

Cattle Egret and Black-crowned Night-Heron Observations Associated with Mangrove Removal at Nu'upia Ponds WMA Kane'ohē Bay, Marine Corps Base Hawai'i in 1996-2000

By Mark J. Rauzon¹, Dr. Diane Drigot² and Lance Tanino³

Introduction:

As part of an on-going program to eliminate introduced red mangroves (*Rhizophora mangle*) that were encroaching on wetland habitat of the federally endangered Hawaiian stilt (*Himantopus mexicanus knudseni*), the effects of tree removal on affected waterbirds in at Marine Corps Base Hawai'i (MCBH), Nu'upia Ponds complex, O'ahu were monitored. Removal activities were scheduled in the non-nesting season of the Hawaiian stilt to avoid any inadvertent negative impacts on these ground-nesting birds. The stilt's favorable response was monitored and results reported elsewhere (Rauzon and Drigot 2002). Disturbance to other resident waterbirds, primarily the introduced cattle egret (*Bulbulcus ibis*) and the indigenous black-crowned night heron (*Nycticorax nycticorax hoatli*), was unavoidable since these birds utilize mangroves as nesting sites and are known to nest at any time of year in Hawai'i. These birds are known predators of Hawaiian stilt chicks and eggs, and the maintenance of their mangrove nesting habitat in Nu'upia Ponds was not a management priority. Nevertheless, these birds are protected by other state or federal laws. Monitoring of waterbird response to mangrove removal included a plan to haze these birds away from areas where heavy machinery was to work; reschedule tree cutting in areas when active nests were encountered until heron or egret chicks were fledged; and collect/measure eggs from selected nests. With proper state and federal



Figure 1
MCBH-Kane'ohē Bay; Nu'upia Ponds Wildlife Management Area

Source: MCBH Abrogated Natural Resources Management Plan and Environmental Assessment (NRM/EA) for 2002-2009 (Nov. 2001)

permits, this plan was enacted, and the results of these actions are reported.

Study Area:

The 482-acre Nu'upia Ponds Wildlife Management Area (WMA), under the jurisdiction of the MCBH is located on the Mokapu Peninsula separating Kane'ohē Bay from Kailua Bay, O'ahu, Hawai'i (Figure 1). Nu'upia Ponds WMA is also an

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Nominating Committee Seeks Candidates for Board of Directors

At the Board Meeting of July 19, 2004, a Nominating Committee of Arlene Buchholz, Ron Walker, and Larry Kimmel was formed. The committee is seeking Society members who are willing to serve on the Board of Directors. The bylaws call for fifteen directors to serve two-year terms; five of the fifteen directors are elected by the membership to officer positions. Normally eight directors are elected in even years and seven elected in odd years. This varies, however, as a result of resignations and Board members being appointed to fill unexpired officer terms.

Running for re-election are President Larry Kimmel, Treasurer Sal Pagliaro, and Directors Ron Walker, Phil Bruner, Arlene Buchholz, and Carol Bebb. Second Vice President, and six additional Director seats are also open for nomination. Incumbents continuing to serve until 2005 are first Vice President Liz Kumabe, Recording Secretary Tonnie Casey, and Director Alice Roberts

The HAS Board is a dynamic group of committed individuals whose energy and expertise involve many aspects of environ-

mental protection in Hawai'i from fund raising to education, and from birding to habitat cleanup. All members of the Board are expected to attend six two-hour Board meetings (one every other month) and a weekend Leaders' Retreat in January. Directors are also expected to be active on one of the Society's two standing committees: Conservation and Education. Persons interested in serving on the Board are encouraged to attend a Board meeting; the next one is listed in the Calendar section on the back page.

If you are a Society member and want to be a candidate, please submit a letter of interest and brief resume of your background and activities (in and/or outside of HAS) to the attention of the Nominating Committee at the Society's address by November 10, 2004. For an information sheet giving more specific information regarding responsibilities of officers and directors, please call the office at 528-1432. Nominating Committee members may be contacted by emailing the HAS office at hiaudsoc@pixi.com.

August 16th Program Meeting: Linda Elliot, International Bird Rescue and Research Center

The speaker for August will be Linda Elliott, the International Bird Rescue and Research Center (IBRCC) representative for Hawai'i and US Pacific Territories since 1994. She has a BS degree with a major in wildlife biology. Linda worked for 6 years at the Honolulu Zoo in the reptile, bird, mammal and animal hospital departments. She was also the Wildlife Manager and Regional Coordinator for the Hyatt Regency Waikoloa for 5 years where she developed unique conservation programs and authored a manual on captive animal care protocols. Linda has completed six years of bird rehabilitation work for the state of Hawai'i and continues in these efforts.

