



THE STATUS OF HARCOURT'S STORM-PETREL (*OCEANODROMA CASTRO*) IN HAWAII

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Harcourt's Storm-petrel (*Oceanodroma castro*), also called the Band-rumped, Hawaiian, and Madeiran Storm-petrel, is the rarest and smallest seabird that breeds in the Hawaiian archipelago. The authors prefer the common name "Harcourt's Storm-petrel" because most of the literature on Hawaiian birds has used this name. It is the only seabird breeding in the Hawaiian Islands for which the nest and eggs have never been found. Although the state of Hawaii considers the population in Hawaii to be endangered (Hawaii Department of Land and Natural Resources [DLNR] 1982), it has not yet been so listed by the federal government. The senior author filed a petition in May 1989 with the U.S. Fish and Wildlife Service (USFWS) to list the Hawaii population as endangered.

This paper summarizes the current status of *O. castro* in Hawaii (Figs. 1 and 2), together with what we can surmise of its biology based on scattered observations in Hawaii in light of detailed studies of its natural history in the Galápagos and on Ascension Island. The authors hope that this paper will stimulate research on the Hawaii population of *O. castro* that will yield additional information regarding its distribution, abundance, breeding biology, and conservation.

DISTRIBUTION AND STATUS

Oceanodroma castro breeds in the warm, temperate waters of the Atlantic and Pacific oceans, nesting in three archipelagoes in the Pacific (Harrison 1983:273-274). Off the North coast of Honshu, Japan, about 8,000 individuals nest on Hidejima; a few more pairs nest on Sanganijima (Hasegawa 1984:492). The Galápagos population comprises 15,000 pairs (Harris 1984:492), including colonies at Isabela (Albemarle), Genovesa (Tower), San Cristobal (Chatham), Floreana (Charles), and Española (Hood) (Naveen 1981-1982). The relationship among the populations at the various breeding islands is an open question. Austin (1952:394-395) noted that storm-petrels "have a strong claim to the dubious honor of being one of the most difficult systematically of avian groups." Nevertheless, Austin, a self-described "unconscionable lumper," concluded that no subspecies were separable.

Whether Austin's conclusion regarding subspecies would stand up today is questionable. Over the years since his work was completed, morphological differences between some populations have become apparent. Birds collected in the Gulf of Guinea are larger and have less white in the rump than those

elsewhere (Harris 1969:99). Birds from Japan appear to have larger rump patches than birds from Hawaii or the Galápagos (Harris 1969:98). While Harris was reluctant to recognize subspecies based on the information available to him, he urged that the "existence of geographic variation be recognized" and concluded that "populations are probably distinct with little mixing." This hypothesis could easily be tested using DNA techniques, if the government of Ecuador would issue a permit to collect bird tissue (e.g., blood) samples in the Galápagos for this purpose and if a permit from the state of Hawaii to collect such samples could be obtained.

Long before Westerners arrived in Hawaii, *O. castro* was common if not abundant on Hawaii, Oahu, and probably other main islands. Hawaiians mimicked its call, naming it *oeoe*, *oweowe*, and *akeake*; thus native Hawaiians had more familiarity with *O. castro* than would be expected if the species had always been as rare as it is today. On Hawaii, Alan C. Ziegler (pers. comm.) has found bones of *O. castro* in middens at Waikoloa beach, Poupou-Kauka Villages (Hawaii Volcanoes National Park), and Bobcat trail habitation cave (saddle area between Mauna Loa and Mauna Kea). Bones are abundant in fossil sites near Barber's Point, Oahu, and a few scraps have been found on Molokai (Olson and James 1982:33). Apparently the Hawaii population once nested in coastal sites. Reasons for the decline of this species remain unclear but could include disease or predation by introduced rats (*Rattus exulans*, *R. rattus*, *R. norvegicus*) or cats (*Felis catus*). In New Zealand,



Figure 1. Harcourt's Storm-petrel.

Photo by J. Sincock

whenever Polynesian rats occur on an island storm-petrels are rare or absent, even when the birds are common on neighboring islands (Jones and Byrd 1979:224). The abundance of bones in middens implies that precontact Hawaiians made some use of this small bird, possibly for its white rump feathers or as food.

Captain James C. Cook's expedition did not collect any storm-petrels in Hawaii (Stresemann 1950), but few would be expected on land from late November to mid-February. Even if a substantial population of *O. castro* had remained by the turn of the nineteenth century, a small black and white bird that passes at night to and from its remaining breeding sites in the mountains would not likely have attracted the attention of early naturalists in Hawaii. Nevertheless, this species was apparently included in the first lists of Hawaiian birds. It was labelled an "unnamed petrel" in the Smithsonian collection and tentatively placed in the genus *Thalassidroma* (Dole 1869:368, 1879:55). Ridgway (1882) described it from two specimens (U.S. National Museum Nos. 41949 and 41950) collected by Valdemar Knudsen from Waimea, Kauai, and named it *Cymochorea cryptoleucura*. Stejneger (1888:78) assigned it to the genus *Oceanodroma*, thereby renaming it *O. cryptoleucura*. By the turn of the twentieth century, the Hawaiian specimens were recognized as *O. castro* (Henshaw 1902), a species described by Harcourt. The Hawaiian population became *O. c. cryptoleucura* and was often referred to as the Hawaiian Storm-petrel. Austin (1952) concluded that *cryptoleucura* is not a separable subspecies based on his measurements of wing, tail, and bill of eleven museum skins from the Hawaii population.

Specimens from Hawaii have been difficult to collect for at least a century. Wilson and Evans (1890-1899:209) expressed their good fortune at obtaining samples from Francis Gay's collection on Niihau and remarked that "nothing certain is known respecting the range of this species." Walter Rothschild (1893-1900:53) observed it at sea near French Frigate Shoals on 29 May 1891 and concluded, apparently incorrectly, that it bred there. Munro (1944:29) reported that Henry Palmer, Munro's colleague on the Rothschild expedition to the Northwestern Hawaiian Islands, sighted it in the Kaulakahi Channel between Kauai and Niihau in July 1893. Munro himself found *O. castro* to be very numerous at sea on the north side of Kauai on 14 August 1891, but his collection consisted of but a single bird found on the beach at Makaweli, Kauai, with down still clinging to its feathers.

Henshaw (1902:118-119) questioned whether *O. castro* was rare:

I have little doubt that the akeake is much more common and widely dispersed among the islands of the group than the above meager notices would seem to indicate. Very little work has been done as yet in the waters surrounding the islands, even inshore, and their thorough examination will yield many facts of interest.

