



OBSERVATIONS ON THE HAWAIIAN CROW IN SOUTH KONA, HAWAII

by

Howard F. Sakai and C. John Ralph

The endangered Hawaiian Crow (*Corvus tropicus*), the 'Alalā, is endemic only to the island of Hawaii. It was once relatively abundant in the Kona and Kau Districts (Perkins 1903), but began to decline in the early 1900's (Munro 1944). Baldwin (1969) stated that by the 1940's the 'Alalā had disappeared from some areas, and that its range was still diminishing. P. C. Banko (MSb) and W. E. Banko (pers. commun.) confirmed this disappearance by interviewing local residents in the two districts. Persons interviewed reported that the species was relatively common 25 to 50 years ago in areas where today there are none, or only a few. Extensive surveys by W. E. Banko and P. C. Banko (pers. commun.) between 1969 and 1973 revealed a small population only in the North and South Kona Districts (Fig. 1). P. C. Banko (MSb) estimated a population of less than 50 'Alalā during the years 1969-1976, over the last 8 years, with the exception of 1974, when they estimated 65 adults, immatures, and fledglings. A bird survey of the Kona area by the U.S. Fish and Wildlife Service in the summer of 1978 estimated a total population of 100 to 175 birds (J. M. Scott, pers. commun.). Dr. Scott reports that this higher population does not indicate an increase in numbers, because more area was censused than ever before. It has been seen only a few times in the Kau District in recent years.

A few reports of 'Alalā food habits were noted by the earlier naturalists. Perkins (1903) reported that 'ie'ie (*Freycinetia arborea*) was its most important food source. He also reported it feeding on carrion, young birds, eggs, and various fruits. More recently, P. C. Banko (MSa) and J. G. Giffin (MSS) reported 'Alalā foraging on young birds, various fruits and flowers.

MATERIALS AND METHODS

We studied the 'Alalā in Bishop Estate's Honaunau Forest Reserve from May 2 through June 23, 1978, concentrating mainly on the feeding habits of adult 'Alalā. Three pairs of 'Alalā were observed constructing nests. We tried to maintain surveillance cameras on active nests, but encountered technical problems. Foliage and branches tended to block the nests, resulting in poor views of the nesting process. We maintained feeding platforms, and also observed fledglings away from their nests. We spent little time observing at the nests during the field work; rather, we briefly serviced the cameras, replenished the nearby feeding platforms and left, so as to minimize disturbance.

In addition, we surveyed an area about 7 km wide of the Honaunau Forest Reserve at least once along contour intervals of approximately 1250, 1280, 1310, and 1330 m (Fig. 1) to locate new nests as well as foraging birds.

During 86 hours of field work, we took "activity budgets" of foraging and nonforaging birds. These were taken only when birds were away from the nest tree, but usually no more than 0.5 km from the nest. Locating 'Alalā farther away from nests was difficult, especially when they were not vocal. We recorded the specific substrate toward which a bird appeared to direct its attention, and the various foraging methods used. Nonforaging activities--singing, preening, sitting, or chasing one another were noted, but not included in the analysis of foraging activities and substrates. We categorized different branch classes used by the birds as follows: twigs (<1 cm diameter); small branch (1-5 cm); medium (5-15 cm); large (>15 cm); and trunk (main support of a tree).

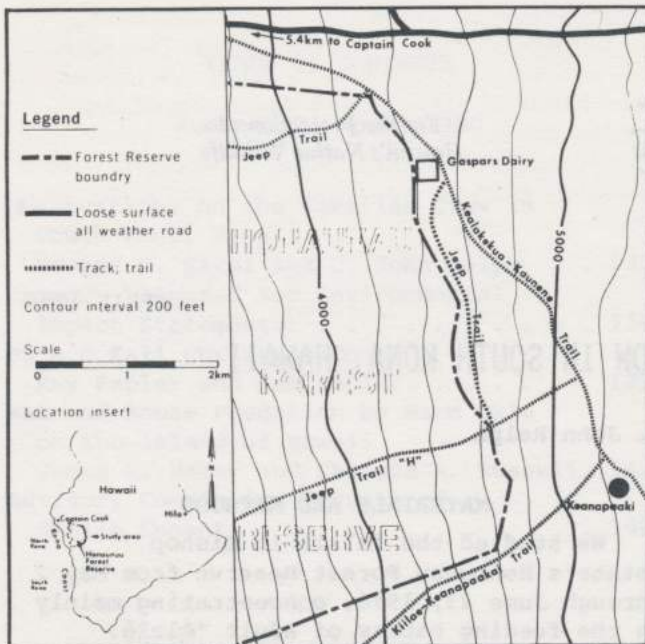


Fig. 1. Locale of the Hawaiian Crow study along the eastern boundary of Honaunau Forest Reserve, Hawaii Island.

RESULTS

Activity budgets

Activity budgets of 83 foraging birds totaled almost 52 minutes (3117 seconds). Activity budgets of 12 nonforaging birds totaled 595 seconds. Budgets were not done if a bird was aware of the observer and vocalized rather than foraged.

Of the 83 foraging activity budgets, 47 percent of the total time were on 'ohi'a (*Metrosideros* sp.), 18 percent on koa (*Acacia koa*), 13 percent on 'olapa (*Cheirodendron* sp.), and lesser amounts on manono (*Gouldia* sp.), 'akalā (*Rubus hawaiiensis*), kāwa'u (*Ilex sandwicensis*), pilo (*Coprosma* sp.), 'ohā-kēpau (*Clermontia* sp.), and naio (*Myoporum sandwicensis*) (Fig. 2).

On 'ohi'a, almost equal amounts of time were spent foraging on flowers, small, medium, or large branches (Fig. 2). In koa, more than one-half of the foraging time was spent on medium branches. On 'olapa, 'akalā, kāwa'u, pilo, manono, and 'ohā-kēpau, most of the time was spent foraging for fruits (Fig. 2).

The fruits of the kopiko (*Psychotria* sp.), kolea (*Mrysiine* sp.), and mamaki (*Pipturus* sp.) were green during the field work, and no foraging was observed on these plants. Ohelo (*Vaccinium* sp.), pukiawe (*Styphelia* sp.), alani (*Pelea* sp.), and

hoawa (*Pittosporum* sp.) all had ripe fruits; however, no 'Alalā were observed foraging on these species. Crows have been reported feeding on the fruits of hoawa, mamaki, and pukiawe by Giffin (1977). The 'Alalā has also been reported (Perkins 1903; Banko MSA Berger 1972) to feed on the fruits and flower bracts of 'ie'ie, but this species was not present in the study area.