As an active member of the State of Hawai'i's Oiled Wildlife Subcommittee since 1992, she facilitated and presented over a half dozen volunteer and first response training programs with IBRCC for Hawai'i (1993, 1994 & 2001), Midway Atoll (1995, 1997 & 1999) and Guam (1995). She continues to assist the state with the development of response plans, procedures & protocols and with identifying and developing response facilities, supplies and equipment.

She will be speaking on the treatment and rehabilitation of wildlife injured in oil and chemical spills. Linda was the IBRCC oiled wildlife response director for five oil and chemical spills in Hawai'i.

Program meetings are held from 7:30 to 9:30pm at Henry Hall Room 109 on the Chaminade University campus, 3140 Wai'alaue Avenue, Kaimuki. Refreshments are served, and HAS products and publications are available for purchase.

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The Natural and Cultural History of Kailua Ahupua'a and Kawai Nui Marsh

sponsored by Kawai Nui Heritage Foundation, 'Ahahui Malama I ka Lokahi and Kailua Hawaiian Civic Club

Educational tours of Kailua Ahupua'a and Kawai Nui Marsh are designed to inform residents, visitors, educators and members of community organizations about Hawaiian archaeological, historic and ecological sites at the marsh. Field study trips for elementary through college age student groups or other Hawaiian cultural groups are also available.

Saturday Sept. 4

Cultural and Natural History of Kawai Nui Marsh

Saturday Oct. 2

Geology of the Kailua Ahupua'a Kawai Nui Ho'olaulea and Makahiki

Saturday Oct. 29

Saturday Nov. 6

Archaeology and Historic Sites of Kawai Nui Marsh

Saturday Dec 4

Birds of Kawai Nui Marsh (Kawai Nui, Hamakua, and Kaelepulu)

Groups meet at Ulupo Heiau next to the Windward Kailua YMCA at 8:30am and will walk and car pool to the various sites, returning to Windward YMCA by 1:00 pm. Donations of \$5.00 for non-members and \$3.00 for members are gratefully accepted. Money supports cultural and ecological restoration work at the Marsh. Groups limited to 25 persons. Dates of tours may be subject to change depending on weather or other circumstances. Check updates at website: <http://www.ahahui.net/>

What to bring: Backpack or fanny-pack, walking shoes, water bottle, mosquito repellent, sunscreen, rainwear, hat or cap, sunglasses. Optional: camera, binoculars, snacks.

Please call Chuck "Doc" Burrows to register at: 595-3922 or email: cahahui@hawaii.rr.com

Field Trips for 2004

All trips with an * are still in the process of being planned. Details will be provided as the scheduled dates get closer. A donation of \$2 per participant on all field trips is appreciated. Field Trip information is also available on the HAS office answering machine (528-1432) and on our website, www.hawaiiadubon.com

August 21, Saturday, 10am Ho'omaluhia Botanical Garden

A birdwalk through lovely Ho'omaluhia Botanical Garden in Kane'ohe. Possible to see Shama Thrush, Red-Vented and Red-whiskered Bulbuls, Red-billed Leiothrix, Hwamei, Common Waxbill, Red Avadavat, Chestnut Munia, Hawaiian Coot, and more. Bring sunscreen, mosquito repellent, water and lunch. Please call the HAS office to register - 528-1432.

Shorebird Homecoming at Paiko Lagoon

September 6, Saturday 6-8:00 am

September 27, Saturday 9-11:00 am

Welcome our shorebirds home! Two more great trips to Paiko Lagoon to welcome our Kolea home and see if other shorebirds have also returned. These are keiki-friendly trips - the kids will love them! Wear old tennis shoes or reefwalkers, and bring sunscreen, water and lunch. We will meet at Paiko Lagoon at 8:30am. Call Alice to register, 538-3255.

*October James Campbell National Wildlife Refuge

*December Christmas Bird Count

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eligible historic property due to its Hawaiian fishpond origins and a delineated wetland (U.S. Army COE 2002).

