



## Interpreting Abnormal Coloration in Endemic Hawaiian Birds

Jack P. Hailman

It is important to report and designate abnormally colored birds accurately so that we can learn more about the pigmental and genetic bases of avian coloration. As L.A. Freed (pers. comm.) pointed out, for example, "some of the spectacular geographic variation in coloration of Hawaiian birds . . . might be more interpretable if color abnormalities of different populations were correctly designated." The difficulty of correctly naming and interpreting color abnormalities is that no authoritative reference is easily accessible. Buckley (1982) presents an excellent review but is unfortunately not accessible to many field observers; Harrison (in press) will provide a somewhat more accessible reference. Recently this general problem of naming and interpreting was addressed with reference to an abnormally colored bird designated as "xanthochroic," whereas its abnormality was really of a different nature (Hailman 1984). Here I draw attention especially to problems arising with regard to the term "albino."

A true albino is an animal without pigmentation, as in human albinos whose only evident color is created by red blood within the eyes. Buckley (1982) has attempted to straighten out the terminology of avian coloration, and as he puts it (page 65) "Albinism is all or nothing, and a bird can be no more a 'partial albino' than a female mammal 'partially pregnant.'" The modification of the term albino is traceable to the influence of Gross (1965) who used but did not explicitly define four "kinds" of albinism: "total or pure" (true albinism), "incomplete" (apparently leucism, or white plumage), "imperfect" (probably a variety of phenomena), and "partial" or leucistic feathers (Hailman and Emlen in press). Recently Johanos and Breese (1984) reported an "albinistic" 'Amakihi (*Hemignathus virens*) in their title, referring to the bird as a "partial albino" in the text. Fortunately, the authors describe the bird in reasonable detail so that the nature of its color abnormality can be interpreted. Other authors are not always so careful, merely designating a bird as "albinistic" and letting it go at that so that the report is not useful to science.

The 'Amakihi showed a condition known as "schizochroism" (split-color), in which one or more pigments are absent, leaving behind one or more pigments that therefore alter the perceived color of the bird. In the case of the 'Amakihi, the disappearance of the black lores, the alteration of the black iris to light brown, the change from gray tarsus and feet to brilliant orange, and the lightening of the gray bill all suggest that the deleted pigment is eumelanin. Therefore, the bird shows non-eumelanin schizochroism.

The absence of eumelanin reveals other coloration, which in conjunction with the eumelanin, gives the species its normal color. The white back (leucistic feathers) and absence of black or gray

lores suggests that normal coloration of these parts is due largely to eumelanin. The brown iris suggests that the other eye pigment is phaeomelanin. The yellowish underparts, peach-colored head and neck, and orange tarsus and legs implicate carotenoids such as xanthophylls, or possibly other pigments (see Table 4-II in Hailman, 1977: 98). Of course, it is not possible to rule out the deletion of another pigment in addition to eumelanin in the reported 'Amakihi; further reports of abnormally colored birds would help clarify the normal pigmental basis of coloration.

The whitish 'Apapanes (*Himatione sanguinea*) seen on the Big Island in the 1970's (van Riper and van Riper 1978) were apparently similar but more complicated cases of schizochroism. The first individual, present from late 1973 to November 1975 was well described; the four birds seen on 20 December 1976 were mentioned only as "partially albinistic." Much of the normally red plumage of the first individual was white, although other parts were orange, and the normally black tarsi and feet were salmon. The bill was its normally black color. The interpretation of this bird is therefore difficult. It would appear that eumelanin was absent from the tarsi and feet but not the bill. Melanins can also contribute to red coloration, but it seems likely that the bright red of the 'Apapane is due to carotenoids. Leucistic feathers of the wings, lower chest and areas of the back therefore suggest deletion of a pigment other than melanin, but the orange color of other plumage could be due either to dilution of the normal red-producing carotenoid or the presence of a second carotenoid remaining after absence of the first. In fact, this particular 'Apapane is perhaps the most interestingly colored individual of any abnormal songbird that I have encountered in the literature. Perhaps if other observers noted details of the four 'Apapanes seen in late 1976 (which might have been relatives of the original bird), they could now come forth with this useful information.

The remaining native Hawaiian species for which abnormal coloration has been reported is the 'Elepaio (*Chasiempis sandwichensis*) described by van Riper (1974) from Mauna Kea. This bird had white plumage and a light bill, but the feet were reported only as "not the pale pinkish color of a true albino." The eye color was not recorded. It therefore appears that the plumage of this bird was totally leucistic and the soft-part colorations may have been normal. Such leucistic birds are fairly commonly reported (Buckley 1982: 65-67), and reveal mainly the tendency of plumage and soft-parts to be under separate genetic control.

In a sense, the study of color abnormalities in wild birds is beginning anew because the older literature such as Gross (1965) lumped heterogeneous cases under ill-defined rubrics of little analytical value. Almost every abnormally colored individual of



any species reveals something new, but as I argue elsewhere (Hailman 1984) reports need to describe coloration as completely as possible and to avoid applying terminology that either has no useful meaning or implies inappropriate interpretations. It seems especially important to avoid misleading terms in titles, as these will be used as "key words" in computer index searches.

#### Acknowledgements

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## HONOLULU CHRISTMAS BIRD COUNT -1984-

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The annual Honolulu Christmas Bird Count was taken on 16, December 1984; this was the 41st consecutive year for the count. Participants counted more than 25,000 wild birds of 46 species within the Count area, which is a circle 15 miles in diameter centered about half a mile east of the Nuuanu Pali overlook. Weather was fine with little wind in the morning, becoming more cloudy with some scattered rain showers in the late afternoon.

Sixty-four observers took part this year, down somewhat from last year's 94. They worked in 30 parties and spent 142 party-hours afield, both figures slightly lower than last year but higher than in any year prior to 1983. The counters spent 47% of their time in parks and residential areas, an increase in percentage over last year while time spent in each other habitat types declined. Sector 6 (from Diamond Head to Hawaii Kai, including several mauka trails) had 27 and one-quarter hours of observation by four parties, much more coverage than in recent years.

