Newell (St. Louis College), and Aubrey Robinson. Additionally, Perkins married Zoe Atkinson, daughter of A.T. Atkinson, in Hawaii in 1902. Ms. Manning would appreciate hearing of any sources of information known to readers. She is especially interested in reading letters, diaries, etc., in private hands. Please contact: Ms. Anita Manning, P.O. Box 6037, Honolulu, HI 96816 (or call 847-3511).

THE EFFECTS OF HEAVY RAIN ON NESTLING WEDGE-TAILED SHEARWATERS (RABBIT ISLAND)

by G. Causey Whittow

Surface-nesting sea birds in the Hawaiian Islands are particularly vulnerable to extreme weather conditions because they generally do not build nests and there is little or no protection from vegetation. There have been several reports of rain damage to Sooty Terns (*Sterna fuscata*) (Richardson 1948, Shallenberger 1973). On the other hand, burrow-nesting birds, such as the Wedge-tailed Shearwater (*Puffinus pacificus chlororhynchus*) enjoy a considerable degree of protection from the elements. The effectiveness of this protection was put to the test recently, when sustained, heavy rain fell on Oahu and its offshore islands. From October 30 to November 1, 1978, more than ten inches of rain were recorded at Honolulu International Airport. Although rainfall was not measured on the offshore islands, there is no reason to believe that it was any less than at the Airport. In the course of our work on the incubation physiology of the Wedge-tailed Shearwater on Rabbit Island (Manana), I had an opportunity to observe the consequences of the heavy rain for the shearwater chicks. (The breeding cycles of the Sooty Terns, Common Noddies (*Anous stolidus pileatus*) and Bulwer's Petrels (*Bulweria bulwerii*) had been completed, and most of the birds had left the island.) I had visited the island at weekly intervals prior to the rain, so I was in a good position to note any effects of the rain, per se.

I was able to land on Rabbit Island on 1 November, a few hours after the rain had stopped. The situation there was most unusual. The western slope facing Sea Life Park, and both the floor and sides of the crater were dotted with shearwater chick. Ordinarily, the chicks would have been in their burrows, and only a small number of chicks would have been seen above ground. The chicks were dry or drying, and there was a great deal of wing-flapping. Some of the chicks had not fared well, however. Several were buried in mud up to their necks; others were presumably buried completely. It could not be determined with any accuracy how many of the chicks had been buried, but it was estimated that approximately one-half of all burrows on the island had collapsed.

There are several possible consequences of such extensive destruction of the burrows.

One was that many of the chicks would have no protection from solar radiation during the day. As the tolerance of the Wedge-tailed Shearwater to strong insolation is not known, the importance of this factor cannot be assessed at the present time. Studies are under way in our laboratory to determine the effectiveness of the shearwater's physiological and behavioral responses to heat exposure. It is also possible, of course, that the shearwaters are able to excavate fresh burrows. On subsequent visits to Rabbit Island (November 10, 17, 24), there was evidence of fresh digging, and several chicks were observed to excavate burrows. However, the possibility cannot be discounted that adults, returning to feed the chicks, may have participated in the excavations.

Probably the most important consequence of the heavy rains was that many of the chicks were displaced from their original burrows, and many of them may have strayed sufficiently far for the returning adults not to be able to find them. This might eventually have forced many of the chicks to leave the island prematurely, with lower body fat reserves and less well-developed plumage. This might in turn have led to increased mortality of the birds at sea. A similar effect may explain "The Shearwater Calamity on Kauai" reported by Hadley (1961). In that year unusually large numbers of shearwaters were reported on the road between Kealia and Wailua, following heavy rains in late October. In the normal course of events, Wedge-tailed Shearwaters are deserted by their parents; subsequently, they leave the nesting colony, prompted, presumably, by hunger and weight loss (see Shallenberger 1973). In 1978, feeding of the chicks by the adults may have been terminated earlier than in other years. Although few dead shearwater chicks were seen on the island, the number that were buried, and the number that may have failed to survive at sea, may add up to a significantly higher mortality than in previous years. However, it is believed that the mortality would have been much higher if the heavy rains had occurred earlier, when the chicks would have been so much less well developed. In addition, they would have been invested in down, which is probably less waterproof than is the adult plumage, with the result that many chicks might have died from hypothermia.

Acknowledgements

I am grateful to Ted N. Pettit for assistance on Rabbit Island and George H. Balazs for drawing my attention to earlier

reports of storm damage to terns and shearwaters published in the 'Elepaio.

