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Mortality of Owls in Hawaii

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Abstract

A mysterious "die off" of endemic Short-eared Owls (*Asio flammeus*) and introduced Barn Owls (*Tyto alba pratincola*), called the "Sick Owl Syndrome" (SOS), has been reported in Hawaii since 1972. Infectious diseases, environmental toxins and lack of prey have been suggested as possible causes of SOS. Eighty-three Barn Owls (66 shot owls and 17 non-shot owls) and one Short-eared Owl were obtained from the island of Kaua'i, and 17 Barn Owls and one Short-eared Owl were obtained from O'ahu. Complete gross examinations and supporting laboratory tests were done on all owls. Based on these test results, the shot-owls from Kaua'i were found to be healthy and normal. Deaths of 12 of the 17 non-shot Kaua'i owls were probably due to some form of collision (airplane or car). Single cases of necrotic stomatitis, coccidiosis, liver abscess, stomach erosion and focal hemorrhage in the stomach area were observed in four O'ahu owls. Eight of the 18 O'ahu owls probably died as the result of automobile kills. Most of these injured owls had lower body weights indicating loss of body mass rather than smaller size because the tarso-metatarsal bone lengths were comparable when compared to the Kaua'i-shot owls. This report presents a new hypothesis that trauma from collisions with motor vehicles is a major cause of mortalities of owls in Hawaii. It is further hypothesized that the inability of grounded and injured birds to hunt may have led to the dehydration and emaciation which characterizes the "SOS."

Introduction

For more than two decades a mysterious "die off" of owls, called SOS has been reported in Hawaii, and most frequently on the island of Kaua'i. Since the first report in 1972 (Anonymous, 1972), various attempts to describe and explain this phenomenon have appeared as letters to editors (Gassmann-Duvall and Telfer 1987; Gassmann-Duvall 1988) and in local newspaper articles (TenBruggencate 1992; Wagner 1993). Studies of SOS were also reported at a Wildlife Disease Workshop held in Hilo, Hawaii on 13-14 February, 1991.

An article in the popular press reported that a total of 268 dead owls were recovered on Kaua'i between 1986 and 1992 (Wagner 1993). Most of the dead owls were found along the roadsides and were emaciated, dehydrated, and injured. It was also reported that the owls were exhibiting signs of weakness, lethargy, and impaired sight and hearing (Gassmann-Duvall and Telfer 1987; TenBruggencate 1992; Wagner 1993). Similar but fewer recoveries were reported on the other islands. Although a wide variability of clinical signs and lesions were noted, most of the owls were categorized as examples of SOS.

SOS has been accepted as a phenomenon resulting in owl mortalities, although no definitive clinical signs have been determined to justify SOS as a new and distinct disease entity. The only consistent clinical sign given in reports of SOS is emaciation which can be a non-specific observation noted in a wide variety of infectious and non-infectious diseases. The difficulty in trying to study SOS is in large part due to this lack of definitive criteria for inclusion of sick and dead owls into this disease category.

More recently, infectious disease, envi-

Table 1. Numbers of female and male owls shot at the Lihu'e Airport during March, April, and May 1992 for control of owl hazard to aircraft.

Date	Female	Male	U/D	Total
March	3	18	1	22
April	5	10	-	15
May	13	16	-	29
Total	21	44	1	66

$X^2 = 5.2045$, $.10 \leq P \leq .05$, 65 d.f.
U/D = undetermined sex

Table 2. A comparison of body weight (g) and tarso-metatarsal bone length (mm) of shot owls obtained from Lihu'e Airport, Kaua'i and injured owls from O'ahu.

	K'auai shot-owls		O'ahu inj. owls
	Female (n=16)	Male (n=27)	Female (n=4)
B.W.	489 ± 33.51^a (462 - 517)	426 ± 36.62^b (405 - 448)	340 ± 33.51^c (215 - 465)
T.M. (mm)	76.5 ± 1.52^a	75 ± 1.72^a	75 ± 1.52^a

^{a,b,c} mean values with different superscript within row differ at $P \leq .005$ (two sample t test with pooled standard error).
Oahu inj. owls = Oahu injured owls
B.W. = Body weight
T.M. = Tarso-matatarsal bone length
CL = Confidence Limits

ronmental toxins and lack of prey have been suggested as possible causes of SOS. But no conclusive data have been published to clearly support any of these current theories. The present report is on the post-mortem examination of owls and offers a new hypothesis that trauma from collisions with motor vehicles is the major underlying problem leading to SOS.