The total of 25,809 individuals was well above the highest previous counts of 22,000+ recorded last year and in 1967. However, this year's total included more than 3500 birds (an estimated 3000 Zebra Doves and 500 Spotted Doves, Mynas and Cattle Egrets) found at the Carl Meier dairy farm in Waimanalo, which had not been covered in previous years. Without these birds, the 1984 total would have been about the same as in 1983 and 1967.

The 46 species tallied this year is in the range of 44 to 48 species recorded in each of the past four years. The most interesting species found this year were Ruddy Ducks, two of which were discovered and studied well at Heeia Marsh by Marie Morin, Fern Duvall and Joel Simasko. The observers are familiar with this bird on the mainland, and submitted an excellent sketch and detailed observational notes. The birds could not be found again later that day, nor subsequently. Ruddy Ducks have been recorded in Hawaii only a few times, and never before on a Christmas Count.

Another observer glimpsed a swift-like bird about half-way to the summit along Halawa Ridge Trail, where Gray Swiftlets have been observed twice before on the Hono-





## HONOLULU CHRISTMAS COUNT - 1984

	Sectors	1	2	3	4	5	6	7	8	9	10	Total
Brown Booby	.	.	.	.	.	.	.	.	.	1	.	1
Red-footed Booby	.	.	.	.	.	.	.	.	.	624	.	624
Great Frigatebird	.	.	.	.	.	1	1	.	15	.	.	17
Cattle Egret	2	2	.	.	.	.	68	234	108	63	.	477
Black-crowned Night-Heron('Auku'u)	.	1	1	.	1	4	2	28	34	5	.	76
Hawaiian Duck(Koloa)	.	.	.	.	.	.	10	.	.	1	.	11
Ruddy Duck	.	.	.	.	.	.	.	.	.	2	.	2
Gray Francolin	.	.	.	.	2	.	.	.	.	.	.	2
Ring-necked Pheasant	.	.	.	.	.	.	6	.	1	.	.	7
Common(Hawaiian) Moorhen	.	1	.	.	.	.	.	11	.	1	.	13
American(Hawaiian) Coot	.	6	1	.	.	.	.	22	1	10	.	40
Lesser Golden-Plover	4	239	73	49	37	219	82	149	286	221	.	1359
Semi-palmated Plover	.	.	.	.	.	1	.	.	.	.	.	1
Black-necked(Hawaiian) Stilt	.	.	.	.	.	4	.	14	69	.	.	87
Wandering Tattler	.	1	.	.	.	5	2	3	10	1	.	22
Ruddy Turnstone	.	14	.	.	.	26	2	12	174	67	.	295
Sanderling	.	.	.	.	.	3	.	.	16	.	.	19
Dunlin	.	.	.	.	.	.	.	.	2	.	.	2
Black Noddy	.	.	.	.	.	1	.	.	1	.	.	2
White Tern	.	.	.	.	9	.	.	.	.	.	.	9
Rock Dove	.	126	.	35	.	31	151	133	5	41	.	522
Spotted Dove	11	339	73	133	181	182	354	1033	187	157	.	2650
Zebra Dove	42	1066	218	283	683	606	3414	779	140	393	.	7624
Barn Owl	.	.	.	.	.	.	.	1	.	1	.	2
Eurasian Skylark	.	6	.	.	.	.	.	.	.	.	.	6
Red-vented Bulbul	85	319	103	34	105	309	308	287	165	336	.	2051
Red-whiskered Bulbul	10	29	142	29	10	25	.	.	.	.	.	245
Japanese Bush-Warbler	6	.	7	.	.	5	8	.	.	57	.	83
Oahu 'Elepaio	3	.	.	.	.	13	.	.	.	.	.	16
White-rumped Shama	31	35	49	13	6	38	31	8	5	49	.	265
Melodious Laughing-thrush	.	.	.	.	.	.	1	.	1	3	.	5
Red-billed Leiothrix	.	.	2	.	.	.	10	.	.	.	.	12
Northern Mockingbird	.	8	3	.	2	3	1	.	.	.	.	17
Common Myna	3	797	38	177	426	492	394	783	266	235	.	3611
Japanese White-eye	149	225	227	34	45	173	65	106	62	149	.	1235
Northern Cardinal	13	35	48	6	8	48	27	42	29	33	.	289
Red-crested Cardinal	.	92	45	54	49	59	19	57	43	33	.	451
House Finch	50	91	57	13	88	110	26	29	46	13	.	523
Yellow-fronted Canary	.	1	.	.	17	8	.	.	.	.	.	26
Oahu 'Amakihi	28	16	5	2	.	8	.	.	.	.	.	59
'Apapane	93	.	1	.	.	2	.	.	.	.	.	96
House Sparrow	.	788	73	75	225	351	245	165	115	132	.	2169
Orange-cheeked Waxbill	.	.	.	.	.	.	.	.	7	.	.	7
Red Avadavat	.	.	.	.	.	.	.	1	.	.	.	1
Nutmeg Mannikin(Spotted Munia)	4	43	47	16	.	33	23	94	44	83	.	387
Java Sparrow	.	176	49	6	24	121	2	13	.	.	.	391
No. of Individuals	534	4456	1262	959	1918	2881	5252	4004	2457	2086	.	25,809
No. of Species	16	25	21	16	18	29	25	23	28	24	.	46
Party-hours	17.5	21.75	14.25	7.25	5.5	27.25	10.75	16.25	9.75	11.75	.	142

Moku Manu Island(outside Count circle): Masked Booby, 8; Brown Booby, 27; Red-footed Booby, 161; Great Frigatebird, 349. Total: 545 individuals, 4 species, 0.75 party-hours.



lulu Count, but the view was too short for certain identification. The Red Avadavat was found at the edge of Kawainui Marsh, near where it was found in '83 and '77.