Banko (MSb) stated that adults were often seen foraging for arthropods on limbs and trunks (usually dead) of koa and 'ohi'a. We compared the foraging time spent on live versus dead substrate on limbs and trunks, excluding flowers and fruits, and found that 49 percent of the time was on dead portions of plants and 51 percent on live substrate of the various species (Table 1). Because live branches are more common than dead limbs and trunks in the study area, the 'Alalā species' showed an equal preference for dead substrates.

The manner in which 'Alalā fed varied with the different substrates. Each "observation" referred to below is a separate observation, taken at least 10 minutes apart.

'Ohā-kēpau--In two observations, a crow picked at the outer shell of a ripe fruit. When it had opened a hole about 1.5 cm in diameter, the bird plucked out the whole fleshy ovary and ate it, leaving the shell attached to the branch. A possible indicator of feeding might be these droopy empty shells attached to the tree, although other animals might feed in the same fashion.

Table 1. The total time spent by foraging 'Alalā on dead and live substrate on limbs and trunks (excludes fruits and flowers) of the various plant species, and the number of activity budgets taken on each substrate.

Plant species	DEAD		LIVE	
	Total seconds	Number observational periods	Totals seconds	Number observational periods
'Ohi'a	494	14	666	21
Koa	320	10	215	6
'Olapa	0	0	56	3
Kāwa'u	45	1	0	0
Naio	48	2	0	0
Total	907	27	937	30

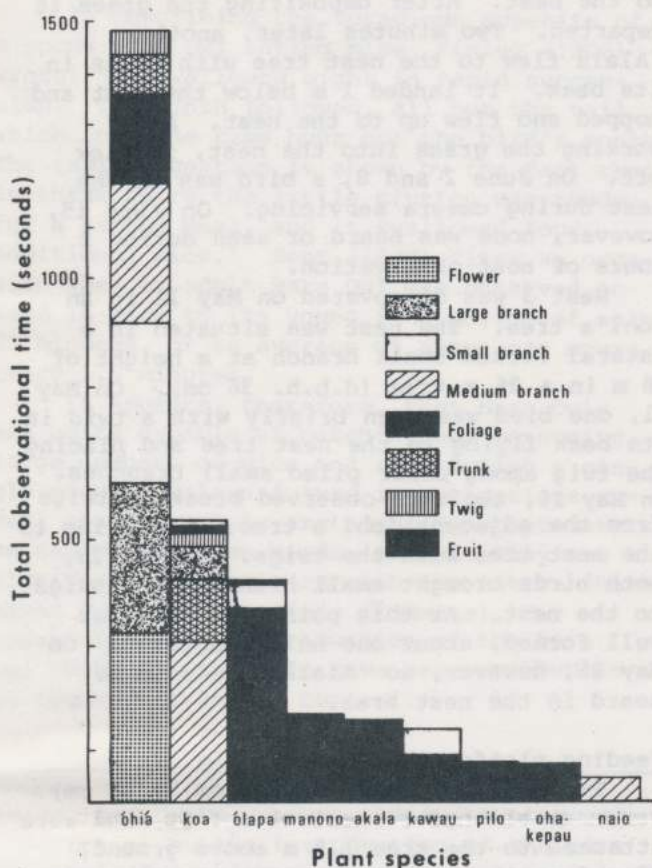


Fig. 2. Amount of foraging activity in various parts of nine plant species in the study area.

'Akalā--In five observations, a bird plucked a whole fruit from a small branch of the Hawaiian raspberry. As the fruit was eaten, bits of it fell to the ground; the birds never swallowed a whole fruit.

Pilo--In two observations, birds plucked whole berries and swallowed them as soon as they were plucked.

'Olapa-- In seven observations, crows plucked the berry and swallowed it whole. On two occasions, they broke off a whole fruit cluster. The bird hopped to a bigger branch, grasped the cluster with its foot and plucked the fruits and swallowed them.

Manono--In four observations, the 'Alalā perched on the outer foliage of the tree and plucked off fruits, swallowing them whole.

'Ohi'a--In nine observations, birds probed in inflorescences a total of 95 times, and 12 times tipped their heads back, apparently to swallow. On two occasions, a larva (2 cm long and creamish in color) was taken from large branches of 'ohi'a and

swallowed. Once, a bird plucked a spider egg sac from the underside of live foliage, tore the sac with its beak, and swallowed the contents.

Koa--In 15 observations, birds were seen probing, pecking, flaking, and gleaning the trunk and branches for arthropods. Once a larva, 2.0 cm long and cream-colored was eaten. Once, while a crow foraged on a large branch, a liquid gel dripped from its beak.

Kāwa'u--In two observations, birds were observed plucking a fruit, and swallowing it whole.

Naio--On two occasions, birds probed and flaked a dead branch, apparently for arthropods.

The average foraging height of the 'Alalā in the various tree species was almost always in the upper one-half, averaging 76 percent of the height (Fig. 3). These data reflect the crows' preference for arboreal feeding. No birds were observed foraging on the ground, although Giffin (1977) mentions that ground foraging is part of their repertoire.

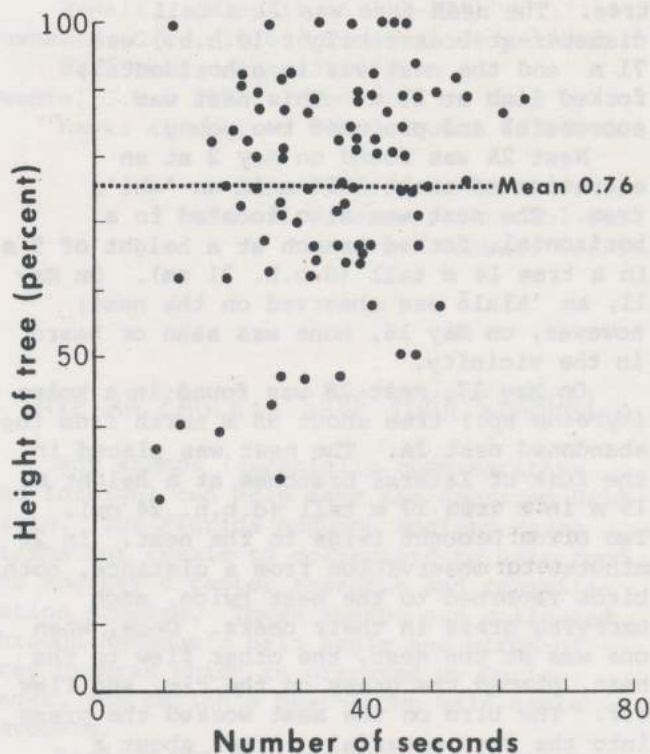


Fig. 3. Foraging height of Hawaiian Crow in the study area.

Nest site and associated behavior

Two active nesting pairs have been reported each year within the same area of the Honaunau Forest Reserve since 1972 (except that in 1975 no nests were found) by Banko (MSa) and Giffin (1977). This year (1978), in addition to the two pairs, the senior author discovered another pair constructing a nest within the Reserve.