Materials and Methods

Source

Most of the owls (Barn Owl [*Tyto alba pratincola*]) for this study were obtained from the United State Department of Agriculture-Animal and Plant Health Inspection Service, Animal Damage Control (ADC) Unit, Lihu'e, Kaua'i. These owls, hereafter referred to as "shot owls," were killed as part of a population control project designed to minimize a serious aircraft strike hazard by owls at the Lihu'e Airport.

The "non-shot" owl (both Barn Owls and Short-eared Owls, the endemic Pueo [*Asio flammeus*]) specimens were obtained from the Kaua'i-Division of Forestry and Wildlife (DOFAW), the O'ahu DOFAW, the ADC Unit-Lihu'e, and the Hawaiian Humane Society, or private citizens who found them dead or injured.

Procedures

Necropsy examinations were conducted on dead and severely injured owls which were euthanatized. The following data were obtained from these owls: history (date, time, and place of recoveries/accident), results of clinical examinations, body weight, evaluation of body condition, sex, tarso-metatarsal length, stomach contents, presence of injury, and the results of gross examinations and laboratory tests of tissues and organs, such as histopathological examination.

An approximation of body condition was based upon the subjective evaluation of the experienced veterinarian who performed the necropsies. Emaciation, for example, was post facto attributed to owls with noticeably atrophied skeletal muscles and viscera, particularly conspicuous loss of breast muscle, and which showed one or both of the following: distended gall bladder and lack of adipose tissue in the normal fat storage depots (subcutaneous, visceral and epicardial). Birds exhibiting an estimated weight loss of 30% or greater from normal weights were defined as emaciated birds; and those with little or no loss were designated as normal animals.

Statistical Analysis

Chi-square analysis was used to compare the proportion of female and male owls during the three months of collection. The body weights and the tarso-metatarsal bone lengths of female and male shot owls were compared by using the two sample t test with pooled standard error (Moore & McCabe, 1989). The body weights of injured owls on O'ahu and Kaua'i-shot owls were also compared by using the two sample t test with pooled standard error. Since all injured owls were females, the comparisons were made between females of both injured O'ahu and Kaua'i shot owls.

Table 3. Numbers and causes of death of female and male non-shot owls found at or outside the Lihu'e Airport.

Owl Spp.	Female	Male	Diagnosis
Barn Owls	3	13	10 = Strike Aircraft 4 = Found with no apparent lesions 2 = Bone fracture
Pueo	1	-	hemorrhagic lesion

Results

Shot owls-Kaua'i

A total of 66 Barn Owls were obtained from the Lihu'e Airport during March to May, 1992. The numbers of these owls are listed by month and sex in Table 1. Weights of females (Table 2) were significantly heavier than that of males and the tarso-metatarsal bone length of females was not significantly greater than that of males. The confidence limits of tarso-metatarsal length of female and male Barn Owls were 75-78 mm, and 74-76 mm, respectively. A loss of 5-15% from what might be normal weight was observed in these owls, none to the point of emaciation. A variety of prey such as rodents and insects were found in the stomach of a majority (54) of the owls: the rest were empty. The stomach contents of one owl was not examined because of severe autolysis. Except for one case of visceral gout, the tissues and organs of all shot-owls were normal and there were no indications of infectious or non-infectious conditions.

Non-shot owls-Kaua'i

Ten of the 14 Barn Owls found by the ADC Unit at Lihu'e Airport were apparent victims of collisions (strike) with aircraft. In addition, lesions suggestive of traumatic injuries were seen in a Pueo and two Barn Owls obtained from the Kaua'i-DOFAW. Hemorrhage in the mouth and blood clots in the stomach were observed in the Pueo. Multiple fractures of both wings and legs were observed in one of the Barn Owls, and left carpal bone fracture was found in the other Barn Owl (Table 3). Data on body weights and tarso-metatarsal lengths of non-shot owls from Kaua'i were not taken because of severe injuries (fracture and soft tissue damages).