The 7624 Zebra Doves was by far the highest total ever recorded for any one species on the Honolulu Count. Even without the 3000 birds at Carl Meier Dairy, the total would still have been a new record high for Zebra Doves but not as high as totals which have been recorded for Mynas and Sooty Terns once or twice in the past. Other species with totals over 1000 this year were Common Mynas (3611), Spotted Doves (2650), House Sparrows (2169), Red-vented Bulbuls (2051), Lesser Golden-Plovers (1359) and Japanese White-eyes (1235). Other than the two dove species, only White Terns (9 vs 8) and Dunlin (2 vs 1) had new all time high counts this year. Totals for Ring-necked Pheasants (7), Gray Francolins (2) and Common Barn-Owls (2) equaled their previous high counts. The nest tree of another Barn-Owl, with a headless dead rat on the ground below, was found on Makiki Loop Trail. The 12 Red-Billed Leiothrix (10 on Old Waimanalo Road, 2 on Manoa Cliffs Trail) was an astounding number for recent years. The species has been found on only about half of the counts since 1969, and then no more than three in any one year. Prior to 1968 totals usually were over 100, and in 1955 Leiothrix was the third highest species with a count of 462.

Spotted Doves, Zebra Doves, Red-vented Bulbuls and Common Mynas were found by every party, excepting one party inside Diamond Head which was able to record only one species amidst an enormous number of tourists. Japanese White-eyes and Northern Cardinals were missed by only one and two parties, respectively. Bulbuls continue to increase each year along the mountain forest trails and all the way to the summit of the Koolaus.

Counts of the native forest birds 'Elepaio and 'Apapane were within the usual range of recent years, but the 'Amakihi total was the lowest in ten years. A bird heard along Halawa Ridge Trail sounded very much like an 'I'iwi, but not quite close enough to be sure it wasn't an unusual Apapane, or a Shama imitating an 'I'iwi.

Escaped cagebirds listed this year included an Orange-fronted Conure, a Senegal Parrot, Two Rose-ringed Parakeets, and two White-fronted Amazons (all in Kapiolani Park), and two unidentified parakeets in Hawaii Kai. Only one Indian Hill Myna and no cockatoos were found in Lyon Arboretum. Several domestic chickens, peafowl and geese were found, along with 19 Muscovy Ducks and 171

feral Mallards.

The Halawa Trail party also conducted a butterfly count. In the lower portion of the trail they found three Bean Butterflies and two Gulf Fritillaries. In the higher alien and native forest they found two Gulf Fritillaries, seven Kamehameha Butterflies and three Blackburn Butterflies. The latter two species are endemic, and are the only butterflies native to Hawaii.

#### SECTORS COVERED

- 1-A: Aiea Trail: John Obata, Susan Schenck
- B: Halawa Ridge Trail: Frank Howarth, Frank Howarth III, Russell Cole
- 2-A: Keehi Lagoon, Kalihi, Ft. Shafter, Moanalua Park, Tripler: Peter Donaldson, Ralph and Nancy Martin
- B: Kapalama, Alewa Trail: Chuck Burrows, Leimomi Akana
- C: Nuuanu, Iwilei: Betty and Arthur Joao, Janice and Paul Sweet, Jack Mitchell
- 3-A: Manoa Cliffs (west), Aihualama Trail, Manoa Falls Trail, Tantalus/Round Top Drive: Wayne Gagné, Allen Allison, Jill Sondeen
- B: Makiki Environmental Education Center, Makiki Loop Trail: Faith Roelofs, Diane Trembly, Ed Twelker
- C: Punchbowl: George Campbell, Betty Johnson, Mitchel Oliphant
- 4-A: Ala Moana Park, Ft. DeRussy: same party as 3-C
- B: Manoa Valley, University: Sheila Conant
- C: Lyon Arboretum, Paradise Park: Leilani Pyle
- 5-A: Honolulu Zoo: Peter Luscomb, Laura Carter, Lillian Bloomfield
- B: Kapiolani Park, Nala'au Arboretum: Mike Ord
- 6-A: Diamond Head Crater (inside): Mike Ord
- B: Palolo to Paiko Lagoon: Andrew and Mary Engilis, Suzan Harada, Mae Ikara, Althea Marrack (feeder)
- C: Waialae Iki Ridge: Jim and Cynthia Krakowski, Maura O'Connor
- D: Hawaii Kai: Jay Munns
- 7-A: Old Waimanalo Road, Bellows Air Force Station, Waimanalo: Robert Pyle, David Woodside, Phil Bruner
- B: Maunawili: Richard and Kendall Smith
- 8-A: Lanikai: Carl, Clarence, and Edna McIntosh, Mary Grantham
- B: Kaelepulu Canal: Helen Sing, Marlene Lemke (by canoe)
- C: Kawainui Dyke, Kailua: Don, Doris and Colin Huddleston, Adam Blenham



- D: Kawainui Marsh, Quarry Road, Kapaa  
Landfill: John Engbring, Darcy Hu,  
Celestino Aguon
- 9-A: Mokapu Peninsula, Kaneohe makai:  
Ronald Walker
- B: Moku Manu (outside Count circle):  
Ronald Walker
- 10-A: Ho'omaluhia Park: Martha McDaniel,  
Boyd Bond (part by horse)
- B: Old Pali Road, Pali Golf Course, Hawaii  
Loa, Hawaii Mem. Cemetery, Heeia Marsh:  
Marie Morin, Joel Simasko, Fern Duvall
- C: Haiku to Kahaluu to Heeia: Tim Burr,  
Alan Samuelson, Dennis Hodsdon

Sixty-three observers in 30 parties plus one observer at feeder. Total party-hours, 142 (94.25 by foot, 42.25 by car, 4 by canoe, 1.5 by horse). Total party-miles: 465 (91.5 on foot, 369.5 by car, 2.5 by canoe, 1.5 by horse).

Habitat coverage (% of party-hours): parks and residential 47%; lowland woods and scrub 23%; mountain forest 19%; marshes, ponds, canals 8%; beach and ocean 3%.

## NO NA LEO 'OLE

### USDA TRI-FLY ERADICATION PROGRAM UPDATE

The California Department of Food and Agriculture (DFA) has emerged as the main proponent of the USDA eradication program which is intended to prevent the spread of Med-fly to the mainland from Hawaii. Some of the California DFA's views were outlined in a Los Angeles Times article by Bill Curry:

"We strongly support (spraying malathion)," said Rex Magee, associate director of the Department of Food and Agriculture in California, where it is widely believed, though not proven, that Hawaii was the source of California's Medfly infestation in 1980-82. "We spend in excess of \$20 million a year to keep out and detect fruit flies.