The natives report a small petrel, which they call by the above name, as common on the fishing grounds five or ten miles off the windward coast of Hawaii, and I have little doubt that it is this species, although I have not yet been able to obtain a specimen.

Munro (1944:29) dismissed Henshaw's reference because he believed the Hawaiians had actually observed Sooty Storm-petrels (*O. tristrami*). Identification at sea in Hawaii is confounded by similarities among three white-rumped storm-petrels: *O. castro*, *Oceanites oceanicus* (Wilson), and *O. leucorhoa* (Leach) (Crossin 1974:155). It seems unlikely that the discerning eyes of Hawaiian fishermen could confuse two species of dark storm-petrels, one with and the other without a prominent white rump. If the birds described by Rothschild and Henshaw were not *O. castro*, it seems more likely that they were *O. leucorhoa*, apparently a common species in those waters (King 1970).

More recently Richardson and Bowles (1964:20) saw *O. castro* off western Kauai (29 July) and between Kauai and Lehua (10 August). Although King (1970:41) did not report any of the birds during his monthly shipboard surveys around the main Hawaiian Islands, he acknowledged that some *O. castro* may have been misidentified as *O. leucorhoa*. Crossin (1974:179) spent a day just off Waimea, Kauai, on 25 June 1966 and observed a "considerable number of birds" that "appeared to be going to and leaving the island throughout the day, but we could not approach the shoreline closely enough to determine if the birds went to land." He managed to collect a single *O. castro* specimen, a female with ovaries enlarging but not yet in breeding condition. Warren B. King (pers. comm.) and Cameron Kepler heard one or two birds at night on the edge of Waimea Canyon, just off the road to Kokee, sometime in the mid-1960s.

Downy young are found most years during the Newell's Shearwater (*Puffinus [auricularis] newelli*) recovery program on Kauai (Table 1). Telfer has often heard fishermen state that they have seen Harcourt's at sea on all sides of Kauai. Banko, Banko, and David (in prep.) report juveniles with some down on the Big Island at Kilauea Military Camp and Kulani Correctional Facility, above Hilo, as well as partial specimens from Mauna Loa. These specimens confirm Berger's (1972:50) statement that immature birds occur on Hawaii and strongly suggest the existence of a colony there.

Oceanodroma castro also might breed on Maui. Warren B. King (pers. comm.) heard *O. castro*'s distinctive calls at the bottom of Haleakala Crater in late June 1970. As many as three birds were calling overhead at about 2200 hrs near 15-meter piles of unvegetated tuff. Although King did not get a glimpse of the birds, the calls were not far overhead. During the evening of 8 August 1983, Peter Pyle, Phil Ashman, and Jack Jeffrey heard three or four *O. castro* calling near Holua Cabin, Haleakala Crater (Pyle 1984). Brien Meilleur reported observing a single *O. castro* one kilometer off east Maui on 25 October 1988 (Pyle 1989).

BREEDING BIOLOGY

Oceanodroma castro is long-lived and probably does not breed until at least the third year of its 15-20 year life (Ainley 1984). Most of our knowledge of the breeding biology of *O. castro* comes from studies at Ascension Island (Allan 1962) and the Galápagos (Harris 1969). On Ascension, they select nest sites on steep slopes and cliff faces where crevices and



Figure 2. Harcourt's Storm-petrel, note the white band on the rump.

Photo by J. Sincock

platforms are flat enough to hold an egg (Allan 1962:275). Similar sites are probably selected in Hawaii. Richardson (1957:19) stated that *O. castro* "probably nest in cliffs" in Hawaii, based in part on the fact that the Gay and Robinson collection comprised four specimens found at the foot of inland cliffs where young birds had fallen when trying to fly (Munro 1944:29). Munro believed that he heard a Harcourt's Storm-petrel squeaking while it flew around a cliff in Hanapepe Valley, Kauai. He did not provide a date.

Sincock heard and taped calls that sounded like *O. castro* from Hanapepe Lookout at 2100-2200 hrs on 12, 13, and 14 June 1979. On 14 June, with the permission of Olokele Sugar Company, he used a parabolic microphone to listen for vocalizations from the west side of Hanapepe Valley. While Sincock could not detect any birds on the west side, he again heard calls from the east at 2200 hrs. On 25 October 1980, Sincock surveyed Hanapepe Valley by helicopter. On a site about 30 meters south of Hanapepe Lookout he observed what appeared to be burrows, feathers, and feces on the cliff face 50-70 meters from the top. These possible nest sites would be accessible only to a good rope climber. Telfer heard what may have been two or three Harcourt's storm-petrels calling overhead on 10 July 1989 while camped at Nualolo Aina on the Na Pali coast. The vocalizations did not come from the ground and the birds may have been using nearby ancient man-made walls for nest sites.

On Ascension, Allan (1962:279) found that courtship lasts five to six weeks. After copulation in the burrow, the birds depart to sea for up to three weeks (Nelson 1979:145) while the female nourishes the growing egg which can account for almost one-quarter of her body weight. In the Galápagos, Harris (1969:116) found an average of 33 days between copulation and laying. Both males and females incubate, and bouts last at least five days at Ascension (Allan 1962:283) and six days at the Galápagos (Harris 1969:120). The incubation period averages 42 days (Palmer 1962:237, Harris 1969:121). The length of time needed for fledging ranges from 64 days (Allan 1962:285) to 70 days (Harris 1969:124). Assuming the Hawaii population has similar characteristics, *O. castro* males probably return in April to reclaim territories and begin to nest

the following month. Such a chronology accounts for the summer sightings, the collection of "barely flying young" in October during the late nineteenth century (Richardson 1957:19), and the capture and release of juveniles during fall in the 1980s.

POPULATION

Any estimate of the population of this species in Hawaii is fraught with difficulty. Crossin (1974:179) stated that "the population on Kauai, as judged by the number of specimens and sightings, cannot be large." On Kauai, 15 birds have been picked up during the past 12 years, 13 of which have been released (Table 1). No birds were reported in four of the years, and the most in any single year has been three. All but two of the captures were hatching-year birds with some down. Many were picked up at Hanapepe or at Waimea Town near a brightly lit baseball park that is close to rocky cliffs at Waimea Canyon.

We can roughly estimate the population of *O. castro* on Kauai by comparing the proportional recoveries of *O. castro*, Newell's Shearwaters, and Dark-rumped Petrels during fall with population estimates of the last two species. On average, about one *O. castro*, five Dark-rumped Petrels, and 1,500 Newell's Shearwaters are recovered on Kauai each year (Telfer et al. 1987). Assuming the three species were equally susceptible to fallout, Newell's Shearwaters would be about 1,500 times as numerous as *O. castro*, and Dark-rumped Petrels would be 5 times as numerous. Although we cannot be sure that each species has an identical attraction to lights, each is nocturnal and each is drawn to lights.