Owls found on O'ahu

During 1992, a total of 18 owls (11 females, 5 males, and 2 undetermined sex) were obtained from the island of O'ahu (Table 4 A). Based on the necropsy results and other information, these owls most probably died from impact injuries. Single cases of necrotic stomatitis, coccidiosis, abscess of liver, stomach erosion, and hemorrhagic lesions were observed. The cause of death of five of the owls was not apparent: no signs of disease or injuries (Table 4 b).

The average and the confidence limits of the body weights of injured owls were 340 g and 214-465 g ($P \leq .005$), respectively. The body weights were approximately 30% less than normal and most were classified as emaciated. The body weights of injured owls on O'ahu were significantly lower than those shot on Kaua'i (two sample t test with pooled standard error, $P \leq .001$) (Table 2) but the tarso-metatarsal lengths of these two groups were comparable.

Discussion

Many of the owls in this study were shot or found dead in the area of the airport in Lihu'e, Kaua'i. The airport may serve as a popular hunting and foraging site for the mobile, Barn Owl population on Kaua'i. During the breeding season, Barn Owls may fly as far as 1-2 miles from their nests to their foraging areas (Barn Owl Research Program 1988). In addition, Barn Owls typically do not "day roost" at their nest sites, but the day roost can be as far as 5 miles from the nest sites, with home ranges as large as 12 square miles (Colvin 1986). Therefore it is speculated that the owls shot at the Lihu'e Airport were probably from the other areas of the island, and may be representative of normal owls on Kaua'i. They may have had an equal opportunity for exposure to any prevalent environmental conditions, biological agents, or chemical toxins, as owls from any other area of Kaua'i.

Table 4.a. Numbers of owls found on O'ahu during 1992.

Date	Female	Male	U/D	Total
January	-	1	-	1
March	-	-	1	1
April	3	-	-	3
May	5	2	-	7
June	1	1*	-	2
July	1	-	-	1
August	-	1	-	1
Septemb er	-	-	1	1
Unknown Date	1	-	-	1
Total	11	5	2	18

U/D Undetermined Sex
* Pueo

Table 4.b. Numbers of O'ahu owls according to the cause of mortality, during 1992.

Diagnosis	Female	Male	U/D	Total
Injury (Trauma)	7	-	1	8
No trauma, no lesions	2	3	-	5
Necrotic Stomatitis	-	1	-	1
Hemorrhagic lesion	1	-	-	1
Liver Abscess	-	1	-	1
Stomach Erosion	1	-	-	1
Coccidiosis	-	-	1	1
Total	11	5	2	18

U/D = Undtermined Sex

There are several reasons why the airport may be an attractive site for foraging owls. The Vector Control Unit of the State Department of Agriculture (1992), reported an abundant year round food supply of rodents and insects and a significant rodent population in adjacent areas. The unusual concentration of owls at the Lihu'e Airport in the months of March, April, and May 1992 could be well associated with the abundance of food at that time of the year (Telfer 1993). The airport landscape of mowed grass also provides an ideal hunting ground for owls.

Kaua'i Owl Population

No signs of emaciation, pathological, toxic or other lesions were seen in examination of the tissues and organs of the shot owls. This lack of signs of disease, poisoning, or starvation suggests that the owl population at the airport is healthy and normal. A study of body weights also indicates a healthy, viable population, because the confidence limit of the body weights of both female and male Kaua'i shot-owls (462-517 g and 405-448g, respectively) are within the normal range of North-American Barn Owls (Marti 1990; Barn Owl Research Program 1988) (Table 5).

The Injury Hypothesis

Of the 17 non-shot owls in this study, clear signs of trauma from airplane or car collisions were seen in 12 owls (Table 3). The two Barn Owls found outside the airport sustained serious injuries: multiple fractures of both wings and legs and a left carpal bone fracture. These injuries probably interfered with flying, hunting, and foraging, and could conceivably have led to the emaciation and death of these owls. The significant lower body weight but comparable tarso-metatarsal length of the O'ahu injured owls suggest that this was actual weight loss following the injury and not smaller body size.