Introduced red mangrove fringed the shoreline on the western half of the Nu'upia Ponds complex for approximately 30 years, trapping sediments and covering mudflats previously used by waterbirds for nesting and feeding. Mangrove prop roots trap fine sediment and create "fast" land along the shallow waters of fishpond edges. This is an undesirable condition in Hawai'i since it causes damage to ancient fishpond walls, decreases water flow rates, increases algal production, promotes low oxygen levels and increases temperatures and acidic conditions, all of which affect food availability for vertebrates (Cox and Jokiel 1996). Mangroves usurp wetland habitat from native fish and wildlife species, while eventually displacing invasive alien pickleweed (*Batis maritima*) at intertidal sites (Rauzon and Drigot 2002).

Red mangroves were first introduced to Moloka'i, Hawai'i from Florida in 1902 to mitigate erosion from destruction of coastal vegetation by humans and livestock (Merlin 1977). In 1921, C. S. Judd, Superintendent of Forestry for the Territory of Hawai'i, reported that he found seven mangrove seedlings in windward O'ahu, that had floated over 60 miles to become established. In 1922, 14,000 seedlings of red mangrove and three other species were planted in the salt marshes of O'ahu. In 50 years, red mangrove established a monotypic community in many fishponds, estuaries and sheltered coastlines in Hawai'i, estimated to be over 70% of all estuarine intertidal habitat in 1977 (Allen 1998).

Mangrove management to preserve biological and cultural resources, such as historic fishpond walls, has been ongoing at MCBH since the early 1980s. This report describes monitoring activities associated with a project starting in January 1995. Within 11 weeks, 12.5 acres of mangroves were removed (See Figures 2 & 3). The removal of the remaining stands in the WMA began in December 1996 and concluded in April 1997 (Drigot, 1999, 2000, 2001).

Cattle Egrets:

Cattle egrets are an Old World (Asian/African) species that dispersed across the Southern Atlantic Ocean to reach South America in the 1940s. Cattle egrets probably were blown around the world on a fairly regular basis, but needed a large herbivore dominated environment to succeed. Once cattle ranching began in South America, the stage was set for them to succeed and eventually spread northward following the lands converted to grazing. Egrets dispersed north and west to reach both Florida and Australia in 1948. In 1952, egrets colonized both Canada and Bermuda on their own (Matthiessen 1959). However, cattle egrets were purposefully introduced to Hawai'i in 1959 (Breese 1959). About 150 cattle egrets were brought from Florida to aid "in the battle to control house flies, horn flies, and other flies that damage hides and cause lower weight gains in cattle." (Breese 1959). Another 22 were released on O'ahu and 26 wing-clipped birds housed at the zoo were released in Honolulu in July 1961 (Berger 1981).

Today cattle egrets are considered to be a pest species in Hawai'i. They prey on chicks of the endangered stilt and Hawaiian coot (*Fulica alai*) (Andrews 1981), and potentially carry diseases (*Salmonella*) that might spread to native birds.



Fig. 2



Fig. 3

Egrets are also a threat to aircraft because birds forage in grass strips near runways and increase the bird/aircraft strike hazard potential (Will 1984). Several airfields exercise lethal control under the authority of state and federal permits (Paton et al. 1986).

The first cattle egret roost discovered at MCBH was in 1960. This rookery was placed in kiawe (*Prosopis pallida*) trees. On October 5, 1970 about 30 nests were active (Olsen 1970). In 1971, the number of egrets using this roost included at least 1,000 birds, and from 1976 through 1979, Audubon Christmas Count totals were within 200 birds of 1105, the mean number of birds. No estimate of the number of nests per year is available, but Shallenberger (1977) reported the area containing nests expanded annually from 1970 to 1977. By 1977 the roost was described as the largest in Hawai'i (Shallenberger 1977). About 2,000 were estimated to roost and nest on MCBH in 1978 and there were 200 nests on March 10, 1979 (Berger 1981).

Shallenberger (pers. comm.) estimated there were 200-250 active nests in the colony on August, 1980 (R. J. Shallenberger, pers. comm.). The colony remained active until at least November, 1981, but in the spring of 1982, the egrets moved to trees south of Nu'upia 'Ekolu Pond, still in the WMA. The roost remained here for at least several months, but in November 1982, birds apparently used this area only as a "morning roost." About 175-200 birds used this area in January 1983 from just after sunrise to mid-morning when they dispersed to feed (G. V.

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Byrd and R. J. Shallenberger, pers. comm.). Apparently a new overnight roost had formed west of the Base in mangroves at He'eia Fishpond, 3.2 km west of MCBH, Kaneohe Bay and continues in use today.