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Kewalo Marine Laboratory
 Pacific Biomedical Research Center
 University of Hawaii
 41 Ahui Street
 Honolulu, Hawaii 96813

REVISION OF BIRD BOOK INFORMATION NEEDED

Dr. Andrew J. Berger, professor at the Manoa campus of the University of Hawaii, is preparing a revision of his important book *Hawaiian Birdlife*. A great deal has been learned about birds in Hawaii since he finished the manuscript for the first edition in October 1970. Much of this information has been published in the 'Elepaio, but many valuable observations do not get to our pages.

Dr. Berger urges birders to send him observations. He mentions specifically that he needs:

- locations and sizes of Black-crowned Night Heron nesting colonies;
- distributions of both native and introduced birds on outer islands, especially Maui and Kauai; and
- nest records or other clues of nesting seasons for any birds.

To emphasize the cooperative nature of a book such as his, Dr. Berger quotes the introduction to A.C. Bent's *Life Histories of North American Birds*: "If the reader fails to find in these pages anything he knows about the birds, he can only blame himself for failing to send the information to -- The Author."

You may write Dr. Berger at: Department of Zoology, University of Hawaii, Honolulu, Hawaii 96822.

FIRST RECORD OF THE BUFF-BREASTED SANDPIPER IN HAWAII

by C. John Ralph and Robert L. Pyle

The first Buff-breasted Sandpiper (*Tryngites subruficollis*) recorded in the State of Hawaii was seen by many observers at Kii Pond in the James Campbell National Wildlife Refuge, near Kahuku, Oahu, on September 10, 1978. This species is an uncommon one, even in the center of its migration range. Additionally, it has a rather restricted breeding range. It breeds locally from Pt. Barrow, Alaska (Gabrielson and Lincoln 1959), eastward across the arctic coast of Canada only as far east as Bathurst Island and King William Island (A.O.U. 1957). It normally migrates in a narrow band (Robbins et al. 1966) through the Great Plains of Canada and the United States to its regular wintering grounds in the pampas of central Argentina. During migration the species has turned up in widely scattered locations from Japan and eastern Siberia to England, Ireland, France, Switzerland, and even Egypt (A.O.U. 1957). It has been recorded wintering in Australia, but not elsewhere in the Pacific (Slater 1971).

During a Hawaii Audubon Society field trip to Kii Pond, Carol Ralph spotted a bird that was behaving quite differently from nearby Pectoral Sandpipers (*Calidris melanotos*). During the course of observations about 20 persons studied the bird closely. It was very active, moving almost continuously in and out of the grass and puddles at about 50 m range from the observers stationed along a dike. It was buffy on the head, neck and underparts, except the undertail coverts, which were whitish. The back and wings were noticeably darker and scaly patterned. The bill was short (only a bit longer than the depth of the head), straight, and dark, and the eye ring was whitish and appeared to be incomplete. The head was small in proportion to the body, as compared with the pectorals, and there were vermiculations of thin dark markings on the side. White sides of the tail showed in flight. No other species of shorebird fits this description.

The bird was seen again at Kii Pond on September 23, by Pyle and Paul W. Sykes. No further sightings were made through the end of the migratory season, and the bird presumably departed for points south, or died.

Its relative scarcity even in the center of its migration route makes this species one of the rarest shorebirds ever to be recorded

in the State. It was certainly unexpected, to say the least. However, the winter records from Australia indicate that occasionally the species does stray from its "normal" route. As Grinnell (1922) pointed out, these vagrants are the pioneers of a species, often sacrificed, but sometimes colonizing new breeding or wintering areas or discovering new routes of migration.

ACKNOWLEDGMENTS

We thank Carol P. Ralph, Robert J. Shallenberger, and Maile Stemmermann for helpful comments on this manuscript.

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Institute of Pacific Islands Forestry
Pacific Southwest Forest and Range
Experiment Station
USDA, Forest Service
1151 Punchbowl St.
741 North Kalaheo Ave. Honolulu, Hawaii
Kailua, Hawaii

ALOHA TO NEW MEMBERS

We welcome the following new members to the Society and hope that they will join in our activities to further conservation in Hawaii:

Joint with National: Marie L.H. Albert, Mililani; George W. Allen, Hilo; William P. Austin, Hilo; Barbara A. Bingham, Honolulu; Steve and Becky Cohn, Honolulu; Kim Epp, Tamuning, GU; Beverly Hookano, Pahoa; Linda Ogata, Kailua; Mr. and Mrs. Oliver P. Pearson, Orinda, CA; Lt. Ruthie K. Rockwell, APO, San Francisco, CA; Lt. Russell Stienecker, FPO, San Francisco, CA; Orana Tahl, Paia; and John B. Van Den Akker, Boring, OR.