"Most originate in Hawaii... only a few hours from us. They say in Hawaii you can't eradicate them and that it's environmentally harmful. We used malathion and there were no problems...

"We put pressure on Congress to provide funds for an environmental impact statement and to provide the methodology (for an eradication program)," said Magee... "California put its muscle behind tri-fly eradication to get it done."

Clearly, the California DFA represents that state's agribusiness and not Hawaii's welfare. Our own State Department of Agriculture (DOA) has urged the USDA to find alternatives to aerial spraying of malathion to rid the islands of the three species of crop-damaging fruit flies. The DOA recommended the use of biological control, sterile fly releases, and ground application of malathion, as opposed to aerial spraying.

There is a serious danger in advocating any eradication methods for Hawaii at this time. For example, current technology of sterile fly release programs is seriously flawed and more research is needed before this should be attempted in Hawaii on a large scale. Irradiation affects the intricate pre-mating behavior of flies, thereby necessitating the release of thousands of flies to assure successful mating behavior in a few flies. This is "swamping," and considering the astronomical numbers of treated flies released, it means that even a very small percentage of genetic flukes and fertile survivors translates into considerable numbers of "unplanned" flies over-all. As released, "sterile males" are 50% females, contain a certain small portion of fertile flies, and have been subjected to mutagenic radiation; experts believe that it is possible to breed a "Superfly."

Malathion, too, has its serious problems. It is a nerve poison toxic to a wide range of both terrestrial and aquatic animals, and thus poses a real threat to our health and the health of the environment. Non-targeted insects and, therefore, insectivorous birds would be affected. Native plants dependent on insect pollinators would be negatively impacted, as well as fruit crops dependent on pollinators. Honey bees were wiped out in areas of California aerially sprayed with malathion during the 1981-1982 med-fly outbreak--contrary to the idea that "there were no problems" associated with the pesticide there. One concern of biologists is that a trial tri-fly eradication program carried out on the island of Lanai from 1973 to 1976 may have eliminated that island's 'Amakihi population.



A grave danger of the USDA deciding to use any sort of eradication method in Hawaii, such as sterile fly releases, is that if it fails, which is highly likely with current technology, the USDA may choose to aerially spray pesticides after all. It appears that the USDA can supersede Hawaii State's wishes in this matter. Carl Christensen, HAS conservation chair, stated, "In short, we in Hawaii are being asked to subject ourselves to a giant experiment in which we would bear many of the economic costs and all of the environmental costs of a project that is uncertain to succeed in any event and that would, if successful, be of principle benefit to somebody else."

Curry's LA Times article also points out that Hawaii's wishes could be overridden by federal interests:

According to E.J. Stubbs of the Department of Agriculture's Animal and Plant Health Inspection Service, plans to eradicate the fruit flies from Hawaii have been "discussed and cussed" for years. But with the California Medfly invasion, which took more than \$100 million and repeated sprayings of malathion to protect state citrus crops, support for eradication gained new impetus.

Final approval to go ahead with program would be made by Congress, which would have to appropriate funds to carry out the spraying program, Stubbs said.

It is unclear what role the state of Hawaii could play in any decision to eradicate the flies, but a 1957 law passed by Congress gives the Agriculture Department the responsibility to prevent the spread of pests within the United States.

Curry's article cited many of the expert objections to the tri-fly eradication program:

Critics of the effort say that the deep, steep valleys of Hawaii, littered with the fruit of guava, are a natural breeding ground for the flies, and eradication proposals are doomed to failure. The Hawaiian Entomological Society, calling eradication a "monumental task," says flatly that "no such scheme has succeeded in the past."

"To eradicate, as they apparently did in California--that's not the same as trying to eradicate it here," said Hampton Carson, a professor of genetics and pioneer researcher in the evolution

of native Hawaii insects.

Carson warns that uncounted native species could be devastated by malathion while the fruit flies live on.

Magee disagrees. "That's simply not true," he said in a telephone interview from Sacramento. "If they say it won't eradicate the fruit flies how can there be eradication of (beneficial insects)? I agree there will be some effect on non-target species with spraying, but when you switch to sterile fly releases, the sterile fly is insect-specific."

Continuing, Curry detailed reactions of Hawaii residents to the proposed eradication:

At the public hearings on the draft environmental report, citizens with photocopies of their statements in hand came forward to protest the spraying of malathion on their gardens, in their water, and on the land they have come to revere.

"It was like a movie queue down at the Xerox," said William S. Merwin, a Pulitzer Prize-winning poet who was one of 250 residents to attend the meeting.

"I object to having our water, or anybody else's, poisoned for the profit of some agribiz speculator in California, or some petrochemical company in Texas," Merwin said. "I object to having every living thing around me dosed for six years with poison for the sake of the income of citrus producers somewhere else or for chemical manufacturers..."

Others who testified hinted that still others might resort to violence to prevent malathion spraying, or deliberately send Medflies to the mainland in retaliation.

The state's papaya industry, which would be the prime island beneficiary of fruit fly eradication, says it supports the program but "not at the expense of the general public and the environment." The sugar industry has opposed it for fear that malathion would kill off bugs that are beneficial to the sugar crop.

In contrast, California DFA feels their agribusiness interests must be protected. Curry quotes:



"A lot of federal money is spent (on fruit fly inspection) and it's useless," said California's Magee. "It's difficult to set up the kind of inspection program that will protect California. Sooner or later we're going to have to tighten down on inspections, and that's going to cause Hawaii a lot of problems...The option is to isolate Hawaii."

The L.A. Times article included comments on genetic engineering:

Carson, the geneticist, for one feels safer methods will ultimately be available. "I'm not saying it's not a problem," he said. "But we now have some possibility of genetically engineering, to engineer the self-destruction of the flies. Look, let's wait. It would be nice to be rid of these flies but we might be able to get a method that's environmentally clean."