Harrison et al. (1984) estimated the populations of Newell's Shearwaters to be 4,000-6,000 pairs and of Dark-rumped Petrels to be 400-600 pairs. This approach leads to an estimate that ranges between three or four pairs (4,000-6000÷1,500) and 100 pairs (400-600÷5). We believe the population surely exceeds three pairs. An upper limit of 100 pairs for the Kauai population of *O. castro* does not seem unreasonable. The Kauai population may be somewhat greater if the birds sighted by fishermen in recent years are indeed *O. castro* and not a similar white-rumped storm-petrel. The statewide population could exceed 100 pairs if viable breeding populations exist on Hawaii or Maui.

CONSERVATION

Several aspects of the biology of storm-petrels justify the preservation of the existing population in Hawaii, even if we have insufficient information to separate the three populations in the Pacific on the basis of morphology. *Oceanodroma castro* is very faithful to its nest chamber (Allan 1962:280, Harris 1969:120), perhaps more so than to its mate. Such a strong sense of territory implies that Harris (1969:99) is correct concerning the genetic isolation of *O. castro* colonies. If the Hawaii population were extirpated, new colonies might not reestablish in the foreseeable future.

Such a situation exists for the Laysan Albatross (*Diomedea immutabilis*). Laysans have not founded colonies at either Wake Island or Marcus Island since those colonies were destroyed a half century ago, despite the fact that Laysan

populations are expanding and new colonies are being formed in Hawaii, the Bonin [Ogasawara] Islands, and the Revilla Gigedos (Harrison 1990:109, 113). In contrast to Laysans, the population of *O. castro* in the Pacific is either stable or shrinking. Moreover, there is little evidence that such procelariiforms as albatrosses and shearwaters, which feed in large flocks, establish pair bonds at sea. Storm-petrels tend to be solitary at sea, and *O. castro* is even less social than most species (Crossin 1974:201). Accordingly, few Japanese or Galápagos birds could be readily recruited into the Hawaii population and recolonization might not follow extinction.

Fieldwork on Kauai and the Big Island from April to October is needed to locate the breeding grounds of this species. Such efforts can be labor-efficient because we have some fairly good ideas of where these birds breed: Hanapepe Valley, Waimea Canyon, Olokele Canyon, and along the Na Pali coast on Kauai; and above 1,200 meters on Mauna Loa, Hawaii. Surveyors must camp in the vicinity of suspected colonies because this species does not arrive at the colony until about an hour after sunset (Allan 1962:279).

Courting storm-petrels swirl overhead in elaborate aerial rituals, weaving back and forth over the colony while filling the air with calls. The vocalizations sound like a "wet finger rubbing on glass" which may be followed immediately by a brief storm-petrel-like purring (Palmer 1962:237). Activity peaks between 2200-2400 hrs (Harris 1969:115). The full moon should be avoided because it inhibits breeders and nonbreeders alike from visiting the colony (Harris 1969:112-115).

Like Harris (1969:116) and Sincock (unpubl. data), biologists should employ tape recordings of the call of *O. castro* to attract birds and ensure that birds nesting in inaccessible cliffs and rock crevices are not overlooked. Such surveys could also use tapes to attempt to locate colonies of Newell's Shearwaters and Dark-rumped Petrels. Surveys on Lanai, Maui, and Molokai may also be warranted. Systematic observations at sea in the nearshore waters of Kauai and Hawaii would help determine breeding patterns, locations, and population estimates.

Storm-petrels easily succumb to mongooses, rats, dogs, cats, owls, and similar predators. Hasegawa (1984) found that huge numbers of *O. tristrami*, a species that weighs over twice as much as *O. castro*, were exterminated at the Izu Islands by introduced black rats and cats. *Oceanodroma castro* may be the small storm-petrel whose fresh burrows Grant (1982:2) observed on Midway during May. The long-term prognosis for any storm-petrel population is problematical, and all colonies require protection and possibly active management. A more accurate assessment of the status of this species will help determine what conservation measures may be needed to protect the remnants of the Hawaii population.

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Table 1. Captures and recoveries of *Oceanodroma castro* in Hawaii, 1949-1989. The records from 1978-1985 for Kauai were previously summarized in Telfer et al. (1987).

Date	Location	Age*	Status
10-28-49**	Kilauea Military Camp, Hawaii	F	dead
07-25-66†	Waimea, Kauai (offshore)	A	collected
11-04-78	Unknown [Lihue, Kauai]	A	released 11-04-78
10-25-79	Waimea, Kauai	F	released 10-26-79
11-18-79	Olokele Mill, Kauai	F	released 11-18-79
10-10-80	Waimea Canyon School, Kauai	F	released 10-20-80
10-10-80	Waimea Canyon School, Kauai	F	released 10-20-80
1981	no recoveries		
1982	no recoveries		
11-01-83	Unknown [Lihue, Kauai]	F	dead
10-29-84	Kekaha, Kauai	F	released 10-29-84
11-01-84	Kekaha, Kauai	F	released 11-01-84
1985	no recoveries		
1986	no recoveries		
10-12-87	Unknown [Waimea, Kauai]	F	released 10-12-87
10-21-87	Waimea Ball Park, Kauai	F	released 10-22-87
10-04-88	Waimea, Kauai	F	dead
10-14-88	Hanapepe, Kauai	F	released 10-14-88
10-20-88**	Kulani Correctional Facility, Hawaii	J	dead
10-20-88	Waimea, Kauai	F	released 10-21-88
11-01-88+	Kaneohe, Oahu (at sea)	A	dead
04-28-89	Kauai (S.S. <i>Independence</i> , at sea)	A	released 04-28-89
10-23-89	Kekaha, Kauai	F	released 10-23-89

*F=fledgling; J=juvenile; A=Adult.

**Source: Banko, Banko and David (in prep.).

†Source: Crossin (1974).

+Source: Pyle (1989).

JOIN US FOR THE ART SHOW OPENING ON SATURDAY, 16 JUNE



Dining on the Fly by Norman Nagai

Opening night festivities for Hawaii Audubon Society's Annual Wildlife Art Exposition, contest and sale are set for take Saturday, 16 June, from 5 to 9 P.M. The event, celebrating 51 years of Audubon in Hawaii, is hosted by Pacific Island Arts Gallery, North Shore Marketplace, 66-250 Kamehameha Highway, Hale'iwa.

