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1972 REPORT OF NENE RESTORATION PROGRAM
By State Department of Land & Natural Resources
Contributed by Ronald L. Walker
First of Two Installments

Introduction

This report concerns the Nene, the State bird of Hawaii. It summarizes the nene restoration project activities. It reviews the results of the propagation phase of the project carried out at Pohakuloa, Hawaii, the release of captive-reared birds and the field survey phase of the program.

History

The Nene, or Hawaiian Goose (Branta sandvicensis), 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.

Mr. Paul H. Baldwin studied the Nene when he was employed at the Hawaii National Park. His article, "The Hawaiian Goose, Its Distribution and Reduction in Numbers," which was published in 1945, did much to bring the plight of the Nene to the attention of biologists and ornithologists. He estimated a population of less than 50 Nene in 1944. Their range, by this time, had been drastically reduced from 3,000 square miles on the island of Hawaii and Maui, to only 1,200 square miles on Hawaii. His studies indicated that an estimated population of as many as 25,000 Nene may have been present on both islands before their decline.

In 1949, Charles and Elizabeth Schwartz compiled a report on the game birds of Hawaii after a year of field studies. They stated that the Nene was the next Hawaiian species facing extinction, and urged action to prevent this. During the 1940's the Nene was considered to be one of the world's rarest birds.

It is generally agreed that the major decimating factors were the hunting of Nene during the Fall, which was their breeding season, and the introduction of a number of new predators. The mongoose, and feral cats and dogs wreaked havoc on nesting and moulting Nene.

The Nene Restoration Program actually began in 1949 when Mr. Herbert Shipman, a rancher on the Island of Hawaii, loaned the Board of Agriculture and Forestry a pair of Nene with which to start a propagation project. At that time Mr. Shipman had the only captive flock of Nene in existence.

Initially this program was financed by a \$6,000 legislative appropriation from the Territory of Hawaii. The program was designed to study Nene in the wild and to rear them in captivity for eventual release. At that time, however, the ecological study portion was not approved by the Board of Agriculture and Forestry. In 1956, Dr. William Elder from the University of Missouri received special grants to undertake an ecological investigation of the wild Nene. The results of his findings and the achievements of the Pohakuloa Project since 1949 prompted the introduction of a Bill in the U.S. Congress to authorize the U.S. Fish and Wildlife Service to spend \$15,000 a year for a period of five years, to carry out a program of research and management to insure the preservation and re-establishment of the Nene in its former known habitat. This bill was strongly endorsed by the top conser-

vation organizations in the United States and was passed by the 85th Congress as Act 891. After the initial five-year period ended, \$15,000 annually was made available from the Bureau to continue the project and this sum was increased to \$25,000 per year since fiscal year 1968.

With the availability of federal funds in November of 1958, Mr. Richard E. Griffith, then Chief of the Wildlife Division, Region 1, U.S. Fish and Wildlife Service, came to Hawaii to survey the program and formulate plans for future work. His initial visit resulted in two men being assigned to the program. A biologist was designated overall Project Leader whose principal duty was to conduct the ecological phase of the project, as well as supervise the entire program. Mr. Ah Fat Lee was assigned as propagationist in charge of the rearing project at Pohakuloa, Hawaii.

Nene in Captivity

Fertility: This propagation project at Pohakuloa since its inception has had a problem of low fertility and hatchability. Fertility averaged 40% during the period 1950-1957, while 57% of the fertile eggs were hatched during this time. In the early years of the project it was suspected that the low fertility rate might be caused by improper diet. Outstanding authorities on waterfowl propagation were consulted to determine the best possible diets. Based on their recommendations various vitamin and mineral supplements were tried, red wheat was specially imported and various mash mixtures were imported or formulated locally. Modifications were made to the breeding pens and in the handling of the birds. The possibility of utilizing artificial insemination was discussed at length but was not pursued seriously as expertise was not available locally.

The Nene at the Wildfowl Trust at Slimbridge, England, had the same low fertility and hatchability rates as at Pohakuloa. This strongly suggested that a major reason for the problem was a genetic factor, since Nene at both projects had been obtained from the same small flock of Mr. Shipman's which had been in captivity since 1918. Observations of wild nene nests in 1958, 1959 and 1960 indicated that fertility was extremely high in the wild birds. After careful evaluation, in March of 1960 one pair of wild birds and one gosling were captured on the slopes of Mauna Loa and taken to Pohakuloa for breeding purposes. This infusion of "new blood" has been eminently successful in increasing the fertility of the flock at the Pohakuloa Project and can be seen by comparing the average fertility rates for the early years of the project with those for the latter years as shown in Table 1. /Tables 1 through 23 are omitted. Only the headings are listed at the end of the report./ The apparent fertility rate of the original (Shipman) strain of birds was "increased" by selectively eliminating breeders which had especially low fertility rates. This is shown in Table 2 where the overall fertility rate for Shipman strain geese appears as 54.5%.

Hatchability, as indicated above, was also quite low. Best hatchability was obtained when Nene were used to incubate the eggs. However, as the potential for increased production by artificial incubation of first and sometimes second clutches appeared promising, alternate incubating methods were tried. During the early years of the project, chickens, Muscovy ducks and electrical incubators were used. Silky bantams were imported in 1960-61. They were effective in hatching Nene, however, as with earlier efforts with chickens and ducks, very few bantams would be broody and available for hatching Nene eggs during the Nene breeding season which occurs during the winter. (See Table 3)

As the fertility rate was increased, the need for forcing the production of a large number of eggs in order to increase the production of young Nene was lessened. During the 1965-1966 breeding season, two geese were allowed to incubate their first clutches and to hatch the goslings. When the goslings hatched, they were taken from the adults and placed in an artificial brooder and the nests destroyed. The experiment was successful as both pairs renested within eight weeks and subsequently reared second broods. During the 1966-1967 season, nine pairs were selected to further test this technique. Eight of these pairs produced second broods during the season. Hatchability of this technique was very high and survival of the goslings in the brooders was excellent. This procedure was used on the entire flock of 30 breeding pairs during the 1967-1968 breeding season with splendid success. The flock of bantams was consequently eliminated.