"It's the insecticide that's the basis for my opposition," Carson said. "There's no question (beneficial native insects) would be very seriously damaged and perhaps exterminated. In addition to those, there's a whole fauna in miniature in these forests, which have evolved entirely differently on each island. The destruction of the insects would be followed by a decline in native birds, many of them already on the endangered species list. Many of them feed on these insects. That ecosystem is...unique."

"To destroy that is to destroy the natural legacy of Hawaii. It ought to be preserved."

March 26, 1985 is the extended deadline for responding to the draft environmental impact statement for the eradication of the tri-fly complex from the state of Hawaii. Please send your comments to Mr. E. J. Stubbs, USDA-APHIS, 638-FB, 6505 Belcrest Road, Hyattsville, Maryland 20782.

Writers can remind Mr. Stubbs that many Hawaii residents will protest vigorously against this disruption to their lives and environment. (*Editors note: see also the article by Wayne Gagné in the January issue of 'Elepaio, Vol. 45, No. 7).*

Please also write our U.S. Senators Spark Matsunaga and Dan Inouye and our U.S. Representatives Daniel Akaka and Cecil Heftel

and urge them to vote against funding the Tri-fly eradication program. Urge that funding be appropriated only for research into new directions of technology, such as for genetic approaches of eradication and for non-pesticide methods of treating outbreaks in California.

#### HAPU'U FARMS AND THE BISHOP ESTATE

Hapu'u Farms, a company owned by the Bishop Estate, has filed an application with the U.S. Fish and Wildlife Service (USFWS) under the provisions of CITES to export tree fern trunks from Hawaii to Japan. The proposed harvest area is agriculturally zoned land at Keauhou Ranch and the adjoining conservation zoned forest (Kilauea Forest Reserve) both owned by the Bishop Estate, just west of the Ola'a Tract section of Hawaii Volcanoes National Park.

The proposed amount of hapu'u to be harvested is 3 million cubic meters. Based on research by Dr. Richard Becker, Dr. Charles Lamoureux (professor of botany at University of Hawaii-Manoa and fern authority) has determined that this volume of hapu'u would require the complete harvesting of tree ferns from almost 40 square miles of forested land. He stated in a letter to Dr. Bruce MacBryde of the USFWS that "the project would result in the destruction of nearly 40 square miles of Hawaiian rainforest harboring 1 endangered plant (and several other which are candidates for listing) as well as 4 endangered passerine birds and the endangered hawk." The Hawaii Creeper, Hawaii 'Akepa, 'Akiapola'au, and 'O'u are the four endangered passerine birds that will be affected if a permit for this harvesting is given.

#### PUUWAAWAA NATURAL AREA RESERVE

The decision to designate a Natural Area Reserve at Puuwaawaa was deferred until the next meeting of the Natural Area Reserve System (NARS) commission in March. The proposal before the NARS commission was for only a small Natural Area Reserve. Rick Warshauer asked the NARS commission to consider an area large enough to include an adequate sample of many of the successional stages of dry forest development that are left, so as to preserve the dynamic processes that occur on relatively young lava flows, not simply the mature forest stage. He reminded the commission that this was the last place on state lands where these particular plant communities existed, and that similar forest types on nearby lands were succumbing



to development or had been destroyed by past fires. The commission decided to consider this proposal and make a decision on the boundaries of the Puuwaawaa Natural Area Reserve at their next meeting.

In another NARS issue, Bob Lee, NARS Administrator, reported to the commission that Biopower, the firm woodchipping Campbell Estate land in Puna, had twice gone into the adjoining Wao Kele O Puna Natural Area Reserve. They bulldozed a road a mile into the heart of the Reserve at one point, and bulldozed and chipped forest along the south margin of the Reserve before having it surveyed, apparently straying into the Natural Area Reserve in the process. We hope that these violations, reported and investigated last November, are followed up by prosecutions and fines.

#### THE CHIPPING GOES ON

The Fifth Pacific Science Inter-Congress met recently in Manila, Phillipines. This group of scientists passes five resolutions. One of these dealt with the resource use conflict created as a result of the chipping of native ohia forests for electrical power production. The resolution called for a "respect for environmental values and concerns" in energy production and further called for "natural energy resource development with good conservation practices". It also called upon the Hawaiian business community, upon being informed of the scientific, educational, and cultural resource values of such native biota and ecological systems, to "turn its attention to less controversial bioenergy resources, such as non-native eucalypt trees originally planted for commercial purposes".

Dr. Dieter Mueller-Dombois, a world authority on ohia ecology, has asked Biopower Corp. to halt the chipping of one of the last remnants of lowland tropical rainforest in the United States. Dr. Mueller-Dombois has presented a scholarly report to Biopower's president, Mr. Warren Ramsey, on the uniqueness, as well as the ecological, educational, and cultural values of the forest being chipped.

The Office of Hawaiian Affairs has passed a resolution drafted by Moani Akaka requesting the recognition of "Hawaii's native forests as a significant environmental and natural resource to be preserved".

Yet, chipping is still ongoing on Campbell Estate land in Kalapana. Big Island representative, Andy Levin, has introduced House Bill 580, which would provide for a review of native forest on agriculturally

zoned lands before it can be logged.

*Libby Powell,  
Conservation  
Writer*

#### LETTER TO THE EDITORS

*(The Editors received the following letter, dated January 24, 1985, from the State Dept. of Agriculture.)*

We read with interest an article by Charles P. Stone and Danielle B. Stone entitled "The '10 Most-Wanted' Management Actions for Terrestrial Hawaiian Ecosystems: a Survey", published in the 'Elepaio, Vol. 45, No. 6, December 1984.

Of particular concern to us is the Sierra Club, Hawaii Chapter's proposed management action listed in Table 7 of the article: "Establish formal and open public review of proposals to import or release alien organisms within State or transport among islands where they do not now occur. Jurisdiction and authority to prohibit such proposals and including biocontrol agents shall be vested in an "Animal and Plant Species Advisory Commission," independent of any State Department and replacing similar bodies in the Department of Land and Natural Resources and the Department of Agriculture."