These three nesting pairs at four nests were observed during 1978, and the nests will be referred to as 1, 2A and 2B, and 3. Nests 2A and 2B were built by the same pair. Nests 1, 2A and 2B were in tall, open 'ohi'a forests characterized by mixed stands of koa and other native trees and shrubs. Both nest areas have been disturbed to some extent by logging and grazing. In the late 1950's, the upper Honaunau Forest Reserve was logged for koa by the Takemoto family of Kona (Edward Ueda, pers. commun.). During 1959, the Reserve was fenced and about 1000 feral cattle removed (Bryan 1977). Nest 3 was located in a denser, closed canopy forest, dominated by 'ohi'a and interspersed with koa, treefern (*Cibotium* sp.), and other native trees and shrubs.

Nest 1 was found on May 2 at an elevation of about 1350 m in an 'ohi'a tree. The nest tree was 21 m tall diameter-at-breast-height (d.b.h.) was 71 m and the nest was in a horizontal, forked limb at 17 m. This nest was successful and produced two young.

Nest 2A was found on May 2 at an elevation of about 1280 m in an 'ohi'a tree. The nest was also located in a horizontal, forked branch at a height of 9 m in a tree 14 m tall (d.b.h. 31 cm). On May 11, an 'Alalā was observed on the nest; however, on May 16, none was seen or heard in the vicinity.

On May 17, nest 2B was found in a kolea (*Myrsine* sp.) tree about 85 m north from the abandoned nest 2A. The nest was placed in the fork of lateral branches at a height of 15 m in a tree 17 m tall (d.b.h. 24 cm). Two birds brought twigs to the nest. In 20 minutes of observation from a distance, both birds returned to the nest twice, each carrying grass in their beaks. Once, when one was at the nest, the other flew to the nest, placed the grass on the rim, and flew off. The bird on the nest worked the grass into the nest material. After about a minute, the bird on the nest left. Nine minutes later a bird returned to the nest tree with more grass material in its beak. It landed 1 m below the nest and hopped up

to the nest. After depositing the grass it departed. Two minutes later, another 'Alalā flew to the nest tree with grass in its beak. It landed 1 m below the nest and hopped and flew up to the nest. After working the grass into the nest, it flew off. On June 2 and 8, a bird was on the nest during camera servicing. On June 15, however, none was heard or seen during 2 hours of nest observation.

Nest 3 was discovered on May 11 in an 'ohi'a tree. The nest was situated in a lateral forked small branch at a height of 18 m in a 26 m tree (d.b.h. 36 cm). On May 11, one bird was seen briefly with a twig in its beak flying to the nest tree and placing the twig among other piled small branches. On May 16, two were observed breaking twigs from the adjacent 'ohi'a tree, and flying to the nest tree with the twigs. On May 23, both birds brought small branches and twigs to the nest. At this point the nest was well formed, about one-half completed. On May 26, however, no 'Alalā were seen or heard in the nest area.

Feeding platforms

Two feeding platforms (43 cm by 48 cm) were established at nests 1 and 2B, and were attached to the tree 1.5 m above ground, 23 m from the nest tree. The platforms were in plain view from the nest tree. Chicken eggs, dead chicks, and dried dog food were put on the platforms, and some food was placed on nearby fallen logs. Fresh food was put out on eight mornings on the platforms and on five mornings on the logs, and checked each evening.

Nothing was eaten at either platform. Although some eggs and chicks disappeared from logs, we observed no actual feeding by the 'Alalā. J. G. Giffin (pers. commun.) observed and photographed 'Alalā feeding on similar food placed on stumps and logs in 1978, but had no success at the artificial platforms.

Observation of Fledglings

Nest 1 produced two successful fledglings. Both were banded on June 10 by Giffin and the smallest brought to the Pohakuloa propagation project. On June 21, the remaining banded juvenile was perched on an olapa tree 18 m from the nest tree. When the tree was approached, both adults called, emitting high-pitched, raspy sounds, and then flew away from the juvenile. During this period, the juvenile sat quietly. Shortly, thereafter, during a heavy downpour, the juvenile hopped and sat under

some overhanging 'olapa leaves. When the rain subsided, the juvenile called out a soft "kee-kee" and an adult flew over and regurgitated some dark-colored berries into the juvenile's throat.

The juvenile appeared to be clumsy in hopping and flying as compared with adults. We detail below the travails of this bird to emphasize the problems it encountered as a fledgling. During the observation, the juvenile first tried to hop from one twig to another, and ended up with its neck protruding forward and its wings spread out. It remained in this position for 10 to 11 seconds before it regained enough balance to jump to an adjacent twig. Its next attempt to fly to an adjacent small branch, about 4 m away and 1 m higher, was futile. Instead of landing on a lower branch, it rapidly beat its wings, trying to gain height. But it bounced off some twigs. After about 15 seconds, it tried flying to a small branch 2.5 m away, but was unsuccessful. With its wings beating rapidly, it gained only 1 m in height. Although it tried to grasp the trunk of the 'ohi'a tree, it fell to the ground. As this was happening, an adult flew to a tree above the juvenile and emitted high raspy "cawks," and the juvenile emitted its soft "kee-kee" call. During the 20 minutes spent on the ground, the juvenile attempted to get airborne six times. It hopped and worked its way up a fern leaf (*Dryopteris* sp.) and attempted a leaping motion while flapping its wings to get airborne. On the last attempt, it almost achieved success when it lifted off 1.5 m and overshot a young koa limb. Again, however, it bounced to the ground. It was successful on the next attempt when it clumsily hopped its way up a leaning dead treefern stump and flew 1 m up an adjacent kolea tree. During this exhausting episode, the adults, perched in a koa tree 15 m away and emitted a raspy "cawk" call. Once the juvenile climbed the kolea tree, both adults flew to it and a soft cooing bout ensued for about 3 minutes. During this time, an adult fed the young once by regurgitating into its throat. Observations ended with the juvenile perched 30 m from the nest tree with one adult in a nearby tree and the other calling from a distant perch.

The next day (June 22), the juvenile was perched in a koa tree about 40 m from the nest tree where it was observed at this

distance for 1 hour. It attempted three unsuccessful and clumsy attempts to fly to a neighboring 'ohi'a branch about 4 m away. Fluttering its wings and attempting to fly, it succeeded for only a short distance (2 m), before crashing onto the koa limbs, frantically grasping to regain its foothold and balance. It perched for several minutes before making another attempt. One adult was perched in an 'ohi'a tree 15 m from the juvenile and the other adult was away foraging; its raspy "cawk" was heard several times.

SUMMARY

In the Honaunau Forest Reserve, three active 'Alalā nests were located during the 1978 breeding season. One pair of birds was successful in producing two fledglings. A second pair deserted its first nest, re-nested in another tree, and then abandoned the second nest. A third and previously unreported nesting pair was discovered in the area, however, they also deserted the nest site.