This year's commemorative lithograph, "Dining On the Fly," depicts an 'Iwi teaching its young how to catch insects. It is based on an original gouache painting by Norman Nagai, first prize winner in last year's show. This limited edition of 950 lithographs was printed by Harbor Graphics on 100% acid-free

paper, using special acid-free, fade-resistant inks. The list price is \$135, plus tax. However, the price for orders received through the opening night of the show is \$95, plus tax. Hawaii Audubon receives a portion of the proceeds of each sale. For information on purchasing "Dining on the Fly" call Pacific Island Arts at 637-7880.

The opening night festivities promise to be fun. Come, bring your family and friends, to socialize with other Auduboners, meet the contest winners, and participate in the art auction. We expect over 200 entries for this year's show.

HUMPBACK WHALES OFF WEST HAWAII

Mari A. Smultea

The North Pacific Humpback Whale (*Megaptera novaeangliae*), Hawai'i's state marine mammal, is a faithful winter resident of Hawaiian coastal waters within the 100-fathom depth contour. This coastal distribution allows whales to be tracked from inland hills or "pu'u" to assess their behavior patterns. Such a study, with the financial help of the Hawaii Audubon Society and others, was conducted during the 1988 and 1989 winter seasons off Pu'u Kuili just north of Makalawena on the Big Island. The primary objective of the study was to quantify and describe the habitat preferences of social groups of humpbacks, specifically cows with calves, critical components of the endangered population.

Researchers Deborah and Mark Glockner-Ferrari have documented increasing aquatic recreational activities, including jet ski and parasail operations, off the west coast of Maui in the last 10 years. However, as there are other possible explanations for shifts in whale distribution, comparison with an area undisturbed by such activity is necessary to substantiate nearshore preferences of humpback cows and calves. This was one of the goals of my study; as nearshore development and water activities are still relatively low on the Big Island, an effectively "undisturbed" assessment of whale distribution could be made.

To assess habitat utilization patterns of humpbacks a theodolite, a land surveyor's transit, was used to obtain precise locations of whales from land by measuring angles and bearings. Theodolite readings were later plotted on a bathymetric chart to determine distribution patterns in relation to water depth and

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Focus on Forests

by Patricia Tummons

The scene: A lush, verdant tropical forest. Draped 'round the trees are thick strands of vine, festooned with lovely purple blossoms.

The setting? Brazil, perhaps, or Costa Rica?

No, it's closer to home than that. In fact, it is home - Hawaii, part of the good old U.S. of A.

And that vine, a visual delight to the untrained eye, has Hawaii's forests in a chokehold. Banana poka, as *Passiflora mollissima* is more commonly known, is an introduced species - a plant native to the Andes which was brought into the islands as an ornamental. Since its "escape" into the wild, it has caused untold damage to many areas of Hawaii's unique forests.

Banana poka is a prime example of the grave threat to Hawaii's forests posed by introduced species of plants. Because Hawaii's native and endemic plants, evolved in isolation and with few natural enemies, they have poor, if any, defenses against aggressive newcomers. Plants from other tropical areas, such as banana poka, are especially devastating.

Why Save Hawaiian Forests?

Hawaii's forests are small. Saving them won't make a dent in the available "carbon sink" needed to counteract the effects of the predicted global warming. The entire state could be planted in trees - or deforested, for that matter - without causing the faintest blip on the greenhouse screen.

But Hawaii's forests are nonetheless worth saving. They are rich in species whose pharmacological benefits have yet to be explored. The variation in plant, bird, and insect life - most species of which are descendants from just a few hundred "colonizers" that arrived in the islands eons ago - has made Hawaii one of the world's best living laboratories for students of evolution. (Over 90 percent of the plants, birds, insects, and other native species are "endemic," that is, they are found no where else on Earth.)

Finally, and not least important, if Hawaii's unique ecosystems are lost or damaged beyond recovery, the United States will be in a poor position to instruct other nations in the prudent husbandry of Earth's natural resources.

Forest Types

Just describing the forests is no small task. They differ from island to island and from micro-climate to micro climate. Tall stands of 'ohia and koa are typical of Hawaiian rainforests, but even among these, wide variations occur.





*View of a partially disturbed forest at Hakalau National Wildlife Refuge
Photo by Dana Kokubun*

Why are Hawai'i's Forests Declining?

Competing plants are only part of the problem. Feral ungulates (pigs, goats, and cattle) and deer constitute another type of disruption that is almost ubiquitous. Pigs tear up low-lying vegetation through their rooting and wallowing. Mosquitoes can breed in the puddles they create, and can in turn carry disease to Hawai'i's forest bird populations. Goats and deer can kill native trees through their bark stripping, and their browsing can destroy native ground cover.

Ignorance has played a role. Early in this century, many deforested areas were replanted with introduced species of trees, although so-called "plantations" account for only 50,000 acres of Hawai'i's 2 million acres of forested lands. Even today, so little is known about the propagation of native trees species that non-native trees continue to be planted for erosion control or windbreaks.

Human activity continues to imperil all but the most remote Hawai'ian forest areas. Construction activities in low coastal areas has resulted in the almost total eradication of natural ecosystems in this zone. In remoter, higher elevations, four-wheel drive vehicles and dirt bikes tear up the ground. Marijuana growers and some utility companies give little thought to chopping down acres of native trees.

On the island of Hawai'i, the controversial drilling of geothermal wells has disrupted the Wao Kele O Puna rainforest. Roads needed for access cause new forest "edges" to be formed, literally paving the way for more non-native species and predators.

Despite common wisdom about the biological diversity of rainforests, the most species-rich vegetation zones in Hawai'i occur in lower-elevation mixed mesic (or "moist") forests, on the islands' windward sides. Unfortunately, most examples of these forests, consisting of a diverse mix of trees and shrubs, have disappeared, "eaten" by development and agriculture.

Dryland forests have all but vanished. The earliest Polynesian settlers probably cleared these areas first. Now they are used for cattle grazing or pineapple cultivation. Only small relics remain.

Mountain bogs form in areas where rainfall exceeds drainage. Trees grow there in dwarf form among the hummocks of low shrubs, sedges and grasses. At the higher, subalpine elevations on Mau'i and Hawai'i are found open woodlands and shrublands.

Forest Caretakers

Despite an uninterrupted history of loss, starting with the arrival of the first Polynesian settlers, a plan to protect representative examples of Hawai'ian ecosystems is in place. At the heart of it is the state of Hawai'i's Natural Area Reserves System, or NARS. Lands were set aside as early as 1970, but in fact, only in the last few years have the lands been inventoried and management plans developed for 15 of the 18 reserves.

The State Division of Forestry and Wildlife, a branch of the

(cont.)

What you can do:

- Participate in conservation work as a volunteer. Weed-eradication outings are routinely undertaken by the various chapters of the Sierra Club and The Nature Conservancy of Hawai'i. Contact the local office of each group if you are interested in more information.