Local Regular: David Sommer, Honolulu.

Subscribers: Sharon Burchett, East Wenatchee, WA; Denise Devine, Chico, CA; Anita Pisciotto, San Francisco, CA; Edward Grey Institute of Field Ornithology, Oxford, England.

HAWAII CONSERVATIONIST HONORED

ENDANGERED SPECIES WORKSHOP

Dr. Otto Degener was commended by the Hawaii State Senate in a resolution adopted on March 22, 1979 for his outstanding service to Hawaii over five and one-half decades as a botanist, author and conservationist. The resolution was introduced by Senator John S. Carroll and signed by 23 senators.

Among Dr. Degener's signal contributions, the resolution points out the following:

"Dr. Degener's many works, including *Plants of Hawaii National Park* and the seven-volume *Flora Hawaiiensis*, comprise an unparalleled collection of information on plant-life in Hawaii, and stand as a remarkable resource in itself to students, teachers, scientists, and laymen alike, both locally and world-wide. . .

"Dr. Degener has been an inspiration to countless others in teaching the values of native ecosystems, in encouraging study of Hawaiian plants, and in recruiting new workers for protection of native wildlife and plants. . .

"Dr. Degener stood alone for most of the past fifty years as a voice in the wilderness, steadily appealing year after year for recognition of Hawaii's botanical wonders and conservation of their habitats, having no peer in his unshakable, deep commitment to Hawaii's natural environment. . .

"Dr. Degener has been tireless in his forthright, fearless efforts to educate and influence government officials, developers, journalists, other conservationists, and the general public to seek protection of native habitats from the bulldozer, feral mammals, introduced game, and introduced weeds that naturalize in our native forests. . .

"All of us who care about the natural beauty and special qualities of these islands that set Hawaii apart in the work of nature owe a bottomline debt of gratitude to Dr. Degener for his lifetime perseverance in relating humankind to the natural environment upon which we ultimately depend for survival as a species. . ."

Otto Degener was a charter member of the Hawaii Audubon Society at its beginning in 1939 and a long-time friend of George C. Munro, co-founder of the Society.

As many readers will know from their publications, for the last 25 years Drs. Otto and Isa Degener have worked together as a team of botanists in both research and writing. Congratulations and aloha!

Mae E. Mull
Island of Hawaii Representative

On February 12-13, representatives from the Portland Regional Office of the U.S. Fish and Wildlife Service (USFWS) conducted a workshop in Honolulu to assist State and Federal agencies in the interpretation and implementation of 1978 Amendments to the Endangered Species Act. Participating in the workshop were representatives from the U.S. Forest Service, National Marine Fisheries Service (NMFS), National Park Service, Corps of Engineers, U.S. Navy, Hawaii Division of Forestry, Hawaii Division of Fish and Game, and virtually the entire Honolulu Office of the USFWS. The primary emphasis of the 2 day workshop was Section 7 of the Act. This section, both in the 1973 Act and in the new amendments, requires Federal agencies to use their authorities to carry out programs for conservation of endangered and threatened species. It also requires these agencies to insure that any actions they carry out, fund or authorize does not jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of officially designated critical habitat. Regulations published after the 1973 Act outlined the procedures for formal consultation between Federal agencies and the USFWS (or the NMFS if marine species are involved). Although the consultation procedures were modified considerably in the 1978 Amendments, federal agencies are still required to consult with USFWS/NMFS if the agency determines that a proposed action may affect listed species. After pertinent biological data are gathered, the USFWS/NMFS will render a formal biological opinion regarding whether or not the proposed action will jeopardize the continued existence of listed species or adversely modify critical habitat.