Foraging activities of 'Alalā away from known nest sites were measured. The activity budget data reflects the 'Alalā's preference for arboreal feeding, and its reliance upon a variety of plant species and substrates for foraging. The 'Alalā probed, pecked, and gleaned on trunks, branches of different sizes as well as foliage, and flowers. They relied heavily on fruits that were ripe.

A fledgling observed during the fledgling process showed to a marked extent the effects of inexperience. The juvenile had difficulty getting airborne, was clumsy in hopping and flying, and sometimes fell to the ground. It is certainly possible that fledglings sustain injuries (whether permanent or temporary) from falling. Although we have not seen any injuries to fledglings, we feel that falls may contribute to the poor success of fledglings reaching adulthood. Once on the ground, these fledglings are certainly more vulnerable to predators. This vulnerability was apparently a concern to the adult 'Alalā because they kept close watch on the grounded fledgling.

It appears that the 'Alalā prefer an array of plant species for their food source and, therefore, major efforts need to be placed on maintaining their present habitat with emphasis on encouraging younger plants for the food of future 'Alalā populations.

ACKNOWLEDGMENTS

We thank Jon Giffin for showing us the study area and for help in locating nests; Dave Woodside for his assistance in mapping out the present distributional range of the 'Alalā. William Stayton, Edward Ueda, and Bill Rosehill of the Bishop Estate arranged for access to the study area and were very cooperative. Winston and Paul Banko, C. P. Ralph, Charles van Riper III, and Mike Scott made helpful comments on the manuscript.

Literature Cited

- Baldwin, P. H. 1969. The 'Alalā (*Corvus tropicus*) of Western Hawaii Island. 'Elepaio 30(5):41-45.
- Banko, P. C. MSa. Report on 'Alalā (*Corvus tropicus*). Unpublished 1974 report. World Wildlife Fund and Hawaii State Fish and Game.
- Banko, P. C. MSb. 1976 report on 'Alalā (*Corvus tropicus*) Unpublished report. World Wildlife Fund and U.S. Forest Service.
- Berger, A. J. 1972. Hawaiian Birdlife. Honolulu, Univ. Press of Hawaii.
- Bryan, L. W. 1977. Bill Bryan views 50 years of Forestry as though it were but yesterday. Hawaii Tribune Herald. p. C14-C16. Feb. 27, 1977.
- Giffin, J. G. MSS. 'Alalā investigation. Unpublished Job progress report, 1976 and 1977. Hawaii State Fish and Game.
- Munro, G. G. 1944. Birds of Hawaii. Honolulu: Tongg.
- Perkins, R. C. L. 1903. Vertebrata. In Fauna Hawaiiensis, (D. Sharp, Ed.). Cambridge, Univ. Press 1(4):365-466.

Pacific Southwest Forest and Range
Experiment Station
Forest Service, U.S. Department of
Agriculture
1151 Punchbowl Street
Honolulu, Hawaii 96813

CHANGES PROPOSED FOR ENVIRONMENTAL IMPACT STATEMENTS

A series of hearings were held throughout the state during January to allow the public to comment on recently proposed changes to the regulations that govern preparation of State Environmental Impact Statements. The amendments, drafted by the Environmental Quality Commission, were designed to clarify procedures and to make the regulations con-

form to changes made in Chapter 343 (Hawaii Revised Statutes) by the 1979 Legislature.

The proposed amendments raised considerable concern among conservation groups and agencies. Some of the strongest criticism came from the Office of Environmental Quality Control (OEQC), the office responsible for implementation of the regulations.

The Society was represented at hearings on Hawaii and Oahu, and submitted additional written testimony as well. Our primary concern, shared by many others, was the change making the consultation procedure prior to filing an EIS optional. The existing mandatory procedure improves the quality of the draft EIS because it makes it possible to incorporate all pertinent environmental concerns. It also enables reviewers of the draft EIS to have the opportunity to read the appended comments of various agencies, individuals and organizations. In this way the reader is able to determine whether or not the draft EIS adequately addresses issues raised when the notice of EIS preparation was circulated.

The Society also expressed concern about the lack of procedures for administrative appeal to Negative Declaration (omission of an EIS because impacts will not be significant). Guidelines and policies for EIS preparation, now incorporated into the existing regulation, would be deleted by the proposed amendments. The Society expressed concern that this change would weaken the intent of the regulations and remove important guidance.

It was also pointed out that the amendments, in total, would create even greater disparity between the format for State and Federal EIS's, at a time when efforts should be made to improve coordination between the two procedures. New federal regulations as of July 1979 stress the critical importance of public involvement during EIS preparation. They also make other important adjustments to the Federal EIS procedure to improve both the quality of the documents produced and, more importantly, the quality of decisions that are made. The costly waste of effort and money resulting from both Federal and State agencies preparing EIS's for the same project can only be prevented through development of compatible regulations, so that a joint EIS procedure can become a reality.



PUU O KALI, MAUI, CHRISTMAS COUNT

by Kay Kepler and Cam Kepler

The second annual Puu O Kali, Maui, Christmas Count, conducted on Monday, December 31, 1979, was an enjoyable and memorable day. A gusty, 24-hour Kona storm broke at 2 a.m. on the count day and lasted until just midnight, thus completely covering the count period (no one ventured out before 2 a.m.). The days before and after the count were fine. In the lowlands, 20-30 mph winds and frequent squalls made it difficult to hear birds, who tended to lie low. Carmelle Crivellone tried to walk down Papanui Ridge (beginning at Haleakala Crater rim) to look for chukars, but could barely stand erect in the winds, which were gusting to 100 mph. She decided at an 8-mile hike into these winds with temperatures below 40° F, fog and driving rain, was unwise, so Chukar unfortunately went unrecorded. A contingent from Oahu flew over in Rob Shallenberger's plane, but the wind was too violent for the return flight, so they reluctantly returned by a commercial plane.

In spite of the weather, 13 participants recorded 5,684 birds of 39 species. This represented almost three times the number of individuals seen in 1978 (1,999). Some unusual migrants were spotted at Kealia Pond. Among the notables were a possible Semipalmated Sandpiper, Red Phalarope, Canvasback, Osprey, a Franklin's or Laughing Gull, and no less than 7 Black-bellied Plovers. The strong onshore winds at Kealia undoubtedly contributed to the presence of three Great Frigatebirds that flew very low over the adjacent beach, road, mudflats and pond; these were the first, and only, seabirds seen in two years, as none were observed offshore. We are accustomed now to the paucity of seabirds in Maui's coastal waters at any time of year, especially adjacent to the south coast.