Since this proposed management action includes biocontrol agents, we would like to comment on this specific part of the proposal.

As you know, one of the major responsibilities of the Plant Pest Control Branch of the Department of Agriculture (DOA) is to biologically control Hawaii's major weed and insect pests. In attempting to accomplish this tremendous task, the DOA has been actively engaged in the importation and release of biocontrol agents. Many species of formerly serious pests have been brought under biological control in Hawaii. The control of the spiraling whitefly and Hamakua pamakani are examples of our recent successful projects.

Due to the adverse impact of pesticides, a greater number of people have advocated the biological method of pest control, such as for the control of clidemia, western flower thrips, banana poka and a recent immigrant insect, the sugarcane leaf-mining beetle.

The present system of review and recommendation to the Board of Agriculture by the scientific Advisory Subcommittee on Entomology and the Advisory Committee on Plants and Animals for proposals to release biocontrol agents from the DOA's quarantine facility for mass propagation and distribution in Hawaii



was developed to ensure that released agents will not adversely affect our environment. The DOA has been carefully following established State and Federal statutes, policies and procedures relative to the importation and liberation of beneficial species of bio-control agents.

The current DOA entomologists and members of the two advisory committees and the Board of Agriculture are keenly aware of the importance of protecting Hawaii's unique terrestrial ecosystems. Therefore, we are confident that all necessary measures are being taken to grant approval for release in Hawaii only those biocontrol agents that are beneficial.

For your information, enclosed are lists of members of the advisory committees and the Board of Agriculture.

Sincerely,  
PO-YUNG LAI, Ph.D.  
Head, Division of  
Plant Industry

*(The letter contained a list of the members for the Advisory Committee on Entomology, the Advisory Committee on Plants and Animals, and the Board of Agriculture. A list of these members is available from the Dept. of Agric.)*

## ANNUAL TREASURER'S REPORT 1984

Prepared by Norris Henthorne

Approved on 12 February 1985 by the Auditing Committee: Audrey Newman and Mary Engilis.

### HAWAII AUDUBON SOCIETY

Statement of income for the year ending 31 December 1984.

#### 1984 Revenue:

Dues	\$ 8430.55
Donations	1363.54
Hawaii's Birds (profit on copies sold)	13556.62
Guide to Hawaiian Birding	108.03
Field Checklist	45.37
Checklist	162.53
Endangered Waterbirds	3.25
Posters	10.49
'Elepaio, back issues	54.01
Tinker's List	3.00
T-shirts	30.00
Postcards	16.00
Interest	5472.01
Miscellaneous	387.40
<b>TOTAL REVENUE</b>	<b>\$ 29642.80</b>

#### 1984 Operating Expenses:

'Elepaio	\$ 10602.41
Office	1135.72
Telephone	85.54
Taxes	272.57
Assistance Grants	600.00
Research Grants	0
Professional Fees	0
Travel	869.95
Miscellaneous	137.62
<b>TOTAL OPERATING EXPENSES</b>	<b>\$ 13703.81</b>

1984 Net Income \$ 15938.99

#### Balance Sheet 31 December 1984

##### Assets

Checking Account	\$ 5035.47
Savings Accounts-Book Reserve	19866.71
-General	17768.48
-Funds	8895.94
-Life Reserve	7914.00
Inventory-Hawaii's Birds	38345.02
-Pacific Birds	15146.47
	<b>\$ 112972.09</b>

##### Equity

Retained Earnings from 1983	\$ 97033.10
Net Income from 1984	15938.99
	<b>\$ 112972.09</b>

## HAWAIIAN PLANT

### NEWLY LISTED AS ENDANGERED

On 4 December 1984, an eleventh Hawaiian plant was formally listed as endangered by the U.S. Fish and Wildlife Service. Hawai'i tree cotton, also known as Koki'o or Hau-hele'ula (*Kokia drynarioides*), is virtually on the verge of extinction; only about 15 trees are known to exist. The plant is endemic to the island of Hawaii, and has been driven to endangerment due to browsing and grazing by cattle and other ungulates, and seed destruction by introduced rodents such as the Roof Rat. Introduced fountain grass (*Pennisetum setaceum*) also inhibits regeneration of the tree cotton and intensifies the effect of wildfires.



## KAMMY WONG

It is with deep regret that we announce the February 16th passing of Kammy Wong, a long-time member and volunteer of the Hawaii Audubon Society. Mrs. Wong devoted much time to membership correspondence and mailing of the 'Elepaio, thereby serving both the Hawaii Audubon and National Audubon Society. A dedicated worker, she continued her volunteer work as long as possible, even while training her successors.

The Society extends its condolences to her family and friends.

## MARCH PROGRAM:

### MASSACHUSETTS BOBCATS

The guest speaker for the Monday, 18 March general meeting is Steve Berendson. Steve is currently working with the U.S. Fish and Wildlife Service in Honolulu. However, he did his M.S. thesis on Bobcats in Massachusetts, and will speak on the "Flora and Fauna of Western Massachusetts", emphasizing his experiences with and knowledge of the elusive Bobcat.

The meeting will be held at McCully-Moiliili Library at 2211 S. King St., Honolulu, at 7:30pm. As always, the public is invited to attend what will surely be an interesting program.

## MARCH FIELD TRIP:

### WAAHILA RIDGE

The Sunday, 10 March field trip will be along Waahila Ridge Trail. This trip will feature the usual introduced forest birds but participants will also see and/or hear native birds such as 'Elepaio, 'Amakihi, or 'Apapane. March is a good month for viewing the native forest birds.

Participants should meet at 7:30 am next to the State Library on Punchbowl St. in Honolulu. Be sure to bring binoculars, lunch or a snack, raingear, water, a hat, and sturdy hiking shoes. The trail does have some steep sections, so be forewarned! The trip leader is Peter Donaldson; call 456-5662 for more information.

