THE ELEPAIO

Journal of the
Hawaii Audubon Society

For the Better Protection
of Wildlife in Hawaii

VOLUME 36, NUMBER 1 JULY 1975

THE HAWAIIAN HOUSE FINCH

By Lawrence T. Hirai

The House Finch, or Linnet, Carpodacus mexicanus frontalis (Say), is a small seed-eating passerine about 14 cm long and weighing 19.5 g. The male is gray-brown, with parts of the head, breast, and rump yellow, orange, or red in color and the belly light colored and somewhat streaked. The female is gray-brown, faintly streaked above, and light colored and more distinctly streaked below.

The Linnet is a western bird, breeding and largely resident as far north as British Columbia, Canada, and as far south as Chihuahua, Mexico (Peters 1968). It was released on Long Island, New York, probably in 1940 (Elliott and Arbib 1953), and has since spread west to New Jersey, north to Massachusetts, and as far south, in the winters at least, as South Carolina (Peters 1968).

A great deal has been written about the House Finch, primarily as short field notes or in lists of birds of specific geographic areas. Most longer papers done before World War II were field-related studies, whereas studies since the war have dealt largely with physiological and photoperiodic problems that were better answered by laboratory and experimental approaches.

The House Finch in Hawaii: The House Finch was introduced to Hawaii, probably from San Francisco as an escaped cagebird, sometime prior to 1870 (Grinnell 1911). It is reported to have established itself on Niihau from the population on Kauai, some 40 km (25 miles) away (Fisher 1951). Today the Linnet is commonly found on all the main islands, in urban and rural areas, and in the high ranch and forest lands on Maui and Hawaii, although it is not common in the near-virgin rain forests. It is also abundant in the mamane-naio (Sophora chrysophylla-Myoporum sandwicense) forest on Mauna Kea and in partly cutover and mixed 'ohi'a-koa (Metrosideros collina-Acacia koa) forests (Berger 1972).

Because of its fondness for papaya, the Linnet is also known as the papaya bird. Munro (1960) gives it an Hawaiian name, Ai-nikana /'Ai-mikana/ (papaya eater).

Work on the nesting biology of this species in Hawaii is largely fragmentary and generalized. Active Linnet nests were found on Kauai in early May (Eddinger, in Berger 1972) and in late June (Richardson and Bowles 1964); on Oahu from early March to July (Berger 1972); on Maui in late April (Berger 1972) and on Molokai in late March (McGregor 1902); on Hawaii at Volcanoes National Park, Kilauea-Mauna Loa section, from April to June (Baldwin 1941) and on Mauna Kea from the first half of April to June (Berger 1972). Nests that were presumed active were found on Niihau in mid-August (Fisher 1951) and on Oahu between late January and early March (W.A. Bryan 1905). Egg-clutch sizes range from three to five, with five-egg clutches not uncommon on the Big Island (Berger 1972). E.H. Bryan, Jr., (1937) reports that the Linnet raises two or three broods a year, with the eggs measuring 14.0 x 20.3 mm. Charles van Riper III (in press) has studied the nesting of the House Finch on the Big Island, especially on Mauna Kea.

From January 1972 through July 1974, I conducted a study of this species mainly on the University of Hawaii Manoa campus, in the 0.4 km^2 (90 acres) area bounded by Maile Way, East-West Center Road, Dole Street, and University Avenue. Some observations were made on the Big Island from 21 to 28 December 1973, and casually and infrequently at various Oahu locales off campus. The study was mainly concerned with the nesting biology of this bird, and consisted mostly of observations on campus, with almost daily checks of nests. Some of the findings are discussed below. Calculations are in the form mean

± one standard deviation.

The Campus Population: The House Finch is one of about 15 bird species found on or near the campus. Other birds include the Rock Dove (Columba livia), Lace-necked Dove (Streptopelia chinensis chinensis), Barred Dove (Geopelia striata striata), Red-whiskered Bulbul (Pycnonotus jocosus), Red-vented Bulbul (Pycnonotus cafer), Mockingbird (Mimus polyglottos), Common Mynah (Acridotheres tristis tristis), Japanese White-eye (Zosterops japonica japonica), Spotted Munia (Lonchura punctulata), Java Sparrow (Padda oryzivora), House Sparrow (Passer domesticus), Cardinal (Cardinalis cardinalis), and Red-crested Cardinal (Paroaria coronata). All are introduced species. The only native bird found on campus is the migratory and nonnesting Pacific Golden Plover (Pluvialis dominica fulva).

From 25 to 50 pairs of House Finches nest on campus at any one time, the nesting season, when active nests are found, extending from mid-February through August, covering about six months. From the literature, it seems that the breeding season occurs for a longer length of time in Hawaii than in other parts of the country, where nesting is usually reported from April to July, only to some degree in March and August, and rarely in February. A molting period, from late July-August until the end of October, follows the breeding season.

House Finches are "skittish" birds and tend to shy away from humans, perching on roofs of buildings, telephone wires, or high up in trees, and usually not near or on the ground. For this reason, Linnets are not as conspicuous as some other bird species, such as Barred Doves and House Sparrows.

During the nonbreeding season House Finches form mixed flocks of males and females, which may number up to 50, especially at feeding sites. In the more open country, as on the Big Island, large flocks of over 100 individuals may be observed. Linnets still flock during the breeding season, but the flocks tend to be small, less than 10, and composed mainly of males feeding in trees or on the ground. In flocks, Linnets displace one another from the perches, with an increase in agonistic encounters as the nesting season approaches. Very few interspecific interactions were observed. While perched, especially in the evening just before roosting, House Finches preen themselves, ruffle their feathers, stretch their wings, legs, and tails, yawn, and scratch their heads indirectly, bringing their feet up and over the lowered wings. They also take water and sun baths.

Diet: On campus, House Finches feed from trees and the ground on a variety of seeds and fruits including: seeds of the ironwood (Casuarina equisetifolia), Formosan koa (Acacia confusa), pink tecoma (Tabebuia pentaphylla), broad-leaved plantain (Plantago major), and beggar tick (Bidens sp.); fruits of the banyan (probably Chinese, Ficus microcarpa /Ficus retusa/) and guava (Psidium guajava); and water-diluted nectar from African tulip blossoms (Spathodea campanulata). In the case of the African tulip blossoms, the Linnets on campus do not drink from the open ends of the flowers, but instead, approach the blossoms from below and slit with their beaks the bases of the corollas to obtain the nectar.