Inland, Warbling Silverbills have increased enormously from their discovery on Maui last year; they now flock regularly in most suburbs and kiawe pastures from Kihei to Kula, and have also been seen in the Hana region. Spotted Doves were abundant in Ulupalakua. Hundreds fed at the Ulupalakua Ranch feedlot, along with mynas and Barred Doves. The rain, fog and wind failed to discourage the native forest birds in Polipoli Park, and we enjoyed high counts of 'Apapane, Creeper, and 'Amakihi, and, like last year, located three 'I'iwi. Perhaps

the severe weather deterred hunters, for we found 14 Ring-necked Pheasants. We did poorly with other game birds; only some Gray Francolins called, and we missed Black Francolin, Common Quail, and California Quail, all residents within the count circle but conspicuously absent on the count day.

It was, as usual, an exciting and fun day, although certainly not a balmy, tropical count as many mainlanders might envision: No snow, but almost all of us became drenched, wind-blown and shivering at times, and we enjoyed the blustery change of scenery. Our grateful thanks to Rob Shallenberger, Sheila Conant, Maile Stemmerman, and Bob Pyle for swelling both our bird and participant numbers...come again next year!

Notes on Unusual Species

Canvasback. One female seen by Rob Shallenberger, Kealia Pond. Known as occasional straggler.

Osprey. One seen by Kay Kepler and Rob Shallenberger at the Aquaculture ponds, Kealia. Unmistakable. Perching and flying overhead and within easy viewing distance. Occasional to frequent migrant to Hawaii. In 1978, one stayed for several weeks at Kealia and Kanaha Ponds, Maui.

Black-bellied Plover. Seven seen in various spots of mudflats close to Kealia Pond, by Rob Shallenberger, Kay Kepler, Debra Clausen, and Kim Sundberg. Identified by black axillars in flight, and general appearance like Golden Plover, but much whiter, especially ventrally, slightly larger size, white eyestripe, and chunkier appearance.

Sandpiper sp? (Semipalmated?). One seen by Rob Shallenberger and later confirmed by Kay Kepler, in one of the unused baitfish ponds at the west end of Kealia Pond. This is possibly the first record of this species from the Hawaiian Islands: A small sandpiper, quite slim, with shortish bill, pale head and very little breast-streaking. Distinguished from Least Sandpiper by black legs and small amount of side breast-streaking; from Western Sandpiper by lack of drooping billtip, proportionately shorter bill, and slimmer body. We saw it standing, feeding, and flying, and for most of the time observed it through a X40 spotting scope at a distance of about 50' (approximately 45 mins.). A Ruddy Turnstone landed within a few inches of the sandpiper, and was decidedly a larger bird by a couple of inches in length, and was also larger in general body shape than the latter species. We investigated the possibility of a Knot,

PUU O KALI, MAUI, 1979 CHRISTMAS BIRD COUNT

Sectors	1	2	3	4	5	6	7	Total
Great Frigatebird	-	3	-	-	-	-	-	3
Black-crowned Night Heron	-	49	2	-	2	-	-	53
Pintail	-	261	-	-	-	-	-	261
Green-winged Teal	-	2	-	-	-	-	-	2
American Wigeon	-	12	-	-	-	-	-	12
Northern Shoveler	-	157	-	-	-	-	-	157
Canvasback	-	1	-	-	-	-	-	1
Lesser/Greater Scaup	-	8	-	-	-	-	-	8
Osprey	-	1	-	-	-	-	-	1
Gray Francolin	-	3	26	25	-	15	-	69
Ring-necked Pheasant	-	-	-	-	2	-	12	14
Hawaiian Coot	-	39	-	-	-	-	-	39
Hawaiian Stilt	-	82	9	-	-	-	-	91
American Golden Plover	-	85	7	7	2	34	10	145
Black-bellied Plover	-	7	-	-	-	-	-	7
Wandering Tattler	-	19	5	-	-	-	-	24
Ruddy Turnstone	-	22	1	7	1	-	-	31
Sanderling	-	14	1	-	-	-	-	15
Sandpiper sp?	-	1	-	-	-	-	-	1
Red Phalarope	-	1	-	-	-	-	-	1
Franklin's/Laughing Gull	-	1	-	-	-	-	-	1
Rock Dove	-	-	31	-	-	21	-	52
Spotted Dove	-	5	33	581	10	88	-	717
Barred Dove	-	89	115	441	-	85	-	730
Pueo (Hawaiian Owl)	-	1	-	-	-	1	-	2
Skyllark	-	-	-	3	-	66	19	88
Red-billed Leiothrix	-	-	-	-	-	-	91	91
Mockingbird	-	1	24	7	-	6	1	39
Japanese White-eye	-	19	53	12	-	14	164	262
Common Myna	-	1	103	272	108	-	-	484
'Amakihi	-	-	-	-	-	-	261	261
Maui Creeper	-	-	-	-	-	-	55	55
'Apapane	-	-	-	-	-	-	505	505
'I'iwi	-	-	-	-	-	-	3	3
Warbling Silverbill	-	-	133	3	37	8	-	181
Spotted Munia	-	14	12	25	22	17	-	90
House Sparrow	-	-	220	-	-	201	-	421
Northern Cardinal	-	5	83	-	-	18	9	115
House Finch	-	11	114	366	-	107	54	652
No. of Individuals	0	914	972	1749	184	681	1184	5684
No. of Species	0	29	18	12	8	14	11	39

but the sandpiper was much smaller, less chunky, lacked the white rump in flight, and did not have the thick-necked appearance of Knots. We are quite sure of this identification, as both observers have seen this bird on mainland U.S.A. (Editors' note: From this excellent description, it is only probable that this bird was a Semipalmated Sandpiper. It cannot be separated in the field by the field marks given with 100% accuracy.)

Red Phalarope. Seen by Rob Shallenberger and later confirmed by Kay Kepler on the baitfish ponds, Kealia Pond. Unmistakable, identified primarily by its feeding and swimming behavior while in the water, short bill (appearing mostly black from mud) and small patch of red on belly. It was extremely tame (we approached within a few feet), refusing to move from its small patch of shallow water, even at our approach. This species has been reported over the years as a straggler on most of Hawaii's islands.

Franklin's/Laughing Gull. Seen by Kay Kepler, Rob Shallenberger, Debra Clausen, and Kim Sundberg at Kealia Pond. It was flying within reasonable viewing distance, and recognized immediately as a Laughing/Franklin's immature by its white tail with black terminal band, darkish back, and almost black primaries. We suspect it may be a Franklin's by its pale head (almost white except for a grey area behind the eye and on crown) and its pale breast. During the course of the morning, we viewed it from several locations.