Since 1983, cattle egrets were observed to use MCBH for feeding, but not for breeding or roosting. However, in March 1996, egrets colonized a mangrove islet in Nu'upia 'Elua (Figure 4). They were likely attracted to this site because of the size, isolation and wind protection of the island. Adults in high breeding plumage were seen and chicks were audible in June. The mangrove islet was scheduled to be cut down as most of the mangrove had already been removed from the ponds in the previous year.



Fig. 4

The nesting island was scheduled to be cut in the winter, presumably when fewer birds would be breeding. Cattle egrets breed year-round in the tropics with different regional peaks (del Hoyo et al. 1992). Paton et al. (1986) found that there was no period between January and June that egrets did not nest in Hawai'i. Nests were detected in November 1996. This second pulse may have been in response to the beginning of the rainy season. Egrets were not in high breeding plumage in November as they were in July 1996.

Immediately before the scheduled mangrove cut, and with proper state and federal permits for hazing birds, 195 cattle egret nests were destroyed with a long pole. In order to salvage some scientific data, we opportunistically measured 185 cattle egret

eggs. Table 1 presents data for cattle egret egg measurements with means, standard deviation and range included. Data of egret eggs collected in Texas are not significantly different from Hawaiian birds. Egg size appears to be the same as "normal" from Texas birds, with a 45.55 mm length and 32.82 mm width (Telfair 1983). Our collection of eggs was opportunistic, instead of marking each egg as it was laid in sequence. Thus some data comparisons are not available, such as what the measurements of the first egg in comparison to the others. Telfair found that the length varied more than the width and in an average clutch, the 1st and 2nd eggs were slightly longer than the 3rd and the 1st egg was slightly narrower than the 2nd and 3rd, but the 4th egg was both longer and narrower than the other three (Telfair 1983). Berger (1981) presents Hawaiian data from one egg near the extreme of the range. Paton et al. (1986) reported a mean clutch size of 3.32 eggs (n=41, s.d.=1.06), but we cannot provide comparable data since the nests were destroyed during nest initiation.

Nests were built upon old former nests made from kiawe and koa haole branches. Most nests had fresh eggs, though about 10% had well-developed embryos. Incubation is 22-26 days with fledging in about 30 days, so eggs would have hatched in December-January period with chicks fledging in February to March; around the stilt nesting season. One clutch per year is usually laid but up to three have been recorded with usually 2-5 eggs per clutch (Berger 1981).

Black-crowned Night-herons:

The indigenous black-crowned night-heron is resident in the WMA. Observations show that their primary food source appears to be introduced tilapia (*Oreochromis mossambicus*) and that they nest in mangroves and other introduced trees. The night-heron is the only native waterbird species in Hawai'i that is not an endemic species or subspecies. Because it has not genetically differentiated from stock on the American continent, it is not a federally protected migratory species, a factor that may affect its survival (Pratt and Pratt 2001). It is a state-protected species but permits are obtainable for lethal control of local populations when, for example, they cause significant depredation in mariculture areas. In fact, statewide increases in night-herons appear linked to mariculture expansion (Engilis and Pratt 1993).

TABLE 1:
Measurement data of Cattle Egret eggs in Hawai'i and elsewhere. Minimums and maximums are in parentheses: n= sample size

	length (mm)	width(mm)	source
Texas n= 275 range	45.26 + 2.40 (34.56-52.24)	32.98 +- 1.09 (27.81-35.65)	collected in 1972-74 (Telfair 1983)
Hawai'i n=185 range	45.55 +-2.43 (37.50-53.35)	32.82 +- 1.13 (28.30-35.40)	collected at MCBH in 1996-97
Hawai'i n=1	53 mm	36.5 5 mm	Berger 1981
India n=80	44.1 mm	36.5 mm	Berger 1981

TABLE 2: Measurement data of Black-crowned Night Heron eggs in Nu'upia Ponds WMA collected in 1996-1997.

Minimums and maximums are in parentheses: n= sample size

	length (mm)	width(mm)
n=42	50.97 +-2.77	36.49 +- 1.45
range	(43.8-59.8)	(31.9-39.2)

Night-herons in Nu'upia Ponds appear to have benefited from both pickleweed management and mangrove maturation. Pickleweed control, via U.S. Marine training exercises using Amphibious Assault Vehicles, opens up foraging habitat (Figure 5) for the intended benefit of stilt. Dense mature mangrove thickets are critical for night-heron nesting by providing elevated isolation from potential predators and human disturbance. In the WMA, before vegetation control efforts began and while mangroves were short, heron counts in the 1950s and 1960s. 1960s were usually less than ten birds. By 1995, the average count was 36 (n=41, range 14-72) (Rauzon and Tanino 1995).