Other authors have noted House Finches feeding on seeds of the spear thistle (Cirsium vulgare) (Berger 1972, on Hawaii), fruits of the rose apple (Eugenia sp.) (Richardson and Bowles 1964, on Kauai), and nectar from 'ohi'a blossoms (Baldwin 1953, on Hawaii). Today the House Finch is not generally considered an economic pest, although this may change if a greater effort is made to establish a sorghum industry in Hawaii.

Male Coloration: Male Linnets in Hawaii show considerable variation in coloration, with the red often being replaced by hues ranging from a dull yellow to a bright orange. Based on reports from the literature and my own observations, the dominating color morph (either yellow-orange or red) seen on the various islands are: Niihau, and presumably Kauai--yellow-orange (Fisher 1951); Oahu--yellow-orange (Grinnell 1911, pers. obser.); Maui--yellow-orange (Dunmire 1961, Grinnell 1911, McGregor 1902); Hawaii--red (Baldwin 1941, Dunmire 1961, pers. obser.).

During 1973, I determined the coloration of males at 93 nest sites. Yellow-colored males accounted for 51 (54.8%) of the total, orange-colored males for 37 (39.8%), and red-colored ones for five (5.4%). For a three-year period, at Pasadena, California, Michener and Michener (1931) trapped 1,226 males, 1001(81.6%) were red and the remaining 225(18.4%) were yellow, orange, or orange-pink. By combining into one category the yellow and orange males that I noted, the proportion of color morphs seen in Hawaii and in California is significantly different (2×2 $x^2_{adj.} = 273.56$, d.f. = 1, P is less than 0.005).

Based largely on this difference in male coloration, Grinnell (1912) proposed in the early 1900s that the Hawaiian Linnet be given species status and be called "Carpodacus mutans." The House Finch in Hawaii is still listed, however, in the 1957 AOU Check-List under C. mexicanus frontalis. The cause for this difference in coloration is unknown, but a number of possible explanations have been advanced, such as dietary differences between the populations on the mainland-Big Island and the other islands (Dunmire 1961) or genetic and physiological effects brought about by the close inbreeding of the small stocks introduced to the various islands (Grinnell 1911).

Song: The primary song of the House Finch is a canary-like warble from two to four seconds long, repeated continuously with slight pauses. It plays a role in the nesting biology of the Linnet. The male sings from prominent and elevated positions to attract a mate or to maintain the pair bond. The song, with a sharp rising final tzeep, is part of the male courtship display before the female. The male is usually the only one that sings, but occasionally I have also heard the female.

The primary song is heard year-round, although a greater amount of singing occurs just before and during the nesting season, from January through June, with a quiet time during the molting period, from late July through October.

Also House Finches sing the most just after sunrise and in the morning hours, with singing decreasing the rest of the day, until a few hours before sunset when a brief increase occurs. Because singing reaches a low point a few hours after midday, the time of day in Hawaii when the highest temperature occurs, the daily song cycle seems to be correlated with temperature.

During the nesting season, the male sings when accompanying the female during nest construction, when he is near the nest during the incubation period, rarely, if at all, during the first two-thirds but noticeably more during the last one-third of the nestling period.

Nesting Biology: The 257 cup-shaped nests that were found in 1972, 1973, and 1974 were built in 26 different types of vegetation. Pandanus and palms were the most common nesting trees, with 41.2% and 28.0% of the total number of nests, respectively. The nests were placed from 1.8 to 15.0 m above the ground, averaging in 1972 4.3 $\pm$ 1.5 m (based on 91 nests), in 1973 5.0 $\pm$ 2.4 m (based on 103 nests), and in 1974 4.6 $\pm$ 1.6 m (based on 63 nests).

Nest building takes from six to 22 days, averaging 11.8 $\pm$ 4.7 days (based on 15 nests), and is done almost exclusively by the female. Only material brought to the nest by the female is used, and the male aids in molding the nest only in the first half of the nest-construction period. Thereafter he only accompanies the nest-building female to and from the site, singing from a nearby perch.

Egg laying usually starts the day after nest building ends, and one egg per day is laid, in the morning hours, until the clutch is completed. A House Finch egg is light blue in color, with black or black-brown specks or lines concentrated at the larger end. Average egg measurements found were: greatest width x length, 13.5 $\pm$ 0.6 x 19.1 $\pm$ 0.9 mm, and weight, 1.89 $\pm$ 0.15 g (based on 197 eggs from 48 nests from the three study years). The yolk of a House Finch egg is a bright yellow, resembling that of a chicken.

In the three years of this study, I found two nests with 2-egg clutches, seven nests with 3-egg clutches, 87 nests with 4-egg clutches, and 31 nests with 5-egg clutches, averaging 4.2 $\pm$ 0.6 eggs per clutch. This does not differ significantly from clutch sizes reported for Linnet populations in other parts of the United States.

Eggs hatch at any hour of the day and night, over a period of several days and not all on the same day, and in the order that they were laid. The incubation period of the House Finch, the length of time between the laying of the last egg in the clutch until that egg hatches when all the eggs hatch, ranged from 11.5 to 13.5 days, averaging 12.8 $\pm$ 0.6 days for 29 nests.

A young at hatching, called a nestling, is altricial, helpless, blind, with some fluffy whitish down on the head and body. Its eyes open when it is about four days old. By the age of seven days, the chick's pin feathers start to unsheathe. Also by this time its gape is red or bright red-orange with a yellow outline and on the upper mandible two dark spots at the corners and a dark centrally located line leading down into the throat. These mouth markings may serve as directive targets in aiding in coordinating the gaping of the young with the feeding response of the adult. The young leave the nest from 14 to 19 days after hatching, averaging in 1972 16.8 $\pm$ 1.1 days (based on 12 young from six nests)

and in 1973 18.5 ± 1.0 days (based on 24 young from eight nests). At fledging time the young bird is a strong flyer, almost fully feathered, with a short, stubby tail, a few strands of down adhering to the head feathers, and distinctively swollen beak corners. Based on limited banding data, the fledgling period, the time when a young has left the nest but is still dependent on the adults for food, lasts about two to three weeks. By the time the young becomes independent it has a fully developed tail and resembles a female House Finch.