## MANANA ISLAND FIELD TRIP REPORT

-MAY 1984-

On Sunday, the 20th of May, 29 intrepid people, led by Dr. Sheila Conant, braved marginal sea conditions to visit Manana Island. On arriving at the island, the party split into two groups, one of which climbed to the top of the crater and the other walked along the shore. About an hour and a half later, the two groups switched routes. As expected, the Sooty Terns dominated the scene throughout the day. Eggs, chicks, and even a few fledglings were seen throughout the colony. Many Brown Noddies with eggs and chicks were seen in their nesting grounds along the crater rim. Some Wedge-tailed Shearwaters were beginning their burrowing activities above the beach. Seven Red-Tailed Tropicbirds cavorted overhead, with at least one pair displaying courtship behavior.

All through the day, small groups of Red-footed Boobies passed between the mainland and the island. A total of two Great Frigatebirds were seen in flight, one of which was observed stealing food from a Red-Tailed Tropicbird. One White-Tailed Tropicbird was sighted, flying over at high altitude. A lone Black Noddy and one Wandering Tattler were seen, and our botanists pointed out several specimens of the native poppy, or pua-kala.

The susceptibility of these birds, who nest so close to civilization, was brought home to us by two incidents. While the group was snacking, a plastic bag was inadvertently allowed to be blown into the tern colony, where it scared up a number of birds every time it moved. The offending plastic was finally recovered near the edge of the colony. Near the end of the trip, a pleasure boat drew near the island, and aboard her was a family and their dog. The dog, apparently eager to play, left the boat and started swimming towards shore. Fortunately, our concerned leaders convinced the boaters to retrieve the dog before any harm was done to the colony. These events prove that extra care is required by everyone to help keep this sanctuary safe from human encroachment.

*Paul and Janice Sweet*



## ALOHA TO NEW MEMBERS

We welcome the following new members and encourage them to join in our activities:

Local: Bruce Bembridge, Calgary, Alberta; Mary Lou Berry, Carmel, CA; Helen M. Brown, Honolulu; William Burke, Kaneohe; Janice Calton, Solana Beach, CA; Coleen Cory, Honolulu; Tom Deibele, Portland, OR; Evelyn DePoister, Santa Monica, CA; Paula Dunaway, New York, NY; Joel Fithian, Santa Barbara, CA; Evangeline Funk, Honolulu; David Hale, Honolulu; Jack Holloway III, Ames, IA; Nadene Kemp, Hickam AFB; Arthur R. King Jr., Honolulu; Jack Leishman, Honolulu; Leslie Mahoney, Honolulu; Kenneth F. Marsick, Willowbrook, IL; William M. Mathews, Cupertino, CA; Steven Melander-Dayton, Wayzata, MN; Pohlman, Needham Hts., MA; Elizabeth Powell, Honolulu; Janet Rensel, Honolulu; Larry Sell, Dallas, TX; Mary Jane Schreiner, Kaneohe; William D. St. Clair, Minneapolis, MN; Jeffrey Stewart, Kaneohe; Roland F.S. Tam, Honolulu; Gen Tanabe, Waialua; George Tanabe, Waialua; Martha Tarantino, Makaha; Carl Taylor Jr., Aiea; Maria Tseu, Honolulu;

Joint with National: Rosanna Akland, Kailua; Nancy R. Albert, Kailua; Marjorie S. Alseth, Honolulu; L. C. Bowers, Lahaina; Mr. and Mrs. Robert Broom, Honolulu; Mr. Lione Carvalho, Volcano; Ila K. Cook, Honolulu; Charles S. Davis, Texas; K. A. Lingan Fischer, Pearl City; R. B. Fuller, Kihei; Barbara Goodell, San Diego, CA; James M. Grady, Honolulu; Thelma Grey, Honolulu; Hotel Hana Maui, Hana; Helen Hayaka, Waipahu; Mr. and Mrs. Ralph E. Hurst III, Honolulu; D. Ikuta, Honolulu; Irene Judd, Honolulu; Keith Keffer, Captain Cook; Unoyo Kojima, Honolulu; Deanna Lee, Honolulu; Pattie Libarios, Kealahou; James Longley, Schofield Barracks; Susan Mill, Honolulu; Michael Miller, Pahoa; James Morgan, Honolulu; Jivan Morgan, Lahaina; Fred S. Morse, Mililani; Elizabeth Nakamura, Lahaina; Minerva Ramos, Kaulapapa; Douglas L. Smith, M.D., Honolulu; Rebecca Solether, Honolulu; Christian Sorli, Honolulu; Carol Stevens, Kaneohe; Mr. and Mrs. Robert Strickland, Honolulu; Emily S. Toby, Kailua-Kona; Richard M. Towill, Honolulu; M. Tripoli, Honolulu; Mr. and Mrs. Kenneth Uyeda, Hilo; Mrs. Leonilda White, Illinois; Larry Wright, Honolulu; Nancy Worthington, New Jersey; Carole Ah Yat, Honolulu;

*Susan Schenck & Kammy Wong*

## MAUI FIELD TRIP:

## WAIKAMOI

There will be a field trip on Maui into the Nature Conservancy's Waikamoi Preserve, "Maui's Forest Bird Heartland". Reservations are required for this March 10 trip, as the number of participants must be limited. Call Terry Quisenberry, Preserve Manager 575-2747 or Mary Evanson 572-9724 to save a spot.

## VOLUNTEERS NEEDED

MAIL SALESPERSON

Person needed to send out Hawaii's Birds books and Hawaii Audubon pamphlets in response to mail orders. Orders are mostly for 1 or 2 copies, but some are bulk orders for the book. Person would need some storage space for small stock of publications, and be able to take the orders to a Post Office promptly for mailing. Occasionally there is the option to deliver bulk orders locally (to Bishop Museum, UH Bookstore, etc.) instead of mailing. Present salesperson will provide instruction before leaving soon for one year overseas job.. Interested volunteers contact Richard Smith (262-4784), George Campbell (941-1356) or Bob Pyle (262-4046).

JOINT MEMBERSHIP REGISTRAR

Person needed to receive mailing labels monthly from National Audubon for use on sending "Elepaio to Joint members. Update these each month for additions and changes, and send to 'Elepaio Mailing Chairman. Receive "Chapter Change Report" monthly from National Audubon containing updates on new members, additions, deletions and changes. Send changes and additions received here to National Audubon, and correspond with National on discrepancies. Send list of new Joint members each month to 'Elepaio Editor. Interested volunteers contact Bob Pyle (262-4046).