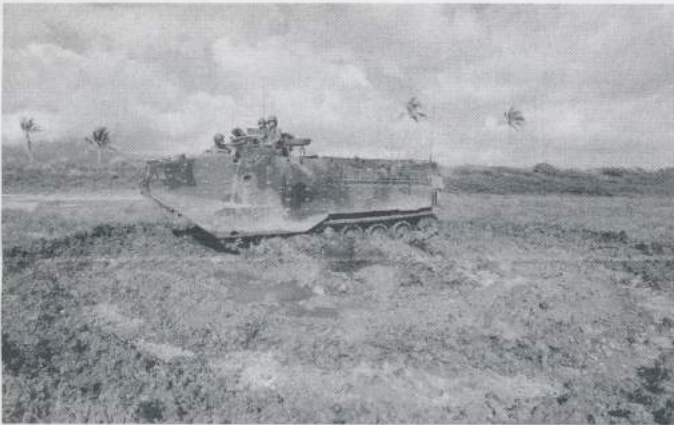


Fig. 5

Figure 6 shows the censuses of black-crowned night-herons over a 52-year period. Their average population is about a third of the Hawaiian stilt population (36 verses 122, respective means) and like stilts, night-heron counts vary over time, due in part to vegetation, observer effort and time of day. In the mid-1980s, mangroves obscured much of the view shed so counts were limited to open mudflat areas. Night-herons roosting in mid-day in dense mangrove were easily overlooked. In fact, observations of night-heron nests were first recorded in the WMA during mangrove removal in 1994, although they probably nested for years without detection. Their stick nests were placed approximately eight to twelve feet off the ground in large mangroves.

During the mangrove removal process, night-herons were discovered nesting in trees scheduled to be cut in 1996-97. In the summer of 1994, 39 nests were located, representing that at least 78 adults were present and assuming at least 15% of the population were juveniles, approximately 100 birds were resident in the WMA (Rauzon and Tanino 1995; Rauzon et al. 1996). During field surveys prior to cutting, on 16 December 1996, we found at least 23 night-heron nests, representing 46 adult birds. After meeting all legal requirements from the Federal and State regulators, 31 night heron nests were eventually destroyed in

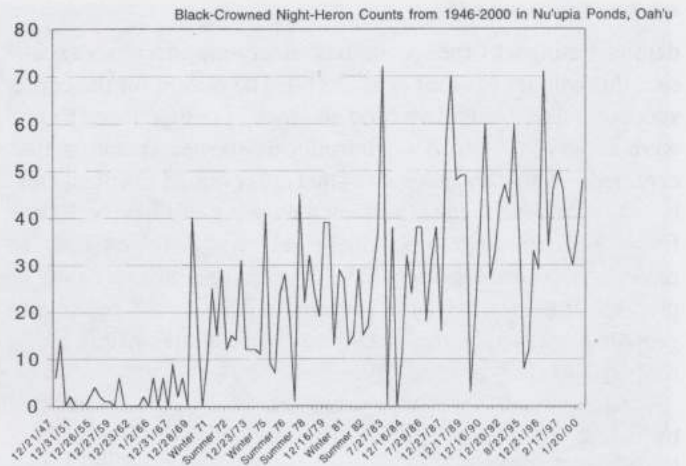


Fig 6

Nu'upia Ponds. In order to salvage some scientific data from the operation, eggs were measured to yield a mean length of 50.97 mm, and width 36.49 mm (n=42) (Table 2). The clutches of two night-heron and two egret nests were collected and donated to the Bishop Museum in Honolulu in compliance with permit conditions.

Two night-heron nests holding chicks were saved from destruction. The trees surrounding the nest were flagged with pink tape to alert the cutters. One nest held one chick and two eggs on 17 December 1996. By the next day, the second egg hatched and the third egg pipped. By subtracting the approximate 30-day incubation length, the eggs were laid in mid-to-late November. When this nest was revisited in 31 January 1997, there was one dead chick in the nest. The others fledged or died earlier and disappeared. An immature fledgling and another dead chick were later seen in the same nest in August 1997.