Only the female House Finch incubates the eggs and broods the nestlings. During the incubation period the male returns to the nest about once an hour to courtship-feed regurgitated seeds to the female. The young are fed regurgitated seeds about two times per hour by both adults; during the first one-third of the nestling period, the male feeds the female at the nest and she, in turn, feeds the nestlings. Both adults usually eat the fecal sacs voided by the chicks, keeping the nest clean for the first four to nine days after the young first start hatching, averaging 6.1 ± 1.3 days (based on daily inspections of 29 nests). Thereafter the fecal sacs are allowed to accumulate on the nest rim, a behavioral trait unusual for passerine birds.

Eggs and young were lost when: strong winds knocked them from nests; eggs, young, and even the nesting females were preyed upon by an animal, probably a rat species; eggs did not hatch because they were infertile, contained dead embryos, or were deserted during the incubation period; and nestlings died because they were inherently weak at hatching, starved to death, became so entangled in the nest material that they could not free themselves and were left behind when the rest of the brood fledged, and, possibly, were pecked to death by House Sparrows.

Nesting success, the proportion of the number of young that fledge in relation to the number of eggs that are laid, was for 1972 17.1% (based on 170 eggs laid in 46 nests), for 1973 30.4% (based on 181 eggs laid in 46 nests), and for 1974 17.1% (based on 164 eggs laid in 43 nests). Nesting success in Hawaii is lower than that reported for House Finch populations in North America, where success usually is at least 50%. The Linnet in Hawaii is a fairly abundant bird, though, possibly suggesting very good survival during the fledgling and adult stages.

Even with the extended nesting season in Hawaii, most likely only two broods are raised successfully in one season by a pair of House Finches because of the long nesting period (about two months, including 20 days before renesting) and the low nesting success. Two broods seem normal for Linnet populations elsewhere.

The House Finch has been in Hawaii for over one hundred years. In that time the main differences between the Hawaiian population and populations in other parts of the country seem to be in male coloration and nesting success.

Acknowledgements: My appreciation to Dr. Andrew J. Berger for editing this manuscript. The study was supported, in part, by Dr. Andrew J. Berger through NSF Grant No. GB 23230 of the Island Ecocystems IRP under the US/International Biological Program. A fuller report of this study is found in Hawaii IBP Technical Report No. 47.

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NESTING INFORMATION OF THE SOOTY TERNS

By James M. Bradley *

During the Spring of 1974 a study was conducted on the nesting and hatching of the Sooty Tern (Sterna fuscata). Although the incubation period was of primary concern in the study, many other interesting facts were observed. The Sooty Terns started to arrive early in Marcn, flying the periphery of Eastern Island, Midway Atoll, for well over a month before landing. During the first week of March only a few birds arrived. As the days went by, more and more colonies arrived. These birds are constantly chattering and squawking. It appears that these birds arrive in colonies, each with its own social environment.

For this study two distinct areas were selected: A. The northern most point of Eastern Island. B. Approximately half a mile away in the central portion of the Island.

Eight areas were marked at each location where the remainder of the colony would settle. The Sooty Terns started to land on the Island in mid-April, a few the first couple of days and then the remainder would settle in a matter of three or four more days. It must be said that these birds live in colonies. Their landing in many different flocks throughout the Island would tend to show that each flock has its own social orders.

Both Areas A and B were staked out on 20 April. Area A had the whole colony on the ground prior to marking. Area B was chosen at the outskirts of one colony in the central part of the Island.

By 22 April, Area B was completely covered with a colony of terns. Regular observations were made of each area until 27 April, so that eggs within the areas could be marked and times could be established for incubation periods.

Area A had no eggs by 27 April and this area was abandoned for this particular project. It leaves many avenues to explore as to why no eggs were laid in this particular area, because eggs were found all around Area A but none in the designated marked areas. Speculation could be that this area was set aside for males. The areas were definitely not selected too late, since many more eggs were laid around these areas after the sites had been chosen. Further speculation could be that the area was set aside for the juvenile population.

The nests were no more than a small depression in the coral sand. The eggs started to hatch on 23 May. It took approximately six to eight hours for these chicks to completely come out of the shell. It was noted that several of the mothers were assisting their young in freeing themselves from the shell. At this time the parents became even more aggressive, working in pairs or groups to drive intruders away, even taking pecks at intruders. Eggs were hatched and progressed as follows:

Area	Egg No.	Time	Date Laid	Date Hatched	Incubation Period
5B	1	1400	24 April	24 May	30 days
8B	2	1900	"	"	"
"	3	"	"	"	"
"	4	1430	25 April	Missing	-
6B	5	"	"	25 May	30 days
4B	6	"	"	26 May	31 days
8B	7	1030	26 April	23 May	27 days
"	8	"	"	"	"
3B	9	"	"	"	"
4B	10	"	"	27 May	31 days
"	11	"	"	26 May	30 days
5B	12	"	"	24 May	28 days
6B	13	1630	"	23 May	27 days
8B	14	1600	27 April	didn't hatch	-
4B	15	"	"	26 May	29 days
3B	16	"	"	24 May	27 days

On 26 April, egg number 4 was found missing at 1630, apparently eaten by rats.

Once the eggs had been laid the Sooty Terns became very aggressive, protecting their eggs with ferocity. After the 27th, no other eggs were found in the selected sites, so it appears that eggs are put down quickly within each colony. From then on all sites were viewed daily to ensure the presence of all eggs. There is a great variation of eggs in color, size and markings and all eggs blended well with their background.

It is interesting to note that no eggs were found in 1B, 2B or 7B, reason again unknown. On 28 May the only egg that had not hatched was egg 14. This egg was observed until 31 May and it had not hatched. Egg 14 was abandoned by its parents at this time.