- Scrupulously observe Hawai'i's plant and animal quarantine laws. Be sure to fill out the Department of Agriculture's declaration form before arriving in state. And if traveling inter-island do not carry any plants or flowers on the prohibited lists. Frequently a pest on one island is still unknown on other islands - and should stay that way.

Forests, continued

Department of Land and Natural Resources, is charged with implementing management plans, and has just this year been authorized to hire eight additional people to help in NARS management.

NARS comprises less than one percent of all Hawaiian land, yet three-fourths of Hawaii's native species are included in the representative natural communities, or ecosystems, of NARS. Besides the natural area reserves, the state has 700,000 acres of other "good" forest lands, according to Michael G. Buck, head of the Division of Forestry and Wildlife.

The Nature Conservancy is the largest private reserve owner. Its four major reserves - on Kauai, Maui, Molokai, and Hawaii - have a land area of more than 48 square kilometers.

The main federal agency charged with conservation work in Hawaii is the National Park Service, which controls over 1036 square kilometers. In recent years, it has moved from a stand of passive protection to more active management of natural resources, and has had success in eliminating pigs and goats from some of the park areas.

But the fact remains that little is left of Hawaii's forests in their pristine, untouched state. Preserving and protecting those areas, as well as searching for ways to keep minimally degraded areas from further damage, are the challenges that face conservationists, both public and private, in the 50th State.

Audubon Celebrates Bill to Restore Kawai Nui Marsh

Governor John Waihee is expected to sign into law this month a measure transferring ownership of Kawai Nui Marsh from the City & County of Honolulu to the State of Hawaii.

The transfer measure, long sought by conservationists, including Audubon, was passed by the legislature on May 1st. State ownership of Kawai Nui Marsh gives the Department of Land and Natural Resources (DLNR) the green light to restore Hawaii's largest remaining freshwater wetland back to health. Decades of disturbance by adjacent human activities led to the overgrowth

Happily for Kawai Nui and the residents of Kailua, the City and the State arrived at a win-win solution: the City will complete badly-needed flood control improvements to the State's satisfaction before the transfer of ownership takes place in 1993. Best of all, DLNR can begin to manage Kawai Nui immediately following the Governor's signature.

Birdathoners Score Big Bucks for Audubon Hawaii

"Score 'em!" That was heard many times Saturday, March 31 from one of our team's enthusiastic experts, Phil Bruner. Birdathon 1990 was a great success for the O'ahu team. Luckily for Audubon's Hawaiian conservation programs, by the end of the day our team total was fifty-six species!

In the Audubon Birdathon, teams are organized by chapter and state offices nationwide and compete to sight the greatest number of bird species in a 24-hour period. Each team member seeks sponsors to donate a certain amount per species sighted. Last year the Birdathon raised over \$800,000 nationally, and over \$5,000 in Hawaii for Audubon's conservation programs.

Our O'ahu team started off near the Waikiki Shell in Kapiolani Park, where we scored big: an unexpected Rose-ringed parakeet and Red-Crowned Amazon parrot flew off over our heads in the direction of the beach. We also saw a fairy tern fledgling that has been reliably sitting on a branch in an ironwood tree for a few weeks. Those of us with cameras all took advantage of the photo opportunity.



of introduced plant life in the marsh, posing problems for mammals and wildlife.

A large share of the credit for this significant step in the restoration of Kawai Nui Marsh goes to Governor John Waihee and Representative Ed Bybee (D-Kailua). Waihee threw his administration's support behind the transfer at a critical time. Bybee -- a long-time advocate of marsh restoration -- lobbied tirelessly for the transfer during the second session. Waihee and Bybee deserve the appreciation of all those who care about Kawai Nui marsh and Hawai'i's remaining wetlands.

Government recognition of Kawai Nui's potential as a public resource and its ailing biology stretches back to the early 1980's, when the state approved a Marsh Resources Management Plan. The Management Plan intended to improve and protect the multiple resources -- natural, educational, cultural, archeological -- of the 750 acre wetland.

Since the approval of the Management Plan in 1983, the State has been quietly buying up acres surrounding the marsh proper in anticipation of their eventual role as managers. Because the City owns Kawai Nui, the State was reluctant to initiate management efforts. Meanwhile, \$850,000 appropriated by the state legislature last year for Kawai Nui lay dormant.



*State Director Dana Kokubun and Representative Ed Bybee
Photo by Kendall McCreary*

The transfer of Kawai Nui Marsh was complicated by the New Year's Day Flood of 1988. The City insisted the State assume full liability for flood control if the marsh became State property. Naturally, the State was at first reluctant to accept such a potentially large financial responsibility.



*Birdathoners at James Campbell National Wildlife Refuge
Photo by Jeff Engel*

Next, we raced off to Diamond Head Crater and heard a Gray Francolin in the grass. After much searching we finally saw the Mockingbird that Phil swore was so tame, he had seen it sitting on a picnic table. We also got a good look at flocks of introduced white-cheeked Java Sparrows.

Turning northward, at the ocean's edge lookout we spied a beautiful Red-tailed tropic bird soaring high above a hill. A host of seabirds - Red-footed booby, Brown booby, Sooty terns (lots of them on Rabbit Island), Great Frigatebird, Brown Noddy - were added to the list. In Koko Crater, there is a breeding colony of peafowl. They appear fairly tame (one almost jumped into the open door of our car), but they are breeding in the wild. In the shadow of Mt. Olomana in Kailua, we failed to see the elusive Red-Billed Leiothrix or the Melodious Laughing Thrush. After missing out on an improbable but hopeful search for a Ring-necked pheasant, we motored on towards wetlands in Kahuku.

A lunch stop at the old Kahuku sugar mill bolstered our spirits. We then scoured the managed wetlands of the James Campbell National Wildlife Refuge, scoring really big! Although someone did call a immature Black-Crowned Night Heron a wading Pueo (Hawaiian Owl), we forgave him. After all, only one mistake all day. Some of the unexpected: Gargary, Green-winged teal, Laysan Albatross, Long-Billed Dowitcher, Ring-Billed Gull. In the long grass around the refuge ponds, we also saw Common Waxbill and Nutmeg Mannikin.

By the time we crossed the central plain to get to the leeward side of O'ahu, it was already 4:00 pm and half of the team called it a day. But a hardy group birded on at Pearl Harbor. Rewarded for their efforts, these die-hard birders saw a Brant, an American and Eurasian Widgeon, a Northern Pintail, and a Eurasian Skylark.