Sectors Covered

- 1 Offshore: Kay and Cam Kepler (compilers, 248 Kaweo Place, Kula, Maui 96790), Helen Scantlin, Bob Pyle
- 2 Kealia Pond: Kay Kepler, Rob Shallenberger, Debra Clausen, Kim Sundberg
- 3 Coastline and Kihei Residential: Helen Scantlin, Kathleen and Harry Johannes, Cam Kepler, Bob Pyle
- 4 Ulupalakua: Cam Kepler, Bob Pyle
- 5 Lowland Scrub and Agricultural Areas: Kay Kepler, Rob Shallenberger
- 6 Kula: Myer Ueoka, Carmelle Crivellone, Cam Kepler, Bob Pyle
- 7 Mountain forests (primarily Polipoli State Park): Maile Stemmerman, Sheila Conant, Bob Pyle.

Habitat Coverage: Mountain forests (part exotic), 25% of party-hours; sugar cane/*Opuntia* cactus/pasture, 25%; marshes and ponds, 20%; parks and lowland residential, 15%; beach and ocean, 10%; and lowland woods and scrub, 5%.

There were 13 observers in eight parties. Total party-hours 49 (33½ on foot, 15½ by car). Total party-miles 127 (19 on foot, 108 by car).

NATURAL HISTORY SCHOLARSHIP

The Hawaii Audubon Society is accepting applications for the Rose Schuster Taylor Scholarship, a one-year undergraduate tuition scholarship at the University of Hawaii. Its purpose is to give financial assistance to deserving undergraduates majoring in natural science, especially those interested in Hawaiian natural history.

For further information, write to Dr. Sheila Conant, Scholarship Committee, Department of General Science, 2450 Campus Road, Honolulu, Hawaii 96822. Deadline for completed application is May 1, 1980.

DUES INCREASE ?

At its March meeting, the Hawaii Audubon Executive Board discussed the possibility of increasing the annual dues for local memberships and subscribers to \$6.00, beginning January 1981. In 1979, the cost for publishing the '*Elepaio* alone was \$6.43 per member. With the present annual dues of \$3.00, the Society is required to subsidize each local member and subscriber by a substantial amount each year. Fortunately, the support shown by our members in the recent request for contributions has helped to finance the subsidy this year.

The Executive Board will decide upon the increase at its May meeting. This meeting will be held at Manoa Library, 2716 Woodlawn Drive, on May 12th starting at 7:00 p.m. The Board members solicit the opinions of the membership on this important question. Society members are encouraged to participate in the discussion by attending this meeting, or by sending written comments to the Society at its post office box.

MANANA ISLAND FIELD TRIPS

In order to meet growing demand for the Society's annual Manana Island field trip, and to permit observations earlier in the breeding season for nesting terns, the Society will conduct two trips to Manana Island in 1980, pending receipt of clearance from the Department of Land and Natural Resources. Scheduled dates are May 11 and August 10. Alternate dates of May 18 and August 17 are scheduled in case of poor weather or heavy seas. Each trip is limited to 30 people. Because of the potential problems of landing on the island, no children younger than 10 years are permitted. All those on the trips should wear shoes and clothes you don't mind getting wet. A jump from the boat without shoes can provide a painful introduction to sea urchins in shallow water. Any gear you want to keep dry should be well sealed in double plastic bags or other waterproof containers. The cost for the ride, to be paid at the pier, will be \$3 to \$4 depending on the boat available. Departure will be from the Makai Pier, just north of Sea Life Park. Audubon Society President Rob Shallenberger will be the trip leader, but others familiar with the island and Hawaii's seabirds will also be along to help out. Call Rob, phone 261-3741, to sign up for one trip only, and if later you can't make the trip please call to cancel. Plan to meet at the Pier at 8 a.m., with return not before 1 to 2 p.m.

RAT AND MOUSE PREDATION BY BARN OWLS ON THE ISLAND OF HAWAII

by James K. Baker and Christa A. Russell

Because of rodent population studies we are doing on the Island of Hawaii in Hawaii Volcanoes National Park, we became interested in the numbers of rats and mice found in a collection of 31 Barn Owl (*Tyto alba*) pellets from Kipuka Puauulu (Bird Park) at 1220 m (4,000 ft.), found in September, 1979. Feathers stuck to the pellets identified the species as the Barn Owl.

All of the pellets came from a single roosting site in a dead 'ōhi'a (*Metrosideros collina*) tree, and they were found to contain the regurgitated remains of 22 roof rats (*Rattus rattus*) and 22 house mice (*Mus musculus*). Our data, and the observations of others mentioned in this paper, indicate that Barn Owls can consume large numbers of rats and mice, especially the latter, in a single night of foraging.

The Barn Owl was introduced into Hawaii in 1958 for rodent control purposes, and it is now a common and well established bird, at least on the islands of Hawaii and Kauai (Au and Swedberg 1966, Tomich 1962, 1971). Wherever found, the Barn Owl is largely nocturnal in its feeding habits, seldom foraging until after dark (Bent 1938, Marti 1974, Reese 1972, Smith *et al.* 1974, Tomich 1971), although on occasions it may forage in daylight (Harte 1954, Haverschmidt 1970).

On the mainland, the diet of Barn Owls consists largely of small animals: rats, mice, pocket gophers, ground squirrels, rabbits, shrews, bats, moles, birds, frogs, fish, and insects (Bent 1938, Carpenter and Fall 1967, Cottam and Nelson 1937, Gallup 1949, Marti 1974, Smith *et al.* 1972, Townsend 1926, Twente 1954).

In 1964, Tomich (1971) collected a series of 100 Barn Owl pellets from the island of Hawaii and found only the remains of rats (*Rattus rattus*, as well as the Polynesian rat, *R. exulans*) and house mice. He found no birds, insects, or other animal remains. Ninety-one pellets contained mice; eight contained both rats and mice; and one pellet contained a rat. Tomich's measurements of five randomly selected pellets were given as 67 x 28; 60 x 35; 60 x 34; 56 x 32; and 47 x 32 mm in length and width; averaging 58.0 x 32.2 mm. Tomich made no weight determinations.



Roof Rat remains in Barn Owl pellets, Kipuka Puauulu, Hawaii Volcanoes National Park, September 1979.

The 31 pellets which we collected ranged in length from 32 to 80 mm with a mean of 46.1 mm. Widths ranged from 16 to 30 mm with a mean of 25.1 mm, and weights ranged from 1.4 to 11.4 g with a mean of 5.6 g.

We found that size differences in skulls, or in the sizes of lower mandibles when cranial bones were disarticulated, easily separated mice in the pellets from the much larger rats. Comparisons of the rat skulls found, against a study collection of known skulls of roof rats, Polynesian rats, and Norway Rats (*R. norvegicus*), showed that the rat remains in the pellets we found were all roof rats. We also found that counting bones other than skulls or lower mandibles did not indicate larger numbers of rats or mice in pellets. The numbers of lower mandibles alone in owl pellets is a reliable index of the numbers of rodents eaten.