Although, as stated previously, incubation periods were of primary consideration, these other points may be of interest. There is a high death rate among the young birds, and within the first five days the mortality rate may be as high as 30%. After this period the mortality rate decreases rapidly. The probable cause of death would be rats. The young are able to move around quite well at one week old. They immediately seek shelter in clumps of grass, under trees or anywhere they are not in plain view. It was also noted that at this time they may stray quite a distance from the nest. I observed one chick travelling a zigzag path some 15 feet away from the nest to get back to its parents. It was also noted that when this chick approached a parent not its own, the parent immediately pecked the chick viciously on top of the head, and this could possibly be another cause of death at an early age. Other than this one sighting, the terns appeared to be sociable towards one another and certainly assisted in a concerted effort to drive away intruders.

The project was considered complete on 5 June and no other observations were made.

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* Notes from Mr. Bradley, 26 April 1975: ...The study...was of my own volition. ...As you can tell, this was the first field study that I have completed and hopefully I will be able to do several other studies while stationed here at Midway Island.

...I look forward to critiques from your noted members....

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Symposium on Threatened and Endangered Species of North America, Washington, D.C., June 11-14, 1974. Sponsored by the Wild Canid Survival and Research Center. Trip report by P. Quentin Tomich, 15 July 1974

...I departed from Honokaa late on June 7 in order to have two days in Honolulu to put the trip package together and to see several key persons active in current endangered species legislation and programs. ...I arrived on schedule at Washington National.../and/ set up the display.

Our exhibit: ...The exhibits were on the mezzanine, convenient to the meeting hall, and each display was limited to single 3x7 table. Fair enough, but a little cramped. I was able to set up a colorful Hawaii Audubon Society panel on the Endangered Birds, flanked by IBP pictorial and graphic transects of the vegetation zones of Mauna Kea. The table surface held a stack of large photos of vegetation types and goat problems in and near Hawaii Volcanoes NationalPark, our various give-away materials, and a register. At the foot of the table was the panel on Extinct Birds of Hawaii.

...Our give-aways included the 6-page flyer we had pieced together at the last minute in Honolulu. We distributed more than 350 copies and it appeared to be a positive means of summarizing the objective of spreading the word about problems in Hawaii.

We also had a mimeo "Hawaiian Wildlife Needs Help" from State Division of Fish & Game, and a sheet on the Sea Turtles of the Pacific from Alan Ziegler. Fred Evenden (Executive Director of The Wildlife Society) brought by a few stacks of literature including the Position Statements, which includes a very strong position on introduction of exotics to islands, and Publications Lists of TWS. Gene Kridler sent along copies of the U.S. Sport Fisheries & Wildlife "Hawaii's Endangered Waterbirds" and "Hawaii's Endangered Wildlife". Everything moved rapidly and we were totally cleaned out at the end of the meeting.

Additional references, papers, IBP reports, copies of Act 49 and maps were available to show or give to those especially interested in some particular topic. A loose-leaf scrapbook "A Conservationists' Sampler for Hawaii" contained clippings, letters, news sheets and a few short papers. It formed a useful reference for the occasional visitor who wanted some detail. There was a perennial interest in the clippings about Maui's newest living bird, the po'o uli, and the recent finds of subfossils in the lava tubes.

...We were well equipped with 2x2 slides (vegetation, birds, goats, insects) in the

event a continuous show could be set up or an odd spot found for them. It turned out we had no space for a show to go with the exhibit....

The symposium and persons seen: The program attracted and was composed of a good mix of interested citizens who work for various causes as laymen or professionals. ...The subject matter was varied. The carnivores and predator problems certainly had their day as expected. ...At least 1500 persons must have attended part or all of the conference, which is testimony in itself to the interest and ideas generated by the symposium. ...

On the endangered plants, Thomas Elias (Cary Arboretum, Millbrook, New York) gave a useful accounting of the problem and cited the examples of Michigan and the Pacific States as being most advanced in drawing up their lists. ...The notion that habitat (i.e., vegetation) is basic to the survival of endangered animal species came across very well in several segments of the conference in spite of a frequent theme of single-species orientation by some of the speakers lacking the broad view.

One of my instructions from Hui Manu O Maui was to determine the status of the EIS for Kanaha Pond and to see what action can be taken to assure moving the proposed sewage treatment plant away from the vicinity of the pond. ...The airstrip extension is, of course, still an open issue which could also affect the survival or demise of Kanaha Pond. ...EIS is circulated in Hawaii, and that siting of the plant is recommended to be adjacent to Kanaha, with the alternative of the injection wells being placed some distance down the beach if further tests suggest that infiltration to Kanaha could occur from wells at the plant site. This is certainly not a satisfactory plan and obvious route is to reopen objections through NWF if at all possible.

Earl Baysinger (Asst. Sec. of the Interior, for Endangered Species)assured me in conversation that revision of Pittman-Robertson projects, particularly for Hawaii, was in progress in line with provisions of the 1973 Endangered Species Act. Concerning the Lacy Act, he encouraged participation from Hawaii to improve it. In his presentation he declared that any introduced species is a potential threat to native ecosystems. ...

Keith Schreiner (Acting Associate Director for Federal Assistance, U.S. Sport Fisheries & Wildlife) emphasized in his talk the need for accurately defining endangered species so that efforts can be concentrated on those really in critical need of rehabilitation. I was advised in chatting with Schreiner that Hawaii's turn for land acquisition will come up again in 1976 (remember the recent expenditure for Hanalei?).... My immediate hope with this news was that Bishop Estate and other owners of critical habitats would not have sold out to other interests by that time. ...

A person from National Academy of Sciences working on a grant to study means for the increase of propagation facilities for primates to be used in medical research, indicated the Molokai was being considered as a location where the climate is ideal and where possibly a large share of the food for the stocks could be grown locally. ...

Other exhibits: There were about 18 display tables in all, largely for the distribution of literature. ...A wildlife artist or two had some prints for sale and there were various buttons and other trinkets available. ...

National Wildlife Federation was distributing a bulleting condemning defeat of the National Land Use Bill (H.R. 10294) on June 11, with a vote of 204 yeas and 211 nays (Mink and Matsunaga were among the yeas). ...