All in all, Birdathon '90 not only was a great day for birding but a great day for Audubon's conservation programs as well. Mahalo to all Birdathoners and sponsors! Perhaps you'll join us as a birder next year?

distance from shore. An effective sighting distance of up to 5 kilometers was possible from the 104-meter-high cinder cone. Records of over 510 groups of whales during the 1988 and 1989 winter seasons indicated that cows with calves significantly prefer nearshore coastal waters. In contrast, larger pods of adult humpbacks (two or more), which tend to include aggressive and sexually active whales, appear to prefer the deeper water farther offshore. Behavioral studies have shown that humpback cows with calves avoid social contact with such groups. Thus cows with calves may select nearshore habitat to avoid surface-active groups that might injure a calf. Cows with young may also prefer nearshore waters for other survival-related reasons, including avoidance of rougher offshore wind and wave conditions, and of predators such as sharks, killer whales, and false killer whales.

Potential displacement of cow/calf pairs from preferred nearshore waters by human disturbance may reduce the survival chances of young calves through exposure to the perils of deeper offshore water. Studies by the University of Hawaii indicate that humpbacks show signs of disturbance at the approach of vessels, and that the number of vessel-related injuries among humpbacks is also on the rise. Thus conflicts between humpbacks and aquatic recreational activities over shallow coastal waters appear to be increasing. Negative manifestations of displacement, in the form of a decrease in the number of surviving calves, have not been documented, however, thereby technically limiting grounds for protective legislation.

Establishing baseline distribution patterns in the presently undeveloped study area allows comparison with distribution in already developed study areas. Such information is important in addressing the following management considerations:

- 1) The National Marine Fisheries Service (NMFS) has drafted a national recovery plan for the humpback whale that includes the identification of critical habitat and/or environmental requirements; few data presently exist.
- 2) Several areas off Maui and Lana'i are designated by NMFS as special cow/calf habitat and are subject to stricter 300-foot vessel-to-whale approach limits than the otherwise 100-yard limit. However, data are insufficient to support specific cow/calf habitat designation.
- 3) The Sierra Club Legal Defense Fund and others sued the Hawai'i Department of Transportation for permitting the operation of thrillcraft in nearshore areas where humpback cows and calves are found. However, specific critical habitat remains to be designated.

- 4) The construction of two small-boat marinas and eight hotel/condominium resorts is proposed for relatively undeveloped coastline near the study site at Makalawena. Current results can be used as a baseline for evaluation of the potential impact of this development on humpback habitat and utilization patterns.

Although the study site represents a relatively small portion of the Hawaiian humpback wintering ground, it is one of the few areas in Hawai'i where whales remain relatively undisturbed by coastal development and ocean recreation. Thus it is crucial to obtain baseline information on the natural, undisturbed behavior and distribution of humpbacks before these pristine areas are developed. Continued monitoring of the study site will detect possible changes in distribution caused by development. These study results supporting nearshore habitat preference by cow/calf pods, in conjunction with studies indicating displacement of cow/calf groups from similar preferred habitats, provide data necessary for the designation and protection of critical shallow nearshore areas. Such information is essential in implementing appropriate species-management decisions for humpbacks, and deciding how and where to curb human-related disturbance before potentially irreversible detriment occurs.

ACKNOWLEDGMENTS

Funding for this research was provided by the Hawaii Audubon Society, Marine Mammal Commission, American Cetacean Society (National/San Pedro, Monterey Bay, Los Angeles Chapters), Cetacean Society International, and the David and Lucille Packard Foundation.

*Marine Mammal Research Program
Texas A & M University at Galveston
P.O. Box 1675*

Editor's note: Mari Smultea received a research grant from the Hawaii Audubon Society for her research on behavior of Humpback Whales. She submitted the preceding report to the Grants and Scholarships Committee last November. Ms. Smultea is a graduate student in wildlife and fisheries sciences at Texas A & M University.

BYLAW AMENDMENTS PASS

Members adopted all the proposed bylaw amendments detailed in the April 'Elepaio. Of 320 ballots cast, 308 voted in favor of all changes.

CONSERVATION NEWS

Now that the State legislative session has ended, the Hawaii Audubon Society Conservation Committee will be focusing on next year's legislative priorities, as well as other conservation-related efforts. In addition to our joint HAS/NAS Conservation Campaign goals (see *Elepaio*, March 1990, Vol. 50(3):24), the HAS 1989 Board identified priorities and rationale involved in the protection and management of native Hawaiian species. These priorities were presented at a forum in December 1989 (and later updated) organized by the Natural Resources Defense Council Hawai'i office and hosted by Dr. Allan Marmelstein, Pacific Islands Administrator, U.S. Fish and Wildlife Service (USFWS), and William Paty, Chairman of the Hawai'i State Department of Land and Natural Resources (DLNR). To the extent possible, HAS will work with others on the following priorities (not listed in any special order.)

Priority:

Secure habitat for native forest birds, including those on O'ahu, and water birds statewide, including designation of critical habitat by USFWS for listed species.

Rationale:

Most of Hawai'i's native land and water birds are listed as threatened or endangered species. Among Hawai'i's 30 listed birds, critical habitat has been designated by USFWS for only one species, although essential habitat has been identified by USFWS in recovery plans for all but four of the 30. Designating and actively managing critical habitat or, at the very least, securing essential habitat, is necessary to conserve these species.

Priority:

Identify, protect, and actively manage pristine and near-pristine functioning native ecosystems with diverse assemblages of organisms.

Rationale:

This was identified as the highest priority action by participants of a 1984 survey (see Stone and Stone, 1984, *Elepaio* 45(6):41-46). Roughly 90 percent of Hawai'i's native species are found nowhere else in the world. Protecting and managing representatives of the full spectrum of Hawai'i's native ecosystems will help to ensure that endemic species and their ecological roles are maintained. Currently, freshwater stream, anchialine pond, and lava tube ecosystems, for example, are not represented by Hawai'i's threatened and endangered species lists. Yet these ecosystems are being continually degraded or destroyed by incompatible land and water uses.

Until ecosystems are identified and legally protected, existing means of achieving this goal in Hawai'i include: designation and management of National Wildlife Refuges by USFWS, state Natural Area Reserves, wildlife and plant sanctuaries by DLNR; listing appropriate and strategically chosen species under state and federal endangered species statutes; and full implementation of these statutes. An ongoing natural communities data base, maintained by the Hawaii Heritage Program and partially funded by the State of Hawai'i, could provide the basis for identifying high priority ecosystems in need of protection.

Priority:

Establish tougher quarantine laws and procedures to control the importation and introduction of non-native species to Hawai'i. To facilitate this, establish a working group of aviculturists, agriculturists, environmentalists, and federal and state officials to review and amend the existing statutes and regulations.