The most significant amendment to the Act in 1978 was a provision that a federal agency could apply for an exemption to Section 7. This amendment was added to the Act after considerable opposition was raised against the inflexible nature of Section 7 in the 1973 Act. The battle in Washington was so heated that the USFWS Endangered Species Office was actually "out of business" for nearly 6 weeks last fall while Congress decided whether or not to extend the Act and provide the funding that supports the Office. The exemption process that was added is lengthy and complicated and will not even begin until an "irresolvable conflict" is reached at the end of the formal consultation process. The exemption process begins with a Review Board that makes an initial determination whether or not the consultation process was undertaken correctly and if there is, in fact, an irresolvable conflict. The

next step in the exemption process is the Endangered Species Committee in Washington, made up of the Secretary of Interior, Secretary of Agriculture, Secretary of Army, Administrator of EPA, Administrator of NOAA, Chairman of the Council of Economic Advisors and a Presidential appointee. A vote of five members can grant an exemption if: (1) there are no reasonable and prudent alternatives to the agency action; (2) benefits of the action clearly outweigh the benefits of alternative courses of action consistent with conservation of the species; and (3) the action is in the public interest and of regional or national significance. Exemptions can also be granted by the Secretary of Defense if the action is necessary for national defense or by the President, for disaster areas.

It is interesting to note that the Tellico Dam snail darter case was the action that received the most publicity and was instrumental in the exemption amendment to the Endangered Species Act. Yet, in the first action of the Endangered Species Committee since the 1978 amendments were passed, the exemption that would have allowed completion of the dam was denied, on the argument that reasonable and prudent alternatives were available. At the same time, the committee granted an exemption for Grayrocks Dam in Wyoming, with the stipulation that alternative water sources will be used to compensate for adverse impacts to Whooping Crane habitat caused by the dam project.

There were many other changes to the Act incorporated in the 1978 Amendments. Readers interested in the details of the amendments should write for information to the Regional Director, Fish and Wildlife Service, Lloyd 500 Building, Suite 1692, 500 N.E. Multnomah Street, Portland, Oregon 97232, or contact the Honolulu Area Office of Endangered Species in the Federal Building.

R. J. Shallenberger

MAHALO FOR CONTRIBUTIONS

MAHALO NUI LOA to the following members who have generously sent contributions to the Society: A.M.Christian, Sharon Burchett, Elaine Russo, Euphie Shields.

A very special MAHALO to Blanche Pedley, an Honorary Life Member of the Society, for her generous donation of an early series of 'ELEPAIO, from volume 1, number 1 complete through volume 27, number 3.

YOU CAN HELP

ALASKA LANDS BILL:

BATTLE HEATED, BUT NOT LOST

Despite news stories about the gutting of the Alaska National Interest Lands Bill in congressional committees, a strongly conservationist bill is still alive and fighting. In early May it will come to the House floor, along with weaker versions of the bill, for vote by all representatives. The Senate has yet to take any Alaska Lands action.

Hawaii's Rep. Akaka has backed off from his earlier support of a strong bill. But it may not be too late for displeased constituents to help him to change his mind. Rep. Heftel apparently is undecided on the issue and is asking for input from his constituents. Our congressmen should know that people in Hawaii know and care about this conservation legislation of the century. To a large extent, its fate depends on us.

According to aides in the Washington offices of Hawaii congressmen, they are keenly interested in two key issues. First is the question of whether the federal government should go along with what the Alaskan delegation wants, on the theory that "they know what is best for Alaska." (This was the reason Rep. Akaka dropped his support of the strong Udall bill and voted for a weaker version, according to an aide.) Second is the question of whether such a bill should be permitted to lock up important oil and gas resources.

Here are some important facts and points to be made about these issues.

The "Alaska Knows Best" Issue

First, the lands at issue are federal lands, belonging to all of us. That's why the U.S. Congress, and not the Alaska legislature is making this decision.

Second, nothing proposed by the strong conservationist bills (Udall's H.R. 39 in the House and S.B. 22 in the Senate) would change the state land selection process set out in the Alaska Statehood Act. It provides that the State may select 104.5-million acres from federal lands that are unreserved and unappropriated at the time of selection. (That's a third of the federal lands ever granted to all states combined!) Alaska has already selected all but about 12 million acres of its allotment. It now wants 10 million acres which are included in the Udall Bill. But by the time the State had given

notice of this, these lands had already been reserved by the federal government for the National Interest Lands selection process. The state still has a pool of some 50 million acres, including lands of high commercial value, from which to select. In sum, the state has been and will be treated very well.