Irvin Naylor and an associate of Mariculture, Ltd. ("Conservation through Commerce") were handing out an elaborate packet on their green sea turtle operation at Grand Cayman Island, B.W.I. Naylor examined our turtle flyer and unreservedly commented that "George Balazs is circulating misinformation." The issue is evidently that Mariculture needs to continue collecting eggs from wild turtles until their captive stocks begin to reproduce. I have not followed the turtle problem closely but a letter by Balazs in the May-June American Scientist appears to be what needled Naylor. It points out that all of the 19 females that laid eggs in captivity were caught as adults and reiterates some of the other unresolved problems of green sea turtle culture for commercial purposes.

I am sending the collection of pamphlets to the care of Steve Montgomery where they will be available to anyone who wishes to examine them.

Conclusion: This wraps up some of the significant points of the Symposium. Obviously one representative to a sizeable conference in a busy place and wearing three hats (the exhibit, the sessions, the contacts) could not adequately cover all the bases. However, it is probable that the seeds planted here and there will bear results for the good of the

endangered biota of Hawaii. Finally, I want to thank all those who assisted in various aspects of the venture.... Steve Montgomery has a record of the financial report.

Sponsoring organizations: Bernice P. Bishop Museum; Citizens Against Axis Deer Introduction; Conservation Council for Hawaii; Hamakua District Development Council Inc.; Hawaii Audubon Society; Hawaiian Botanical Society; Hui Manu O Maui; IBP; Sierra Club, Hawaii Chapter; The Wildlife Society, Hawaii Chapter.

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HAWAII'S NATIVE BIRDS

By Bo Alexander, Junior Member (Age 15)

Since the native Hawaiian birds have gone through drastic and devastating changes, the remaining birds must be saved. The following is a history of the native Hawaiian birds, starting from prehistoric Hawaii and tracing the birds' diminishing numbers and habitats and reasons for most of what is happening. The end is a projection of the birds in the future, and ways to save them.

The Hawaiian Archipelago in prehistoric times was a haven for the evolution of plants and animals isolated from the rest of the world by the vast Pacific Ocean. Few plants and animals found their way to the remote islands, and even fewer became established. Those which became established began to branch off into several subspecies. Fifteen ancestral types of birds made their way to the islands and evolved to produce the 70 known kinds of native Hawaiian birds. An example is the Nene. "The Nene, or Hawaiian Goose (Branta sandwicensis), is believed to have evolved from Canada goose stock. Migrant flocks of this species remained in the Hawaiian Islands and gradually evolved into a distinct species. This species is identified by the reduced webbing of the foot, and a comparatively short wing. The former adaptation is eminently suitable for the barren lava slopes inhabited by Nene." (6)

The animals and plants of prehistoric Hawaii evolved without repellent characteristics such as thorns, for there were no plant-eating animals to repel. The fact that the native Hawaiian plants and animals evolved without any natural defenses was to prove devastating in years to come. (3)

Prehistoric Hawaii was closely woven and perfectly balanced with the biota. Almost all of the flora and fauna in prehistoric Hawaii was indigenous. The isolation of the Hawaiian Archipelago was shattered with the arrival of the first men, the Polynesians. The Polynesians found the islands teeming with life. Soon others arrived and settled, bringing several species of life unknown to the Archipelago. The settlers brought pigs, dogs, fowl, rats, about two dozen kinds of food and fiber plants, weeds and insects. All of the exotic plants and animals would contribute to the havoc of the native Hawaiian birds. The Polynesians needed land for their imported crops, so native forests in low elevations were destroyed. The settlers also brought fire to the islands, and soon dryland forests were ablaze, intentionally or not, for as the population increased so did the need for more space. The Polynesians went on thriving on the lush tropical forests' natural resources and those which they had introduced. Those first inhabitants of the Hawaiian Islands lived somewhat harmoniously with the natural environment as compared to the next inhabitants.

In 1778 Captain James Cook of the British Navy found the Hawaiian Islands. This marked the end of the thriving environment and the beginning of its deterioration. The Europeans had been sailing all over the world to get to the Hawaiian Islands and this led to the introduction of hundreds of plants and animals exotic to the islands from all over the world. The exotic animals also included many species of livestock which were perfect carriers of diseases, viruses, and parasites. Soon there were so many grazing animals that large forested areas were destroyed. Those forested areas were the habitats of some of the native birds.

The devastation of the native forests was not over, for as commerce increased so did the wholesale destruction of the forests. The forests were destroyed for their wood products, grazing lands, and agriculture.

In 1826 the mosquito was accidentally introduced. This was the bond which brought all of the factors together and almost wiped out the native birds. The mosquito was an efficient agent for spreading the diseases, viruses, and parasites to highly susceptible native birds. Many of the forests were gone, so the native birds were somewhat concentrated in the remaining forest and thus any disaster could spread faster. The populations

of native birds began to decrease and many became extinct because they couldn't adapt to the new habitats made of exotic plants, or they died of the parasites, viruses, and diseases.

Since the native birds couldn't handle the explosive populations of insects, several species of exotic birds were introduced to help; such as, the Mynah which was introduced for armyworm control, and the Cattle Egret was introduced for house fly control. Exotic birds were also introduced as song birds and garden birds. Game birds were introduced for hunting.

All of the species of exotic birds influenced the native birds in some way. Some exotic birds had the same or almost the same diet as some of the native birds. This maybe one of the causes for the diminishing numbers of some native birds. Most of the exotic birds' ecological roles are unknown.

Through the years, the habitats of many native birds have been destroyed, and these birds have either died or adapted somewhere else. Many of the birds have adapted in their critical habitats--last place of refuge. "Known critical habitats have been delineated, and further research is urgently needed to determine other significant areas. Critical areas must be protected from all forms of disturbance, and economic considerations should not be the sole measure of best use. Monetary returns may be short, the damage permanent." (3)

We have exploited Hawaii enough at the expense of its unique birdlife. Further exploitation would prove little and would have drastic affects on its birdlife. We must set aside the critical habitats and keep them undisturbed. If we don't the exotic species of plants and animals will engulf our native plants and animals.