Rationale:

New species of non-native plants and animals are continually being introduced accidentally or deliberately to Hawai'i from the mainland and foreign countries. Examples include illegal snakes, which are regularly found on O'ahu and less frequently on the outer islands; pest plants such as clidemia, gorse, and banana poka, which overrun and destroy native ecosystems; insects such as fruit flies and mosquitoes; escaped cage birds such as red-vented bulbuls and parrots, which cause serious agricultural damage and spread pest plant seeds into native areas, as well as avian diseases to native birds; mongooses, rats, cats, and dogs, which prey on native species; and feral pigs, sheep, goats, introduced deer, and domestic and feral cattle, which degrade native areas.

Hawai'i needs a much stricter and more effective quarantine program. This would require effective inspection of incoming cargo, baggage, and mail. Money spent inspecting and excluding rather than trying to undo damage after pests become established would be far more efficient. Such a quarantine program is needed, in particular, before a pest such as the brown tree snake, introduced to Guam with disastrous results, finds its way to Hawai'i via military or commercial transport.

Priority:

Obtain adequate and permanent funding for the USFWS Hawaii Field Station at Hawaii Volcanoes National Park.

Rationale:

Research on distribution, habitat requirements, and limiting factors is essential to species recovery. Invaluable research programs carried out by the Hawaii Field Station include the Hawaii Forest Bird Survey, identification and mapping of vegetation units, and

monitoring of the Palila bird's recovery on Mauna Kea, Hawai'i. Research programs require continuity for success, and long-term planning for this research requires reliable funding.

Priority:

Obtain federal funding to expand the Cooperative Fishery Research Unit at the University of Hawaii to include wildlife research.

Rationale:

Permanently staffing the existing unit with two additional biologists would enable it to coordinate and conduct research on rare, threatened, and endangered terrestrial species. This would complement the recently established evolution and conservation biology programs at the University. High-quality research would be conducted and wildlife managers trained. The quantity and quality of research results from the existing fishery unit so far is evidence of a wise investment.

Priority:

Obtain necessary funding to begin research on avian diseases in Hawai'i.

Rationale:

Avian diseases have been identified as a major limiting factor in Hawaiian native forest bird populations. Research is necessary in this area.

Priority:

Enhance the ongoing research and effort to protect and conserve plants and wildlife on the Northwestern Hawaiian Islands, including non-breeding visiting birds.

Rationale:

These islands are unique. Research is necessary to learn more about their plants and wildlife, and to enhance management efforts in order to stabilize these populations. Increased efforts might be patterned after the previous tripartite program of the USFWS, DLNR, and the Sea Grant College Program at the University of Hawaii that conducted research jointly and developed a program for the area.

Priority:

Increase funding and staff for state and federal endangered-species listing and recovery efforts in Hawai'i. Encourage cooperation among USFWS, DLNR, and research and private sectors.

Rationale:

Fifty-eight native Hawaiian taxa have been listed as threatened or endangered under the federal Endangered Species Act. These taxa are automatically listed by DLNR; a few additional ones have been listed by DLNR independently. No Hawaiian plants or animals have been listed under the federal act since 1986, although proposed rules to cover five plants and one seabird were recently published in the Federal Register.

At last count, 180 category 1 candidate plant taxa (34.2 percent of category 1 plants in the U.S.) are native to Hawai'i. (Category 1 candidates are defined by USFWS as taxa for which USFWS currently has sufficient information to support proposals to list them as threatened or endangered species.) Approximately 20 percent of the total candidate animal taxa in the U.S. are in category 2 and native to Hawai'i; most of these are insects. (Category 2 candidates are defined as those for which there is some evidence of vulnerability, but for which there are not enough data to support listing proposals at this time.)

Until most recently, only one botanist/listing biologist has been assigned to Hawai'i and all U.S. territories under the jurisdiction of the USFWS Pacific Islands Administrator. The USFWS endangered species biologist position in Honolulu, vacated a few years ago, has not been filled. There appears to be no equivalent position in DLNR. Thirteen recovery plans covering 31 threatened and endangered Hawaiian species have been approved to date. Most of the high-priority recovery tasks, considered essential to the survival of the species, have not been implemented in any organized and systematic way. Recovery teams for most Hawaiian species are non-existent; however, there is an interest within the research and professional communities to conduct research on endangered species (for example, the Conservation Biology Initiative). At least one USFWS position and one DLNR position should be committed to coordinating recovery efforts and working with involved agencies and individuals. Species recovery requires cooperation; no single agency or organization can do it alone.

Priority:

Empower USFWS and DLNR to enter into all areas where listed threatened and endangered species occur in order to monitor and manage populations.

Rationale:

Threatened and endangered species are public resources. State and federal endangered species statutes require appropriate government agencies to conserve these species. Conflicts have arisen over the fundamental issue of managing public resources on private land. Government conservation efforts, including surveying, monitoring, and management, may be precluded by denial of access to habitat on private property and other legal restrictions.

Priority:

Conduct a comprehensive review and analysis of the State's endangered species statute (Hawaii Revised Statutes Chapter 195D and implementing rules), including an assessment of necessary resources to implement the statute adequately.

Rationale:

Pursuant to the federal Endangered Species Act, the State is required to maintain an adequate program for conserving threatened and endangered species in order to receive federal assistance such as Section 6 funding. The State's endangered species statute is not consistent with, nor is it up to the standards set by the federal statute. For example, DLNR's duty to list species is discretionary; there is no provision in the state statute for critical habitat designation; the statute makes no reference to federally designated critical habitat; there is no requirement that state agencies consult DLNR where agency or private applicant actions may adversely affect listed species; there is no time limit within which DLNR must act on petitions to list species; and there is no citizen lawsuit provision.

Priority:

Implement Act 82 of 1987 (Hawaii Revised Statute Chapter 195D-5.1), which requires DLNR to amend the state Conservation District boundary to include high quality native forest and habitat for rare native species of flora and fauna.

Rationale:

High quality native forest provides habitat for rare and listed species and watershed cover. Some of the essential habitat for listed endangered Hawaiian birds, identified by USFWS in recovery plans, is zoned as state Agricultural District and should be designated Conservation. Similarly, watersheds should also be conserved and protected. Appropriate state forested areas should also be designated as state Forest Reserve.

Priority:

Designate the nearshore waters off Kilauea Point, Kaua'i as a state Marine Life Conservation District, and explore the possibility of designating additional marine habitat.

Rationale:

The unique marine environment at Kilauea Point is noted for the spectrum of native species occurring there, including seabirds, turtles, monk seals, spinner dolphins, humpback whales, and fish. Designation will enhance protection and management, and increase public awareness of this special area. The designation of additional areas, including estuaries, needs to be explored by the state Division of Aquatic Resources, DLNR, in order to properly manage these environments.