Of the 44 rats and mice found, we counted 10 mice from a single pellet. Tomich (1971) also found a pellet containing 10 mice. Twelve pellets contained one rat each, and three pellets contained two rats each. Four pellets contained both a rat and one mouse each, and five pellets contained mice only in the following counts: 10, 3, 2, 2, and 1. The individual pellets containing only one to three mice were the smaller pellets. Seven pellets contained skeletal materials which did not include skulls or mandibles, which may indicate that heads may sometimes be pulled from bodies and eaten separately or are regurgitated in separate pellets. Marti (1974) concluded from his studies that prey items may be contained in more than one pellet. We did not find any remains of insects, birds, or other animals.

In describing the voracious appetite of a young Barn Owl eating mice, Finley (1906) wrote: "It swallowed eight in rapid succession. The ninth followed, all but the tail which for some time hung out the bird's mouth. The rapid digestion is shown by the fact that in three hours the little glutton was ready for a second meal, and it swallowed four additional mice." Bent (1938) cites an occasion when an adult Barn Owl was observed to feed 16 mice to its young in a period of only 25 minutes, or an average of about one mouse every 1.6 minutes.

It appears, therefore, that Barn Owls are quite capable of catching and consuming large numbers of mice and rats during a single night. Unless future investigations reveal that Barn Owls are significant predators on native Hawaiian birds, or that they are significant competitors with the native Short-eared Owl, or Pueo (*Asio flammeus*), for rodent food, the introduction of the Barn Owl to Hawaii seems to have been worthwhile in regards to rodent control.

LITERATURE CITED

- Au, S. and G. Swedberg. 1966. A progress report on the introduction of the Barn Owl (*Tyto alba pratincola*) to the island of Kauai. 'Elepaio 26:58-60.
- Bent, A.C. 1938. Life Histories of North American Birds of Prey. Part 2. U.S. Nat'l. Mus. Bull. 1970.
- Carpenter, M.L. and M.W. Fall. 1967. The Barn Owl as a Red-winged Blackbird predator in northeastern Ohio. Ohio J. Sci. 67:317-318.
- Cottam, C. and A.L. Nelson. 1937. Winter nesting and winter food of the Barn Owl in South Carolina. Wilson Bull. 49: 283-285.
- Finley, W.L. 1906. The Barn Owl and its economic value. Condor 8:83-88.
- Gallup, F.N. 1949. Banding recoveries of *Tyto alba*. Bird Banding 20:150.
- Harte, K. 1954. Barn Owl hunting by daylight. Wilson Bull. 66:270.
- Haverschmidt, F. 1970. Barn Owls hunting by daylight in Surinam. Wilson Bull. 82: 101.
- Marti, C.D. 1974. Feeding ecology of four sympatric owls. Condor 76:45-61.
- Reese, J.G. 1972. A Chesapeake Barn Owl population. Auk 89:106-114.
- Smith, D.G., C.R. Wilson, and H.H. Frost. 1972. Seasonal food habits of Barn Owls in Utah. Great Basin Naturalist 32: 229-234.
- Smith, D.G., C.R. Wilson, and H.H. Frost. 1974. History and ecology of a colony of Barn Owls in Utah. Condor 76:131-136.
- Tomich, P.Q. 1962. Notes on the Barn Owl in Hawaii. 'Elepaio 23:16-17.
- Tomich, P.Q. 1971. Notes on food and feeding behavior of raptorial birds in Hawaii. 'Elepaio 31:111-114.
- Townsend, C.W. 1926. Findings of pellets in Barn Owls. Auk 43:544.
- Twente, J.W. 1954. Predation on bats by hawks and owls. Wilson Bull. 66:135-136.

Hawaii Field Research Center
Hawaii Volcanoes National Park
Hawaii 96718

Pairs of lower mandibles of 10 House Mice from a single Barn Owl pellet, Kipuka Puau, Hawaii Volcanoes National Park, September 1979.



SAVE AN EAGLE: SAVE YOUR STAMPS!

Any stamps (especially commemorative and foreign) can help save the American Bald Eagle. The Florida Audubon Society saves stamps for resale to collectors to help fund the Society's raptor research and rehabilitation program. These stamps are collected through Audubon's bald eagle and birds of prey program which is directed by Doris Mager, the nation's best-known bald eagle advocate.

Readers who want to save their foreign and U.S. stamps to help save the Southern Bald Eagle should write to Florida Audubon Society Stamp Program, P.O. Drawer 7, Maitland, FL 32751 for an informative brochure about the project.

ADVISORY COMMISSION THREATENED

House bill 2842 — relating to fish and game — was introduced in the State House of Representatives, and a public hearing was held on February 28. The bill would abolish the Animal Species Advisory Commission, a body that has served the Division of Fish and Game for over 9 years with advice on proposed animal introductions to the state. The Commission has also provided valuable and sometimes controversial advice on matters relating to fish and wildlife conservation including review of the establishment of new hunting areas and natural reserves, conservation and land use regulations, endangered species (critical habitat and recovery plan reviews), aquaculture, commercial fishing and forestry, to name a few.

The first draft would have required that the Division of Fish and Game consult with scientists, but did not specify how these scientists would be chosen. There is no requirement in the proposed bill that the scientists to be consulted are to be familiar with the native ecosystems of Hawaii, implying that these scientists could well be from other states or regions. Presumably these scientists could even be sought within the staff of the Fish and Game division, thus creating a conflict-of-interest situation.

As a result of strong testimony from conservation organizations (including Hawaii Audubon Society) and two former Commission members, the bill has been amended to retain the Commission as an advisory group for the Department of Land and Natural Resources, rather than simply for one of its divisions. While this sounds like a step forward, a small change in the technical language of the bill will, if passed, succeed in stripping the Commission of what little power it has. As it stands, the Commission is only advisory, so that it has no way to enforce its recommendations. Present legislation requires that Fish and Game consult with the Commission on certain matters. The proposed legislation makes this consultation optional. What is left is an advisory body whose advice can be sought at the pleasure of the agency; a very weak situation indeed. A simple change of phrase from "shall advise" to "may advise" would effectively render the Commission without substantial influence.

The Senate hearing on this bill will be over when this 'Elepaio reaches you. However, you can help by calling your senator and asking him to pass H.B. 2842 only if the Depart-

ment of Land and Natural Resources is required to consult with the Commission on animal introductions and fish and wildlife conservation.

This body is the only means for open and public review and discussion of numerous critical environmental issues in the state of Hawaii.

PLEASE HELP!

Sheila Conant

P.O.Box 3711
Carmel, CA 93921
February 12, 1980

To the Hawaii Audubon Society
P.O. Box 22832
Honolulu, HI 96822

The plaque of appreciation from the Hawaii Audubon Society came as a complete surprise to me. Please thank all who were responsible for this recognition — it's nice to be remembered!

It also came at a time when I was very busy with house guests and getting ready for a cruise thru the Panama Canal. Am just now getting caught up with all the little duties I've neglected. Please forgive!