The future of Hawaii's native birds does not look bright; their over abuse in the past has almost wiped them out. The native birds do have a possible future, if their critical habitat is preserved, and if they can fully adapt to it. Then their numbers may increase, possibly until the numbers become so great that the birds are no longer considered endangered.

The quarantine process which has been established was a plus factor in the preservation of the native birds. In the future the quarantine process must be enforced to higher standards, because even now some exotic species of insects have been able to enter the State.

Native water birds need protection. Water refuges such as Kanaha Pond on Maui must be preserved and new ones developed.

Many projects begun awhile ago are looking up, such as the Nene Restoration Project which has almost doubled the population of the endangered Nene. Probably more projects modeled after the Nene Restoration Project could begin with other species of native birds.

Ever since men arrived in their paradise, the native birds of Hawaii have been abused and disregarded; many to the point of extinction. Those which are hanging on deserve to be saved, and most of them can be. The native birds can be saved by setting aside the birds' critical habitats and sheltering them from disturbances and by using the frame work of the Nene Restoration Project for other endangered species.

The future of Hawaii's endangered birds depends on our deep involvement today, for tomorrow will be too late.... (3)

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Plover watching from Sigrid B. Southworth, Librarian, Kamehameha High School, 12 May 1975:

Kamehameha Kolea: As usual we have had quite a number of them on the campus this year. One that I feel sure has returned to the upper campus dorm lawn for several years in a row returned in the fall, but disappeared around Christmas time. There are a lot of wild cats on the campus, and I fear one may have gotten her.

For the first time ever this year I saw two kolea together peaceably on the same small plot of grass. Usually they are so territorial that the only time I have ever seen two together is when one has been chasing the other. I only saw these together the one time.

Our birds here began changing into breeding plumage about the first of April, and they left sometime in the week after April 20.

Kolea Gathering: On April 20 my family and I were in Mokuleia. We had been out to Dillingham Field, and on the way back had to stop at the Mokuleia Ranch office. We turned in one road too soon (which would make it the first mauka direction road Dillingham Field side of the main ranch entrance), and just off the highway in a rather large pasture found dozens and dozens of kolea. It was very exciting. I have always heard of them gathering before migrating, and this was the first time I had ever seen a gathering. It was in the next week that I realized the Kamehameha kolea were gone. Most of the birds in that Mokuleia gathering had fully changed into breeding plumage.

Olinda, Maui, Kolea: My parents live at Olinda, approximately 3 miles above Komoda Store in Makawao on the Maluhia Road. For a long time they have been kolea watchers, and have named their regular tenant Kali. They have three acres, but only the one bird ever comes to them.

Two items of interest have been noted about her. (Her? I'm not sure how to tell!) They have a shallow, round bird bath about 1½" deep and 12" in diameter. Occasionally she will come for a bath in it, but not often. With her long legs and that shallow water they have found it both fascinating and highly amusing to watch her work at splashing water all over herself.

One December when I was there I began noticing that every evening about 6:00 Kali would call good-bye and fly down-country, generally in the Makawao-Haiku direction. After realizing that she left at about the same time each evening, I began to realize that if I went outside I could hear calls coming from numerous kolea in the nearby pastures across the gulch. There were undoubtedly birds coming from pastures higher up too...the Olinda pastures are very full of kolea each year.

On returning to Kamehameha in January I began to listen for birds leaving this campus around 6:00. I do not hear them as frequently, but have heard them calling at dusk on numerous occasions. I have also heard them calling as late as 10:00 p.m. on a number of occasions.

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April Field Trips by Erika Wilson

Lualualei and Waianae: A large group of 37 people car-pooled to the leeward side of Oahu for the April 13, 1975, field trip. Our first stop was the Lualualei Naval Reserve where several sewage ponds provide waterbird habitat. Lt. Hudson kindly arranged access to the ponds, where we saw 5 or 6 Black-crowned Night Herons, a dozen Hawaiian Coots, and 2 Hawaiian Gallinules. The latter species is rare on Oahu, so we were delighted to see these two stalking along the pond margins. The coots were quite active, engaging in chasing bouts, during which they flew across the water, their feet paddling madly on the surface. We also saw mongoose in the area, which Dr. Berger noted are a serious threat to the ground-nesting gallinules.

The second part of the field trip, lead by Omer Bussen, was devoted to hiking in the upper part of Waianae Valley. Along a jeep road with introduced vegetation, we recorded Cardinals, Mockingbirds, Shama Thrush, Melodious Laughing-thrush, Japanese White-eyes, and Japanese Bush Warblers. The last two species were also heard at higher elevations in native vegetation, along with House Finches, 'Amakihi, and 'Elepaio. On several occasions we saw 'Elepaio, each one cocking its tail and displaying its prominent white rump. From a clearing at 1600 feet we had a marvelous view of the leeward coast as we ate our lunches.

Ulupau Head and Nuupia Pond: A large group of over 40 adults and children gathered at the Kaneohe Marine Corps Air Station on April 20, 1975, to visit the booby colony and the saltwater ponds which attract shorebirds. Sgt. Johnson was good enough to arrange access to the booby colony. Very strong trade-winds prevailed throughout the trip, but the weather was otherwise pleasant. Upon arriving at the colony we saw a lovely Red-tailed Tropicbird sailing just off the cliff face. Overhead reeled Red-footed Boobies--adults bringing in nesting material, second year birds in their mottled plumage, and first year birds in brown. Most of the nests in the colony were occupied by incubating adults, although we saw a few nestlings in downy white. At nests near the trail we could see the

single egg, often scratched so as to reveal a pale blue under the chalky white coating.

As the morning advanced adults were seen fluttering their gular patches to lose heat. The large louse flies (Hippoboscidae) which feed on blood were quite common. They seem to focus their feeding activities on the boobies' necks where the boobies have difficulty in dislodging them. Dr. Shallenberger tells me that the Red-footed Boobies at Sea Life Park don't seem to be as troubled by this parasite. We enjoyed talking with Mr. Al Labrecque, longtime Society member, who had banded boobies here during the late 40s. Low over the water we saw Common Noddies and Sooty Terns, while high overhead hung Great Frigatebirds.