## WAIKIKI AQUARIUM

### "SPRING INTO LEARNING"

The Waikiki Aquarium announces its spring 1985 educational offerings for adults and families. "SPRING INTO LEARNING" and enjoy fascinating day and night reef walks, courses on sharks, Hawaiian seaweeds, marine aquarium set-up, miniature reef life, the biology of Hawaiian fishes, and more. Brochures and registration information are available; please call or write the Waikiki Aquarium Education Section, 2777 Kalakaua Ave, Honolulu, Hawaii 96815; phone (808)923-9741.

### 5-YEAR INDEX

#### NOW AVAILABLE!

The 5-year 'Elepaio index (for Volumes 36-40) is now available. It may be obtained by sending a \$2.00 check or money order (made out to "Hawaii Audubon Society") to: Hawaii Audubon Society, P.O. Box 22832, Honolulu, Hawaii 96822. This small fee covers the cost of reproducing the index and also includes postage.

A big "Mahalo" to Sol Cushman, who compiled this 5-year index, and did such an expert job. Also our thanks to Susan Schenck, who compiles our yearly indices, without which there would be no 5-year index!

### BACK ISSUES OF 'ELEPAIO

Current prices for back issues of 'Elepaio are listed below. Actual postage charges for shipping will also be added on to these prices.

Vol. 41, No. 1(July 1980) to present:

50¢ per issue, \$5.00 per volume

Vol. 1 through 40(1939 to 1979):

\$1.00 per issue, \$10.00 per volume  
(5 or more volumes: \$8.00 per volume)

Vol. 1 through 43(complete set: 1939 to June '83)

\$350.00 for the complete set

## HELP WITH 'ELEPAIO

The April issue of the 'Elepaio will be put together the 23rd of March (Sat.) at 1415 Victoria St., beginning at noon. Call Marie at 533-7530. Help is always needed and welcome! Proofreaders and typists are especially needed to help out prior to the 23rd.

## PUBLICATIONS OF THE SOCIETY

HAWAII'S BIRDS by the Society (1984). This is the best field guide to our birds, and includes colored illustrations of all native and well-established nonnative species..... \$4.95 plus postage: 85¢ (surface mail) or \$1.03 (air). Hawaii residents only: add 20¢ for tax.

FIELD CHECKLIST OF BIRDS OF HAWAII by R. L. Pyle (1976). A pocket-size field card listing 125 species found in Hawaii with space for notes of field trips.  
(Postpaid).....\$ .25  
(ten or more, 10¢ per copy)

GUIDE TO HAWAIIAN BIRDING by members of the Society and edited by C. J. Ralph (1977). Where to go and some idea of what you are likely to see. For the islands of Kauai, Oahu, Lanai, Molokai, Maui and Hawaii  
(Postpaid).....\$1.50

CHECKLIST OF THE BIRDS OF HAWAII by R. L. Pyle (1983). An authoritative compilation of all species naturally occurring in Hawaii as well as those introduced by man which are currently established as viable populations. Gives each species' status.  
(Postpaid).....\$2.00

### 'ELEPAIO BY AIRMAIL

Members and subscribers wishing to have the 'Elepaio sent by airmail to addresses outside Hawaii may now obtain this service by remitting the additional amount needed to cover airmail postage costs. These amounts for 12 monthly issues are:  
U.S. and territories and Canada.....\$4.50  
Central America, Caribbean.....\$12.50  
S. America, Europe, Africa, Pacific  
and Asia.....\$14.50



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	(Send articles to Marie Morin,	
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	Honolulu, Hawaii 96822)	
Production	Lee Bauer, Robert Pyle, Susan	
	Schenck, Joel Simasko, Jill	
	Sondeen, and Irene Judd	

## ISLAND REPRESENTATIVES

Maui	Mary Evanson	572-9724
Lanai	Peter Connally	565-6242

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(National and Hawaii Audubon Societies)

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Family.....	38.00
Sustaining.....	50.00
Supporting.....	100.00
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*Special rates for full-time students and Senior Citizens (65 years of age or older) are available. Please write for application form.*

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(Hawaii Audubon Society only)

Regular.....	\$ 6.00
Junior (18 and under).....	3.00
Subscriber (non-Hawaii residents)....	6.00
Life (payable in three equal annual installments).....	150.00

*All Local Memberships and Subscriptions are for a calendar year January through December. New Local Members and late-renewing members who send in dues through September may obtain all previous issues of 'Elepaio in that calendar year, upon request and reimbursement to the Society for mailing costs. Dues received after September are applied to membership extended through the following calendar year, but do not include previous issues of 'Elepaio in the current year.*



# CALENDAR OF EVENTS

- Mar. 10 (Sun) Field trip up Waahila Ridge, Oahu. Meet at 7:30 am at State Library Punchbowl St. Call Peter Donaldson (456-5667) for info.
- Mar. 10 (Sun) Maui. Field trip to Waikamoi Preserve. Call T. Quisenberry (575-2747) or M. Evanson (572-9724) for info.
- Mar. 11 (Mon) Board meeting at the home of Bob Pyle, 741 N. Kalaheo Ave. Kailua, at 7:00 pm. Call 262-4046 or 847-3511 for info.
- Mar. 18 (Mon) General meeting with Steve Berendson on "Flora and Fauna of Western Massachusetts" with emphasis on Bobcats. McCully-Moiliili Library at 2211 S. King St., at 7:30 pm.

# TABLE OF CONTENTS

Vol. 45, No. 9, March 1985

Interpreting Abnormal Coloration in Endemic Hawaiian Birds	
Jack P. Hailman.....	81
Honolulu Christmas Bird Count 1984	
Robert L. Pyle.....	82
No Na Leo'ole	
Libby Powell.....	85
Letter to the Editors.....	88
Treasurer's Report	
Norris Henthorne.....	89
Manana Island Field Trip Report May 1984	
Paul and Janice Sweet.....	90

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