* * *

For more information on HAS conservation matters, please call Marjorie Ziegler, HAS Conservation Committee, 528-1432.

MAHALO DONORS!

The Hawaii Audubon Society thanks the following members and friends for their generous contributions. The list reflects donations received from 15 April 1990 through 6 May 1990.

Geraldine Anderson, M. Anne Anderson-Metcalf, Guy Arakaki, Daryl Arita, Suzanne Aw, Elizabeth Behn, Al Blakeslee, Yvonne Bringual, Diane Brown, Lesley Anne Bruce, Hinano Bruner, Phillip and Andrea Bruner, Ellen Bruno, Pat Buckman, Lynn Carey, June Chang, Brenda Clawson, Computer Associates International, Inc., Satoru Doi, Bernard Eilerts, Thomas Foster, Deborah Frankum, Jamie Fry, Christine Gehrett, Barbara Green, Nancy Guthrie, Patricia and Howard Hall, Victoria Hill, David Hudson, Chet Hunt, Andrew and Jennie Lee In, Dottie Jackson, Lois Janis, and Kimberly Jenkins.

Also, Jerry Kane, Jim and Penny Kitchens, Edmond Kok, Dana Kokubun, John Mallen, Lori Mapes, Marla McDowell, Helen Mohlie, R. Eugene Mohlie, Ted Mohlie, Robert Morrisey, Wendy Music, Dean Naito, Joyce Neeley, Sondra Lee O'Connor, Tim Ohashi, Dan and Geri O'Leary, Ferne Orlik, Jacki Poulson, Sandra Roberts, Dr. Gary Ryan, Dr. Fredrick Sands, Paul Spaulding, Suzanne Winckler, Gary Yasui, Sharon Yoder, and Clayton Yoshizawa.

BEQUESTS

A bequest to the Hawaii Audubon Society is an excellent way to help in our conservation efforts. George C. Munro, enthusiastic and tireless field ornithologist and naturalist, provided for a fund to be used exclusively for the protection of native dry forests. Today, the George C. Munro Fund provides money for research projects on such forests. 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, Hawai'i, 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, 212 Merchant Street, Room 320, Honolulu, HI 96813, (808) 528-1432.

ENVIRONMENTAL DIRECTORY AVAILABLE

The Hawaii Audubon Society recently published the *Hawai'i Green Pages*, a directory compiled in celebration of Earth Day 1990. The directory lists over 150 environmental efforts in Hawai'i. For a free copy, send a self-addressed stamped #10 envelope to Directory, Hawaii Audubon Society, 212 Merchant Street, Room 320, Honolulu, HI 96813.

**JUNE FIELD TRIP:
MANANA ISLAND KAYAKING**

Hawaii Audubon Society members will kayak to Manana (Rabbit) Island, off Windward O`ahu, on Sunday, 24 June 1990 instead of the originally scheduled 17 June. The field trip was announced in the January 1990 issue of 'Elepaio (Vol. 50(1):4). All 15 openings for the trip are filled. Participants, who made reservations, will meet at the Makai Pier in Waimanalo at 7:30 A.M. Features will be Large Sooty Tern, Brown Noddy, and Wedge-tailed Shearwater breeding colonies, other seabirds, and possibly marine mammals and sea turtles. Bring swimming attire, tabi or old tennis shoes, a hat, sunscreen, binoculars, camera, water, lunch, and your \$20 fee.

**TO APRIL FIELD TRIP
PARTICIPANTS: AN APOLOGY**

The Hawaii Audubon Society Field Activities Committee apologizes to those who turned out for the Palikea hike on Sunday, 22 April. The hike had to be cancelled, and the committee was unable to contact everyone.

**SPECIAL OFFER FROM
BIRD WATCHER'S DIGEST**

Bird Watcher's Digest, a bimonthly magazine which features birds and birding, has made a special offer to Hawaii Audubon Society members. HAS will receive half of all new subscriptions generated by the chapter.

Articles in recent issues covered such diverse subjects as the common barn owl, recognizing bird watchers, how to clean your binoculars, birders and hunters, to feed or not, how to photograph birds in flight, teaching children about birds, the forest birds of Hawai'i, the Hawaiian Stilt, growing up without a field guide, and stories on various species of birds.

If you wish to subscribe, send a \$15 check payable to the Hawaii Audubon Society, along with your name and address, to the Hawaii Audubon Society, 212 Merchant Street, Room 320, Honolulu, HI 96813. Hawaii Audubon receives \$7.50 from each subscription.

FILING CABINET NEEDED

Once again we are looking for a new or used four-drawer filing cabinet. Please call the office, 528-1432, and leave a message if you can donate one. All contributions are tax deductible to the extent allowed by law.

**JUNE PROGRAM: EVOLUTION OF
HAWAIIAN PLANT SPECIES:
IMPACTS OF ALIEN SPECIES**

Dr. Charles Lamoureux, Professor of Botany at the University of Hawaii, Manoa, will speak on the evolution of Hawaiian plant species and the impacts of alien species at the Hawaii Audubon Society General Meeting on Monday, 18 June. The meeting in the Atherton Halau at the Bishop Museum begins at 7:30 P.M. All are welcome, and refreshments will be served.

HAWAII AUDUBON SOCIETY
212 Merchant Street, Room 320
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CALENDAR OF EVENTS

- June 11 (Mon.) HAS Conservation Committee Meeting at the HAS office at 6:00 P.M. Call Marjorie Ziegler for details, 528-1432.
- June 11 (Mon.) HAS Board Meeting at the HAS office at 7:00 P.M. Call M. Casey Jarman for details, 948-9789 (wk), 263-4070 (hm).
- June 16 (Sat.) Wildlife Art Exposition and Sale, and Opening Night Gala, 5 to 9 P.M. Pacific Island Arts Gallery, North Shore Marketplace, Hale'iwa. See Page 52.
- June 18 (Mon.) HAS General Meeting at the Bishop Museum Atherton Halau, 7:30 P.M. Program: Evolution of Hawaiian Plant Species: Impacts of Alien Species, by Dr. Charles Lamoureux, 7:30 P.M. See Page 57.
- June 24 (Sun.) Kayaking trip to Manana Island. See Page 57.

HAWAII AUDUBON SOCIETY
212 MERCHANT STREET, ROOM 320
HONOLULU, HAWAII 96813



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The Status of Harcourt's Storm-petrel (*Oceanodroma castro*) in Hawaii

Craig S. Harrison, Thomas C. Telfer, John L. Sincock 47

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