At the makai pond we saw Black-crowned Night Heron-2, Golden Plover-10, Ruddy Turnstone-2, Wandering Tattler-1, Hawaiian Stilt-12, and White-capped Noddy-6. The turnstones and some of the plover were in their breeding plumage. At another pond a small group of us watched several hundred shorebirds feeding at a large mudflat. Flying over the water were White-capped Noddies-6, while evenly spaced Black-crowned Night Herons-16 stood about in the shallow water. Working the mudflat were Golden Plover-100, Ruddy Turnstone-60, Sanderling-20, Wandering Tattler-5, and Hawaiian Stilt-18. One small shorebird attracted my attention as having a long bill, a rufous back, a whitish breast, and a black belly; I recognized it as a Dunlin (Calidris alpina)/Erolia alpina/ and this was confirmed by R.J. Andree and Rob Lesser, two mainland birders. Dr. Berger (in his HAWAIIAN BIRDLIFE) lists the Dunlin as having been seen on Oahu in 1967 and 1970; it is an occasional migrant.

Other birds seen on the KMCAS included a pair of Mockingbirds (inside Ulupau Head), a small flock of Spotted Munia, Cardinals, Common Mynahs, Barred Doves and House Finches.

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Field Trip to Aiea Loop and Ridge Trails, 8 June 1975, by Sheila Conant

Twenty-two guests and members made the hike from the beginning of the Aiea Loop Trail to about one mile up the Ridge Trail. We returned on the upper part of the loop, rather than walking the lower part of it after returning from the Ridge Trail. The weather was excellent: partly cloudy, cool, with very occasional drizzle and a light breeze. During the hike we saw two 'ohi'a trees in yellow flower and numerous koa trees with green and ripe pods.

On the short drive from the entrance to the park to the upper parking lot we saw a male Shama Thrush in a roadside ditch. White-eyes were numerous throughout the hike, and we saw and heard many House Finches. A few Spotted Doves were present on the Loop Trail, but not on the Ridge Trail. The most conspicuous bird observed on the hike was the Japanese Bush Warbler. Some of us caught glimpses of them in thick bushes, but their low whistles and long repetitive song were much more obvious than the birds themselves.

Although we heard 'Apapane singing on three occasions, we saw none. Similarly we heard 'Amakihi calling on 5 different occasions, but were not able to sight any birds. No 'Elepaio were seen nor heard. While resting in a clearing on the ridge before turning back we saw a single White-tailed Tropicbird soaring gracefully along the ridge into the back of Kalauao Valley.

I can remember hiking this trail in 1968 when 'Elepaio and 'Amakihi were common on the Loop Trail and 'Apapane were not difficult to find at all. Today one must hike out on to the Ridge Trail to find these species, and frequently they are not seen even then.

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Letter from Warren B. King, 20 March 1975

It may be of interest to the Hawaii Audubon Society that the U.S. Forest Service is undertaking preliminary planning for an endangered species program in Hawaii. Presently envisioned are two or three permanent positions to be filled by well-qualified biologists. A year or two many be required to secure all approvals and to get the program underway. Dr. Dixie Smith, U.S. Forest Service Principal Wildlife Range Scientist in Washington, who has spearheaded the development of this program, has compiled an outstanding record of action on behalf of endangered species. He takes seriously Section 7 of the Endangered Species Act of 1973, which calls on all federal agencies to carry out programs for the conservation of endangered species, and thus far he has received strong support from Department of Agriculture budget administrators for Forest Service endangered species programs. For example, Forest Service support of the Puerto Rico Parrot Amazona vittata program has equalled or exceeded support from the Fish and Wildlife Service. It has been an outstanding example of what can be achieved through constructive cooperation of dedicated, enlightened government representatives.

I urge Society members not to let previously formed opinions of the efforts and objectives of the U.S. Forest Service in Hawaii bias their thinking on this issue. The Forest Service endangered species program will be a strong shot in the arm for endangered species efforts in Hawaii. The Society should encourage the development of this program by expressing its approval to appropriate government officials in Honolulu and Washington, D.C.

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CORRIGENDUM: The following information pertaining to the nene to unidentified geese CORRIGENDUM on page 148, Vol. 35, No. 12, June 1975 was received from C. Fred Zeillemaker, Assistant Refuge Manager, Hawaiian Islands and Pacific Islands National Wildlife Refuges, Kauai, dated 28 April 1975: ...No geese (nene or Canada geese) should be included on the 1974 Lihue Christmas Bird Count. Paradise Pacifica is a private tourist attraction with ponds interspersed among tropical gardens. The grounds are adjacent to the Wailua State Marina on the south side of the Wailua River. ...

He further explains in a letter to Dr. Andrew J. Berger dated 24March1975 as follows: ...I visited Paradise Pacifica at Wailua, Kauai, on March 19. On a lagoon in the visitor attraction I observed the following: 1 black swan (Cygnus atratus), 1 swan goose (Anser cygnoides), 2 Canada geese (Branta canadensis), 2 hybrid geese (A. cygnoides x B. canadensis), and 1 Egyptian goose (Alopochen aegyptiacus).

The black swan remained in the water throughout my visit and I was unable to determine if it was banded or if it was capable of flight. (Since this letter Fred has determined that this bird is pinioned.) The swan goose was not banded and appeared to have both sets of primaries. It was constantly in company with a Canada goose that wore a band (HON 14) and was pinioned. The hybrid geese were raised by the latter two birds two years ago according to Mr. Ben Tangalin, Landscaping and Beautification Department Manager. Mr. Tangalin reported that there have been no goslings since. The other Canada goose was banded (HON ?--number not read) and pinioned as was the Egyptian goose (band: HON 26). Mr. Tangalin reported that the original birds were acquired from a zoo in Texas four or five years ago. No mention of obtaining nene was made by Mr. Tangalin, but he did express an interest in attracting all kinds of wild birds and acquisitions of "flamingos" and other "showy" birds. There were a number of Hawaiian gallinules present during my visit, including half grown young. One adult bird was even "scratching" or picking its way through the content of a 55 gallon trash barrel!