I read with great interest the Anniversary 'Elepaio. Wish I could have been with you...

Aloha,

Blanche Pedley

FIELD TRIP TO KANAHA PONDS, MAUI

Fifteen bird species were identified on December 12, 1979 on a Maui Group Sierra Club outing led by Dr. Cameron Kepler and Dr. Angela Kay Kepler, and organized by Helen Scantlin. Twenty adults and four children participated on a clear, beautiful day. Cameron Kepler began the outing with a talk of the history of Kanaha Pond and of its importance to the endemic birds and the migrating ones. He had sighted a European Ruff on previous observations, but we weren't lucky. A low-flying, soaring frigate bird delighted all viewers, and Cam described its bone structure, feathers, feeding habits, and its great soaring range. The White Horse, British Columbia, couple were as intrigued as the rest of us. The Keplers have promised more birding outings in the future.

ADOPT A SEABIRD

Protection Island, a few miles west of Port Townsend near the Olympic Peninsula, has been named one of the most unique and endangered ecosystems in the State of Washington, by the U.S. Fish and Wildlife Service.

It comprises the major breeding colony of the Rhinoceros Auklet in the contiguous United States, with 17,000 breeding pairs; the largest breeding colony of Glaucous-winged Gulls in Washington; the largest nesting site of the Tufted Puffin in Puget Sound; and a major breeding area for Pelagic Cormorants, Pigeon Guillemots and Black Oystercatchers. It is also an important pupping and loafing area for Harbor Seals, and is significant for Pleistocene paleontology.

The entire island and the one-fifth of the island already reserved as the Zella M. Schultz Seabird Sanctuary are increasingly threatened by human activity and habitat destruction, and cannot be protected and preserved unless some immediate action is taken.

It is the purpose of this endeavor to:

- (1) Allow the public to show its support and concern, with the hope that county, state and national commitments will result in complete protection for this precious and irreplaceable national asset.
- (2) To acquire funds for acquisition of parcels of property as they become available on Protection Island. Parcels will be held for the sole purpose of protecting the birds and other wildlife that use the area, and will be classified and posted as part of the Zella M. Schultz Wildlife Preserve.

Adopt a Glaucous-winged Gull for \$10.00, a Rhinoceros Auklet for \$25.00, a Tufted Puffin for \$50.00, a Pigeon Guillemot for \$100.00, and a Pelagic Cormorant for \$150.00, or a Black Oystercatcher for \$200.00. Please make check payable to:

SAVE PROTECTION ISLAND FUND
c/o Admiralty Audubon Society
P.O. Box 666
Port Townsend, WA 98368

All donations are tax-deductible for income tax purposes.

ALOHA TO NEW MEMBERS

The Society welcomes the following new members and hopes that they will join in our activities to further the protection and

appreciation of Hawaii's native wildlife.

Local Regular: Robert Adler, Seattle, WA; Paul Banko (reinstated), Hawaii National Park; Hilde Cherry (reinstated), Honolulu; Lincoln Drake, Honolulu; Wayne and Betsy Gagné (reinstated), Honolulu; Linsley Gressitt, Honolulu; Michael Hadfield, Honolulu; George Ledec, Hollywood, CA; A.R. Smith, Jr., Kilauea.

Subscribers: David M. Brenner, Lincolnwood, IL; Paul T. Kubick, Minneapolis, MN; Charles N. Mason, Washington, D.C.; Pauline O. Smith, San Jose, CA; and Mr. & Mrs. T.C. Williams, Swarthmore, PA.

APRIL FIELD TRIP TO OBSERVE SEABIRDS AND WATERBIRDS

Each spring Hawaii Audubon Society pays a visit to the birds of Kaneohe Marine Corps Air Station (KMCAS). The trip involves tramping and driving the outskirts of Nu'upia Ponds where we will probably find Hawaiian Stilt, possibly nesting, and Black Noddies, Auku'u, a breeding colony of Cattle Egrets and a variety of shorebirds. Gulls and a glimpse of the visiting Caspian Tern are possible. Later, and if the Marine Corps gives us permission, we will take a half mile walk to the Red-footed Booby colony at Ulupau Head. From there, with good spotting scopes, we may see the frigatebirds, Masked Booby, Gray-backed Tern and possibly others. Turtles, sharks and whales have been seen from the overlook.

APRIL TALK FEATURES HALEAKALA MANAGEMENT

Dr. Clifford Smith is Associate Professor of Botany and Director of the Cooperative Parks Resources Studies Unit (CPSU), a research unit which facilitates management-oriented research by university faculty and students in national parks. Dr. Smith will discuss the results of recent research and their implications for management programs in Haleakala National Park. Some of the more pressing issues concern control of feral goats and pigs, exotic plant control and impacts of visitor use. The talk will be illustrated by color slides.

The meeting will be at St. John Hall, University of Hawaii, room 011, starting at 7:30 p.m. The Hawaiian Botanical Society will join us in a joint meeting. Parking is \$1.00.

TABLE OF CONTENTS

Number 10, April 1980

Observations on the Hawaiian Crow in South Kona, Hawaii	
Howard F. Sakai and C. John Ralph. . .	133
Changes Proposed for Environmental Impact Statements.	138
Pu'u O Kali Christmas Count	
Kay Kepler and Cam Kepler.	139
Rat and Mouse Predation by Barn Owls on the island of Hawaii	
James K. Baker and Christa A. Russell.	142
Advisory Commission Threatened	
Sheila Conant.	144

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

HAWAII AUDUBON SCHEDULE OF EVENTS

April 13 (Sunday). Field trip to Kaneohe Marine Corps Air Station (pending permission). Meet 7:30 a.m. at the State Library on Punchbowl St., or at 8:00 at the Main (H-3) Gate of KMCAS.

April 14 (Monday). Board Meeting at the Century Center Club, 3rd floor of the Century Center Bldg., 1750 Kalakaua Ave. (Norris Henthorne, 734-7562). Valet parking. 7 p.m. - all members welcome.

April 21 (Monday). Regular meeting at NEW PLACE, St. John Hall, University of Hawaii, room 011, 7:30 p.m. Parking \$1.00. Joint meeting with Hawaiian Botanical Society. Dr. Clifford Smith will speak on *Resource Management in Haleakala National Park*.

May 11 (Sunday). Field Trip to Manana Island.

May 12 (Monday). Board Meeting to discuss dues increase. Manoa Library, 2716 Woodlawn Dr., 7:00 p.m.

For details, see inside back page.

HAWAII AUDUBON SOCIETY
P. O. Box 22832
HONOLULU, HAWAII 96822

ADDRESS CORRECTION REQUESTED

Non Profit Organization
U. S. POSTAGE
PAID
Honolulu, Hawaii
Permit No. 1156