Historical Background of Injury as the Cause of Owl Mortalities in Hawaii

In the 1991-1992 Job Progress Report of DOFAW-Kaua'i (Telfer 1992) shows 5 out of 6 owls picked up by the roadside on Kaua'i were noted to have been injured. In addition to these, the report states that 8 dead owls were seen lying along the roadside but not retrieved. Therefore, 13 of 21 owl mortalities in this report could have been due to road injuries. In the following year (1992-1993), owl mortality records from Kaua'i also indicate a high percentage of road casualties and air strikes (Telfer 1993). Moreover, most of the owl mortalities on Kaua'i during March and June 1987 were found along the roadside and many may have been due to collision with motor vehicles. No evidence of infectious diseases was found in any of these owls (collected during March and June 1987) submitted to the pathology lab (*Anonymous,* 1987). Five of 8 Barn Owls recovered between June 1988 and May 1990 on Kaua'i had died as the result of injuries with or without emaciation (Sileo 1991).

The possibility that many Barn Owl mortalities are the result of road casualties is not new to Kaua'i. In the mortalities of Barn Owls study (Au and Swedberg 1966) following the introduction of Barn Owls to Kaua'i, they report that of the 27 Barn Owl mortalities, it was "fairly obvious that the immediate cause of death was automobile traffic on highways." The lack of definitive signs of disease and the clear signs of trauma/injury strongly suggest that road casualties may be a major cause of owl mortalities on Kaua'i.

Injury as the Cause of Owl Mortalities in Europe & the U.S.

Studies in several areas of the world - Idaho (Smith and Marti 1976), California (Schulz 1986), Britain (Sutton 1927; Hodson and Snow 1965; Glue 1971; Garzon in Bunn et al. 1982; Newton et al. 1991; Cooper 1993), Holland (Braskma & de Bruijn in Bunn et al. 1982), and Belgium (Verheyen in Bunn et al. 1982) have documented the common occurrence of fatal motor vehicle collisions involving owls. In a survey of road kills in California, 912 Barn Owls were recovered along the roadside of the California Central Valley from 1981-1985 (Schulz and Yasuda 1985). The Barn Owl mortalities in California in recent years have also been attributed to road casualties, and it was noted that these owls were often dehydrated and emaciated (pers. comm. T. Morishita, Raptor Center, University of California-Davis, California, 1993). Two studies regarding Barn Owl mortalities in Great Britain (Newton et al. 1991; Cooper 1993) also indicate that the road accidents were the most important cause (>40%) of mortalities.

Possible Contributing Factors

Road and roadside regions seem to make for attractive hunting fields because prey are abundant and visible. Because they rely on sound and their narrow visual field (110°)

Table 5. Comparisons of the body weights (g) of female and male owls (*Tyto alba pratincola*) between this study and other studies done in the United States.

	Female	Male
This study	489 ±33.51*[a]	426 ± 36.62[b]
(CL)	(462-517)	(405 - 448)
Ohio (B.O.Res.Prog)		
(Range)	482 - 709[a]	397 - 539[b]
Utah (Marti, 1990)		
(Range)	420 - 700[a]	400 - 580[b]

[a,b] mean values with different superscript within row are different.
* Mean ± SE
B.O.Res.Prog. Barn Owl Research Program (1988)
CL = Confidence Limits

(Prestt and Wagstaffe 1973), the Barn Owl attacks its prey from only a few meters above the road, making it particularly vulnerable to collisions. The behavior of owls swooping towards a moving light (Hodson 1962), and temporary blindness caused by the bright lights of an automobile (Labisky 1960) may contribute to the bird mortalities on the road. In addition, the speed and density of traffic (Glue 1971) might also contribute to the road casualties. Approximately a two fold increase in the numbers of motor vehicles from 1979 to 1993 (>28,000 to >56,000) on Kaua'i (pers. comm..Transportation Dept.- Kaua'i, 1994) may account for the increasing mortalities in owls due to accidents.