I returned March 21 and gave Mr. Tangalin a copy of HAWAII'S ENDANGERED WATERBIRDS. I also left him copies of State animal introduction regulations numbers 2,3,4,11,& 12. ...

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Donations: MAHALO!

David Woodside, not only a life but also a charter member, has generously included $10.00 with his reservation for the indexes by noting, "The enclosed may help a little in the expenses." He is one of the few members who banded birds with the late George C.Munro. We are grateful for his continued generous KOKUA. MAHALO NUI LOA!

Mrs. Clyde K. Stroburg, a member since April 1967 from San Diego, visited Hawaii in June but unfortunately wasn't able to come on the field trip nor to the meetings, but she generously donated $2.00 with the following note, "Enclosed is a small donation to help with the Society's expenses. I'm sure they must be increasing all the time." Sorry, you were so close and yet so far away and weren't able to participate in some of our activities. MAHALO NUI LOA for your concern and generous KOKUA.

The yearning to become an active constructive participant in this unique Hawaiian ecosystem can never come about without the guiding hand to ignite the spark of insight into life and its reality. The following letter from the science teacher Sandra Kay Crumley notes how a spark brought about an action to correct damages done by man: "... Enclosed is a check for $120.00 donated by the students of St. Theresa's School to be used in helping prevent native waterbird habitat destruction. We are happy to be able, in a small way, to help you carry on the good work that you have been doing.

"From lessons that I taught the seventh grade class during National Wildlife Week such enthusiasm was generated that the students worked out an idea for a school project. First, groups of seventh grade science students taught two lessons to each of the first through sixth grade classes concerning the dangers of habitat loss in Hawaii. Then, the seventh grade students held a bake sale in which the entire school participated, thus raising the $120.00. ...

HONOLULU STAR-BULLETIN, 31 May 1975, page A-10, Our Environment by Harry Whitten has

an article about this wonderful generous project at St. Theresa's School.

MAHALO NUI LOA to all of you who made this project a success, and I hope you'll always remember that constant vigilance is necessary and with compassionate cooperation Hawaii can continue to be a challenging wonderful place.

The Schweitzer Legacy--The deeper we look into nature the more profoundly we know that we are united with all life. Man can no longer live for himself alone.

Miss Thelma Hensley has generously sent me the following books and printed matter, which I'd like to share with you and they'll be displayed at the general meeting for your reference: 1.NO ROOM IN THE ARK-Alan Moorehead, 2.UGANDA NATIONAL PARK, 3.Shell Guide to East African Birds, 4.Breeding Waterbird Sanctuary, Keoladeo Ghana, Bharatpur-Bombay Natural History Society, 5.BIRDS AS OUR GUESTS IN THE GARDEN (Second Series)-Toshiko Saeki, 6. Duck-netting in the Imperial Preserve, 7.Mt.Hiei & Enryakuji Temple, 8.Henry Yuen's "Be a Bit Birdie"-HONOLULU magazine, 9.Carl W. Buchheister's "Out of the Gray Mist"-AUDUBON magazine, 10.John H. Baker's "Saving Man's Wildlife Heritage-NATIONAL GEOGRAPHIC magazine, 11.TROPICAL BIRDS-Clive Roots, 12.AN INTRODUCTION TO BIRD LIFE FOR BIRD WATCHERS-Aretas A. Saunders, 13.BIRDS AND THEIR ATTRIBUTES-Glover Morrill Allen, 14.A SAND COUNTY ALMANAC-Aldo Leopold.

These are all very interesting, and some of the books and leaflets were obtained while she was travelling in the various countries. I especially recommend Toshiko Saeki's BIRDS AS OUR GUESTS IN THE GARDEN, a delightful photo book. On page 3 is a wonderful color photo of the white-eye and the elusive bush warbler, and on pages 9 through 12 are black & white pictures of the bush warbler at the feeder eating persimmon, suet, and even doughnut!MAHALO!

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ALOHA to new members:

F. Groepler, c/o Queen, P.O. Box 899, Honolulu, Hawaii 96808
Wesley Teraoka, 4550 Kalanianaole Highway, Honolulu, Hawaii 96821

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MAHALO & ALOHA to Mr. & Mrs. Carroll Wilson

October 1973 to May 1975, a very short time, a transit period for many of us but not for the Wilsons. They were ecologically concerned and plunged right in and worked until the very last day. He in his quiet way and she very actively. Practically every job to be done but no one to take over, Erika volunteered and did it immediately with excellent results. The results are evidently flashing through THE ELEPAIO. We are very grateful to the Wilsons. MAHALO NUI LOA and we send our warmest ALOHA.

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REQUEST FOR NESTING INFORMATION: Audubon members can add a great deal to our records of the nesting activities of both introduced and native species if they will call when they find a nest. Dr. Berger has agreed to coordinate the nest-record program. If you find a nest, please call him at the Department of Zoology, University of Hawaii, telephone 948-8655 or 948-8617. MAHALO NUI LOA for your interest and KOKUA.

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The poster "We Care About Hawaiian Wildlife Habitat" is available for a suggested donation of $1.50 or more. Despite our frugal existence we are unable to give away this valuable educational poster to the general public. For information call Steve Montgomery, 941-4974.

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HAWAII'S BIRDS, a field guide, is out of print. As soon as the new edition is out, we'll let you know. We'll do our best to keep the price as it is now, but no guaranty.

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JULY ACTIVITIES: PLEASE NOTE DATE

7 July - Board meeting at Waikiki Aquarium Auditorium, 6:45 p.m. Members welcome.

13 July - Field trip to Waahila Ridge to study forest birds. Bring lunch, water, and if possible, your car. Transportation cost ($1.00) to be paid to the drivers. Meet at the State Library on Punchbowl Street at 8:00 a.m.
Leader: Omer Bussen, telephone 262-5506

21 July - General meeting at Waikiki Aquarium Auditorium at 7:30 p.m.
Program: Tracing Long-lost Hawaiian Feather Work Collected during Captain Cook's Third Voyage in 1778-1779 by Dr. Adrienne L. Kaeppler, Department of Anthropology, Bishop Museum.

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