A second occupied nest had 3 three eggs on 17 December 1996 and again on 31 January 1997. Re-nesting had occurred since the incubation period does not extent to 45 days. The second clutch hatched around 7 February 1997. The chick with emerging pinfeathers was still alive on 27 February 1997, and presumably fledged in spite of the disturbance from nearby chain saw activity. This nest site also held a large juvenile in August. These observations suggest that several pairs use nest sites throughout the year, perhaps successively. Night-herons continue to breed in other mangrove-infested areas off Base, and in Brazilian pepper trees (*Schinus terebinthifolius*) and kiawe fringing the WMA. They also continue to forage at Nu'upia Ponds, often feeding in the stilt nesting area.

Feeding night herons were counted during each stilt survey from March 1994 until February 1995. The range of 41 counts spanned 14 to 72 with the mean being 36.4 birds. Six counts made during late 1996-early 1997 yielded a mean of 41 herons. In 2000, 48 night-herons were counted, suggesting their population and use of the ponds is consistent in spite of nesting habitat loss. However, it is very likely populations would have increased if mangroves remained.

Discussion:

The fecundity of the cattle egrets is especially high compared to the Hawaiian stilts. Within one year of establishing a colony, the egrets produced over 200 nests with about 500 eggs, clearly

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demonstrating why the species has undergone enormous expansion this century (Telfair et al. 2000). The reason for the egrets success is likely abundant food and lack of competition. Egrets were observed to feed on introduced species (cockroaches, centipedes, katydids, mice, etc.) that are revealed during disturbance by browsing cattle and lawn mowing machinery. Egrets fill an unoccupied ecological niche in Hawai'i as elsewhere. No native species are known to have learned to adjust its habits so precisely to human ways. The limiting factor to population growth appears to be the availability of nest-sites within heron rookeries (Telfair et al. 2000).

Cattle egrets do benefit the ecological health of the watershed by eating many pest species (Figure 7). However, USFWS biologists have reported several instances of egrets eating endangered birds (Andrews 1981). They also potentially carry diseases (*Salmonella*) that might spread to other birds.



Fig. 7

Night-herons also exert an unknown but possibly significant predation pressure on Hawaiian stilt eggs and chicks. "All available evidence points to black-crowned night-herons being extremely opportunistic predators utilizing whatever suitable prey happens to be most plentiful or most easily caught at any particular place and time" (Collins 1979).

Wolford and Boag (1971) found night-herons in Alberta, Canada, fed on blackbird, egret, ibis, duck, gull and tern chicks. Shallenberger (1977) found regurgitated pellets containing a sooty tern (*Sterna fuscata*) chick under a Hawaiian night-heron roost. An adult night-heron was observed eating a stilt chick at James Campbell National Wildlife Refuge, O'ahu (Andrews 1981). After the mangroves were removed, cattle egret observations declined at Nu'upia Ponds. Since egrets nest colonially, it is likely that they may have returned to the large colony at He'eia Fishpond, also on a mangrove islet. Some individuals continued to roost nearby the former site in the remaining

mangrove until these were cut. Cattle egrets continue to forage on MCBH, but may now have to commute 3.2 km to roost, although without radio telemetry studies this is not confirmed. Night-herons breed in the drier woods and other mangrove stands around the Base. They also continue to forage at Nu'upia ponds, often feeding in the stilt nesting area. Regardless of the reduction in mangrove nesting habitat at Nu'upia Ponds, Figure 5 suggests the relatively same number use the WMA and that their primary use of the ponds is as a foraging habitat.

Acknowledgments:

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**Mark Your Calendar –
HAS' 11th Annual Awards Dinner Takes
Place Tuesday, October 19th**

This marks the eleventh year that the Society has recognized outstanding volunteers, corporate leaders, and public servants for their contributions in protecting Hawai'i's native wildlife and habitats. Tentatively, the dinner will once again be held at Hawai'i Imin Conference Center at UH Manoa from 6:00 to 9:30pm, with dinner catered by Kaka'ako Kitchen. Look for details in the October 'Elepaio, or coming soon on our website, www.hawaiiiaudubon.com. Please make your reservations no later than October 13th by calling the HAS office at 528-1432 or emailing us at hiaudsoc@pixi.com.

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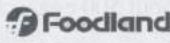

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Calendar of Events

Monday, September 20 Board Meeting:

Open to all members, 6:30 to 8:30 p.m. at the HAS office. Education and Conservation Committees meet at 5:45 p.m. before Board meetings.

Monday, August 16 Program Meeting:

Linda Elliot, IBRRC. See page 42.

Saturday, August 21 Field Trip

Ho‘omaluhia Botanical Garden. See page 46.

Saturdays, September 6 and 27 Field Trips

Paiko Lagoon. See page 42.

Tuesday, October 19 Annual Awards Dinner

See page 46.

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