Infectious Disease

There were no consistent signs of a widespread disease in any owls examined in this study to support the theory that owl mortalities were due to infectious and epizootic disease. No widespread inflammatory or other lesions suggesting either acute or chronic disease have been observed in the shot owls or owls examined by others (Sileo 1991). Furthermore, 20 years of an epizootic disease presumably would have devastated the owl population on Kaua'i. There were insufficient numbers of injured owls submitted for this study to investigate the correlation of injury to degree of emaciation.

Lack of Prey

The abundance of food in the stomach of most owls and the lack of visible signs of emaciation in owls shot on Kaua'i does not support the hypothesis that there is a deficiency of prey for owls.

Environmental Toxins

Only the death of two owls in this study might have been due to acute anticoagulant poisoning. Previously, only one owl on Maui was found to have tissue levels of a rodenticide (Gassmann-Duvall in TenBruggencate 1992).

Conclusion

Based on the results of this study, the owl populations on Kaua'i appear generally healthy and normal. Most of the non-shot owls found on Kaua'i and owls from O'ahu were apparently killed by injuries sustained in either airplane or car collisions. Moreover, the significant loss of body weight in O'ahu injured owls supports the alternative hypothesis that injuries sustained in collisions with motor vehicles might lead to the underlying problem of the SOS. The frequently seen signs of emaciation and dehydration may be due to the inability of the owls to hunt following injuries sustained in collisions with motor vehicles.

Acknowledgements

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Vector Control Unit, State Dept. of Agriculture,

Red-masked Conure (*Aratinga Erythrogenys*)

by W. Michael Ord

While participating in the 1994 Christmas Bird Count in Kapiolani Park on 18 December, my attention was drawn to parrot-like calls coming from the area behind the tennis courts. I was particularly interested as I had just completed counting birds in the area and had neither seen nor heard anything that looked or sounded like a parrot. The specific area for those interested in seeing these birds is behind the tennis courts on Paki Drive and the archery range in the area fenced off by City and County of Honolulu for nursery purposes. The location is dominated by a large, cut back banyan tree and an African tulip tree. Observation can be done from the parking lot.

Initially, the birds were flying back and forth through the upper levels of the keawe trees behind the archery targets, which was inconvenient since the archers were out in force that morning. They subsequently flew out of this area into both the African tulip tree and the banyan where it was possible to see several birds very clearly and in very good light. One immature bird was observed feeding with adult birds.

The description of the Red-masked Conure is fairly straight forward. The bird is basically green though the underparts tend to be paler and more yellowish; the forehead, crown, lores, and foreparts of cheeks are red. The red extends well behind the eye which had a naked periophthalmic ring creamy-white; bill horn-colored; bend of wing, carpal edge, outermost under wing-coverts, and thighs red. Red thighs are not easy to see even with a perching bird. Red in the bend of the wing can also be difficult to see in some perching birds. However, in flight, the red under wing-coverts are easily seen. Immature birds have green heads and green thighs. Red in the under wing-coverts is less extensive than in adult birds. Otherwise, the immature birds resemble the adult birds. Length is approximately 33 cm.

On the count day, I conservatively estimated 18 birds. Subsequently, I returned twice (25 and 26 December) and again observed the birds. On the 26th, I was fortunate to see 12 birds feeding in the African tulip tree (eight adults and four immatures) while there were other conures feeding in both the banyan and keawes, possibly as many as 10 by sight and call. Particularly noteworthy on this occasion was the observation of an adult bird feeding a young bird. The four young observed appeared to be from different nests inasmuch as only one of the four young was not self-sufficient and its head coloring was noticeably lighter.

Joseph M. Forshaw in the *Parrots of the World* notes that the Red-masked Conure has a restricted range of the arid zone of western Ecuador which may extend southward into the coastal area of northwestern Peru. The birds tend to band together in both small and large flocks and move around quite a bit within their range. In Ecuador, they apparently do not breed between late February and August, which may explain why young were being fed in December in Hawaii, i.e., north of the equator the birds still retain their regular breeding cycle.

In captivity, the Red-masked Conure will lay four white eggs. Incubation lasts approximately 28 days and the young fledge the nest within six weeks of hatching. The pet trade also refers to these Conures as Red-headed or Cherry Conures.