Finally, not everyone in Alaska is in agreement with the economically oriented position taken by state government spokesmen. A survey reveals Alaskan citizens to be almost evenly divided on the issue. Native groups want to see much of the federal land preserved in its natural state. Several groups have contacted the Hawaii-Alaska Coalition and leaders of the native Hawaiian movement seeking support for a strong conservationist bill.

The Energy Issue

To a large extent, this issue is a red herring. Federal and state surveys have identified areas of favorable or high potential for oil and gas. Of these, only 5 to 10 percent are in the National Interest Lands. Almost all of the areas in conflict are in the Arctic National Wildlife Range (ANWR), which, if designated "wilderness" as proposed, would be closed to oil and gas exploration and development. This area, in the northeast of the state, supports an unusually varied and dense fish and wildlife population, including numerous bird species, polar bears, wolves, musk oxen, and snow geese. It is the calving ground for the large Porcupine caribou herd on which native villages in the area depend for subsistence.

More than 36 million acres of onshore favorable or high potential oil and gas lands lie outside the ANWR. Even richer deposits lie close offshore. At this time, it makes sense to expend limited exploration and development capital on these areas which involve less significant resource conflicts.

If at some time in the future it becomes necessary to take the deposits in the ANWR, Congress can authorize that. Hopefully, at that time, methods less damaging to the wildlife would have been developed.

What You Can Do

This is the time to get messages of strong support for the conservationist bills to our congressmen. Anyone who wants more information on this issue should call Hawaii-Alaska Coalition task force members Mary Hudson, 737-3505 or 521-9261 (after 5 p.m.); Annette Kaohelualii, 247-4113 (evenings); or Ken

Nagata, 947-5952 (evenings).

In any event all Audubon members and friends are urged to express their opinions to Reps. Akaka and Heftel (House of Representatives, Washington, D.C. 20515).

Mary L. Hudson
4805-D Kahala Ave.
Honolulu, HI 96816

CANAL CLEAN-UP COMING!

All of you who are sick of watching gullinule perch on cardboard boxes or coots search for food in piles of Big Mac wrappers, come on out and join in a quick and dirty clean up of Kaelepulu Canal, along Hamakua Drive in Kailua. We are looking for warm bodies. Yours will do just fine. The clean-up date is Saturday, May 19, and we'll be starting work promptly at 9 a.m. We'll need garbage bags, boxes, rakes, and a weed-whacker or two if we can scrounge them up. If you have a small boat or canoe to use for gathering garbage, that would be useful.

After the clean-up, there will be a volleyball-barbecue at Rob Shallenberger's house. It will be a pot-luck affair. Please call Rob (261-3741) during the week of the 14th so we can plan the equipment and food.

Let's get behind this one! The more people show up, the less work for each.

ATTITUDES TOWARD ENDANGERED SPECIES IS SUBJECT FOR MAY MEETING

"Endangered Species: A Three-year Attitude Survey of Hawaii Residents" is the title of Mr. Mark Merlin's program planned for the General Meeting on May 21st. The study began several years ago when Mr. Merlin suggested public opinion surveys as semester projects for students in the courses he teaches at the University's Department of General Sciences. The results provide data on an important but poorly studied aspect of the endangered species problem. Assessments of public opinion can have important influences on planning. Mr. Merlin will receive his PhD. in Geography this year from University of Hawaii. His publications include two popular field guides to plants of Hawaii.

HAWAII AUDUBON SCHEDULE OF EVENTS

May 1 (Tue.) Board Meeting at Maile Stemmermann's new apartment, 1710 Makiki St. #402, (949-3430). Members welcome.

May 13 (Sun.) Field Trip to Poamoho Trail near Wahiawa. This has been Oahu's best trail for forest birds, with chance to find 'I'iwi and the newly rediscovered Gray-sided Laughing-Thrush. Leader: Omer Bussen (262-5506). Meet at Hawaii State Library on Punchbowl St. at 7:00 a.m. Bring water, lunch and car if possible.

May 19 (Sat.) Kaelepulu Canal Clean-up! Meet near Mr. Sub's on Hamakua Dr., Kailua at 9:00 a.m. Leader: Rob Shallenberger (261-3741)

May 21 (Mon.) Regular Meeting. Mark Merlin will speak on *Endangered Species: A Three-year Attitude Survey of Hawaii's Residents*. McCully-Moiliili Library, 2211 S. King St., 7:30 p.m.

FOR DETAILS, SEE INSIDE BACK COVER

HAWAII AUDUBON SOCIETY
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ADDRESS CORRECTION REQUESTED

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