There are two other conures that are similar to the Red-masked: Red-fronted Conure (*Aratinga Wagleri*) and Mitred Conure (*Aratinga Mitrata*).

The Red-fronted is closely related and its range extends well to the south and north, up through Venezuela, of the Red-masked's range. The Mitred Conure's range extends from central and southern Peru south through Bolivia into northwestern Argentina. Immature Red-masked Conures coming into adult plumage could easily be mistaken for either of the above, though both are slightly larger (3-5 cm respectively).

Previous observations of Red-masked Conures should be mentioned, though the exact dates are not available for some. On the 17 December, 1989, Christmas Bird Count five Red-masked Conures were seen in Kapiolani Park, though at that time they were improperly identified as Mitred Conures. In May/June 1990, etc., two adult birds were seen flying into the upper Aina Haina Valley on two occasions in the late afternoon (possibly nest or roost—author's speculation) and in 1993 a solitary adult bird was observed sunning itself in the early morning sunlight on 21st Avenue in Kaimuki. Climatically speaking, Kapiolani Park, Kaimuki out to Aina Haina would be similar to conditions in western Ecuador and we would appear to have another breeding exotic in our list for the state.

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Your Bequest Can Help

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Although an attorney should be consulted in the drafting of your will, a model clause for bequests is set forth below.

"I hereby give, devise, and bequeath to the Hawaii Audubon Society, Honolulu, Hawaii, the sum of _____ dollars (or set forth a description of property), to be used for the general purpose of said organization."

For more information and assistance, contact the Hawaii Audubon Society, 1088 Bishop Street, Suite 808, Honolulu, HI 96813, (808) 528-1432.

Mahalo Castle and Cooke, Outrigger, and Aloha Airlines

by Wendy Johnson

The Hawaii Audubon Society is pleased to announce the receipt of generous donations from Castle & Cooke Homes Hawaii, Inc. and Outrigger Hotels Hawaii in support of the upcoming Paradise Pursuits television program to be aired this spring. The recent gifts will help to cover production costs associated with taping, editing and broadcast of the semi-final and final competitions involving the top Paradise Pursuits teams from O'ahu, Maui, Kaua'i and the Big Island. Castle & Cooke Homes Hawaii, Inc. will have the opportunity to air two 60 second commercials during the Paradise Pursuits program, joining Hawaiian Electric Industries as a major sponsor of this lively statewide broadcast. Outrigger Hotels Hawaii will be represented by a 30 second commercial.

Additional support for Paradise Pursuits comes in the form of complementary airline tickets from Aloha Airlines. Fifteen round trip tickets have been donated so that students and coaches from each of the neighbor island winning teams can travel to O'ahu in April for the final competitions to be held at KITV. Aloha Airlines' valuable contribution is vital to the success of our program and is greatly appreciated by the staff and participants of Paradise Pursuits.

A big mahalo to Castle & Cooke Homes Hawaii, Inc., to Outrigger Hotels Hawaii, and to Aloha Airlines for their past and current support for this unique environmental education opportunity for Hawaii's high school students.

Birding on O'ahu

A two-page guide listing areas on O'ahu where interesting birds may be found and where access is not a problem is now available. Written by Peter Donaldson, it offers important information for birders unfamiliar with Hawaii. The guide is not designed to give detailed directions or information on bird identification. For a free copy, send a self-addressed stamped envelope to O'ahu Birding Guide, Hawaii Audubon Society, 1088 Bishop Street, Suite 808, Honolulu, HI 96813.

Field Trip Reports

by Lance Tanino

James Campbell NWR

On an overcast and windy 26 November, 1994, 18 people met at the Kahuku Sugar Mill Shopping Center for another memorable birding day at the Ki'i unit of the James Campbell National Wildlife Refuge.

Everyone was treated to a memorable birding experience. The day started with a good look at a pair of Blue-winged Teal, with the male in almost full breeding plumage. After a large flock of ducks was flushed, Peter Donaldson found what was probably responsible for scaring the ducks—an adult female Northern Harrier flying low over the terrain. This impressive hawk was observed flushing all types of birds in its path as it flew behind our group. Also seen were a winter-plumage adult Bonaparte's Gull, a first-year Ring-billed Gull, and an immature Glaucous-winged Gull.

Also observed were a tropicbird (sp.?), Great Frigatebirds, Cattle Egrets, Black-crowned Night-Herons, Fulvous Whistling-Duck, Mallards (probably migratory), Northern Shovelers, Common Moorhens, Hawaiian Coots, Pacific Golden-Plovers, Black-necked Stilts, Wandering Tattlers, Ruddy Turnstones, Sanderlings, Long-billed Dowitchers, Common Snipe, Rock Dove, Zebra Doves, Red-vented Bulbuls, Common Mynas, House Finches, Common Waxbills, Red Avadavats, and Nutmeg Mannikins.

Ka'ena Point Natural Area Reserve

On a cool 8 January, with overcast skies, 17 people hiked to Ka'ena Point. On the way we encountered the usual lowland, coastal vegetation like Haole koa, keawe, and scattered patches of native strand, pa'u-o-hi'iaka *(Jacquemontia ovalifolia)*, and ilima *(Sida cordifolia)*. As for birdlife, we saw Brown Boobies and Noddies (black or brown) flying around the fishing boats and two Wandering Tattlers dodging the huge surf that was crashing into the rocks. We also had a pod of spinner dolphins following us out to the reserve. Ironically, while the trip leader was trying hard to find a Laysan Albatross for the group, Beverly Lee tapped him on the shoulder and pointed to a beautiful adult Laysan Albatross as it quietly glided about 20 feet above the whole group, leaving the trip leader and everyone else stunned.

As soon as we reached the natural area reserve a pair of Red-footed Boobies flew around the point. While walking along the trail, we noticed how much the native vegetation has grown back, especially the rare 'Ohai *(Sesbania tomentosa)* growing everywhere. The group was also rewarded with an up-close look at two nesting Laysan Albatrosses.

Unfortunately, no humpback whales were seen. But, the spinner dolphins were spinning in the air during the entire trip.

Undergraduate Scholarship Available

The Hawaii Audubon Society will be awarding one undergraduate tuition scholarship of $1,534 to a Hawaii resident attending the University of Hawaii for the 1995-'96 school year. This scholarship, named the Rose Schuster Taylor Scholarship, is made available by the Yao Shen Trust, in honor of Rose Schuster Taylor. Terms of the trust require that the recipient be a Hawaii resident, attending the University of Hawaii, whose area of study is related to Hawaiian natural history, especially if it may lead to the better protection of native wildlife in Hawaii.

Applicants should submit the following information: name, address, telephone number, class year, and explain how their academic major relates to Hawaiian natural history. They should also discuss how they plan to apply their academic degree to further study or work experience in Hawaiian natural history, how their course of study will enable them to contribute to the better protection of native Hawaiian wildlife, and if they have made contributions to the study of Hawaiian natural history, especially to anything that might contribute to the protection of native wildlife.

Applicants should attach a transcript of their college or high school records and three letters of recommendation.

Applications should be sent to Phil Bruner, Chair, Scholarships and Grants Committee, Box 1775, BYU-H, La'ie, HI 96762, telephone 293-3820 (W). The application deadline is 1 May.

Hawaii Audubon Society

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T-shirts for Sale

The Hawaii Audubon Society has a stock of T-shirts designed to spread the Audubon message. Not only are they attractive personal apparel, but they make excellent presents as well.

T-shirts bearing the Society's 'Elepaio logo are available in blue spruce and mountain rose with a black design. We also have a few in ash (gray). In addition, the "hot" Kolea (Pacific Golden Plover) T-shirts are also available. This T-shirt is white with a three-color design of the Kolea and native hibiscus. Proceeds from the Kolea T-shirt go to help HAS fund research on shorebirds in Hawai'i and elsewhere in the Pacific region.

T-shirts are $12 each, plus $2.00 per shirt for postage. They are available in medium, large, and extra large adult sizes only. When ordering T-shirts, be sure to list size and first, second, and third choice of color. To order T-shirts send your check, payable to the Hawaii Audubon Society, to Yvonne Izu, 1957 Alai Place, Wahiawa, HI 96786. Don't forget to add $2.00 per shirt for postage. Insufficient postage will delay your order until the proper amount is remitted. T-shirts are not available at the HAS office.

HAS Dues for 1995

All amounts are in U.S. dollars.
Includes delivery of *'Elepaio*.

Regular Member	
Delivery to U.S. zip code addresses	
Via bulk mail	**$ 10.00**
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Via first class mail	**16.00**
(Hawaii residents: there is no significant time difference between bulk and first class mail to addresses within the state of Hawaii.)	
Junior Member (18 and under)	**5.00**
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(three annual payments)	**100.00, 100.00, 50.00**
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Patron (one-time payment)	**1,000.00**
Delivery to non-U.S. addresses:	
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Canada (airmail only)	**17.00**
All other countries (surface mail)	**18.00**
All other countries (airmail)	**28.00**
Introductory dues for National and Hawaii Societies:	**20.00**
(Includes delivery of *'Elepaio* and *Audubon Magazine* as bulk or 2nd class mail to U.S. zip codes. Renewal, $30 annually.)	

Research Grants

The Hawaii Audubon Society makes grants for research in Hawaiian or Pacific natural history. Awards generally do not exceed $500 and are oriented toward small-scale projects within Hawaii. Special consideration will be given to those applicants studying dryland forests and aeolian systems on Hawai'i. The deadlines for receipt of grant applications are 1 April and 1 October. For an application form send a self-addressed stamped envelope to Grants, Hawaii Audubon Society, 1088 Bishop Street, Suite 808, Honolulu, HI 96813. For more information, call Phil Bruner, (808) 293-3820 (W).

Mahalo Donors

The Hawaii Audubon Society thanks the following members and friends for their generous donations. This list reflects contributions received through 10 February.

Gary Blaich, John Burch, Amelia Starr Ceglia, Patricia Englehard, Michael Fischer, Leonard Freed, Desiree Groesbeck, Darcy Hu, Jill Jordan, John Kronen, Jr., Cathy Lowder, Robert Petersen, Mr. and Mrs. Burton Roberts, Kurt Schwarz, Leon Slavecki, Richard Soehren, Ben Torke, Stewart Wiggers, Janis Yamamoto, and Kevin C. Young.

Birders Network

HAS has a list of birders who are interested in informal trips with other members, allowing members to find others to go along with them on their outings—for the sake of safety, to share information on good spots, or simply to increase the fun. If you are interested in putting your name on the list, which would be circulated to all those on the list, call or write HAS, attention Andy Cowell.

Publications Available

The Hawaii Audubon Society publishes books, checklists, and field cards relating to birds of Hawaii and the Pacific. For a complete price list send a self-addressed stamped envelope to Publications List, Hawaii Audubon Society, 1088 Bishop Street, Suite 808, Honolulu, HI 96813.

Calendar of Events

First Tuesday of Every Month
Monthly meeting of the Conservation Committee, 6:30 p.m., at the Coffee Line, 1820 University Avenue (in the YWCA). To join or for more information call Andy Cowell, 944-6421 (H).

First Wednesday of Every Month
Monthly meeting of the Education Committee, 7:00 p.m., at the Coffee Line, 1820 University Avenue (in the YWCA). To join or for more information call Emily Gardner, 734-3921 (H). The Committee is actively seeking new members to work on the Paradise Pursuits Program. All are welcome.

Monday, March 13
Board meeting, 7:00 p.m., HAS office.

Saturday, March 25
Kahuku Point coastal hike. Explore this secluded stretch of coastal dunes at O'ahu's northern tip. Learn about Hawaii's unique coastal plants, shorebirds, and seabirds on this 5-mile (one-way) hike which includes stream crossings. Expect wet feet. Bring sun screen, water, lunch, and hiking shoes. Binoculars and camera optional. Meet at the State Library on Punchbowl Street at 7:30 a.m. or the Kahuku Superette Parking lot at 9:00 a.m. For more information call trip leader Ati Jeffers-Fabro, 595-7086 (H). Suggested donation: $2.00.

Moving?

Please allow four weeks for processing address changes. Because our records are kept in order by zip code, we need both old and new addresses.

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