Ten additional pairs of breeding age birds were retained and added to the breeding flock for the 1968-1969 season. A record total of 156 young birds was produced. This large increase in birds caused an excessive workload on the staff and proper care and maintenance of the project through the long breeding season proved to be more than the

two men assigned to the project could manage. It has been necessary to reduce the breeding flock back to 30 pairs, carefully selected for their productivity.

Diet: Adult Nene at the propagation facility are fed with commercial poultry feeds and green feeds. Scratch feed with 9% protein and All mash egg food with 16% protein, plus greens make up the basic diet of the Nene. Each day a minimum of two gallons of soaked scratch feed and four gallons of All mash egg food is fed to the Nene. The procedure is as follows:

A gallon of scratch feed is soaked overnight. The water is drained with a wire screen, and this moist feed is placed into a bucket. One rounded teaspoonful of vitamycin (vitamin-mineral supplement) is mixed onto this moist grain. Then two gallons of All mash egg food is mixed into this feed. This ration is fed to the Nene on the basis of one-half cup per bird. If all of the feed is consumed, then a little more is provided each day until some feed is left.

In addition to this commercial feed, the grass in the pens is fertilized and irrigated to provide green feed, and watercress is also fed daily. A supply of clam shells and grit is provided in each of the pens to supplement that which is present in the commercial feed. The Nene prefer the green feed over the commercial feed, which they consume sparingly.

Goslings which are removed from the first clutches and reared in the brooders are fed a different ration. For the first few days finely chopped chickweed, Stellaria media, is placed in a pan in the indoor brooder. To encourage the goslings to feed on this green feed, some of the chopped chickweed is floated in the water fountains. This has proved to be an effective technique for getting the goslings started on green feed. Subsequently, small amounts of All mash egg food are sprinkled on the chopped greens to get them started on commercial feed. In addition to chickweed, winter wheat, turnip greens, Siberian kale, pualele (Sonchus oleraceus) and watercress are chopped for the goslings. The bulk of their diet is composed of this green feed. They are fed in the morning, at noon and in the afternoon.

The goslings are moved to the outdoor brooders in approximately two weeks. Here they receive the same diet, chopped greens and All mash egg food that was fed them in the indoor brooder. A mechanical feed chopper is used at this time to prepare the bulk of chopped feed for the older goslings. Green feed for the younger goslings is still chopped by hand. As these goslings grow, they are permitted to enter an outdoor run during the day. Here they have the green grass, as well as pualele which is placed in gallon cans within the run. When the goslings are between ten to twelve weeks old, they are sexed and banded and placed in a holding pen. They are fed the same diet as the breeders during this period.

It should be noted here that the Vitamycin which is added to the Nene ration does not have antibiotic action. It is a vitamin and mineral supplement made by the Dow Chemical Company.

Feeding of the adult Nene is accomplished in the morning. Each of the pens is checked: the old feed is removed and new feed placed in the pans; the container for the watercress is cleaned and replenished with fresh watercress, and the ponds are scrubbed clean and refilled. Seasonal changes in weight of adult Nene as shown in Table 4 are not caused by the diet provided to the birds as the same ration is fed year round.

Maintenance: The pens are cleaned each week or sometimes twice a week if needed. The grass around the water ponds is cut when it gets too dense. During the summer the pens are severely mowed, then fertilized and irrigated to promote good growth of the grasses for the breeding season.

Plots selected for the plantings of green feed are mulched with the grass clippings. Seedlings of Siberian kale and turnip greens are prepared during early fall and transplanted into selected plots during the breeding season. The chickweed patches are encouraged to grow by fertilization and irrigation during the fall. Chickweed is the first source of green feed that is used during the breeding season.

A watercress patch is being prepared at Kamuela to replace the one at Pohakuloa which does not have a dependable water supply. This source of green feed is essential and our propagation of watercress is required to have this feed at the time it is needed and in the quantities required. Formerly a commercial grower was providing the project with watercress. This source was found to be unreliable because of the normal winter storms which destroyed his watercress plantings. Thus, he was unable to supply the green feed at the time it was most needed to feed the active breeders and growing goslings. In

addition, the quality of the watercress fluctuated greatly and the supplier was known to use various herbicides and pesticides to safeguard his crop.

Nesting: New nesting material is supplied to the breeding Nene each year. The old nesting material is removed from the project site after the broods have been reared. Chopped Bermuda (manienie) grass and sphagnum moss are supplied as a source of nesting materials. The Nene use these materials to line the nest which the goose makes by scraping the ground. The nests are usually constructed under redwood lath shelters which are provided in each of the pens, and quite often the geese select a site to nest in the verberna plantings or under other cover available in the pens such as Rhamnus or wild olive bushes. There appears to be a marked preference for verberna.

The sphagnum, in addition to being soft, is useful in retaining water when the eggs are sprinkled during the incubation period.

Egg Handling: The eggs are removed from the nest as they are laid. A dummy egg made of wood is used to replace each egg. The eggs are stored after the number of the egg and number of the goose is noted in pencil on the shell. When the clutch is completed, all of the eggs are marked with indelible ink with the goose number and egg number, then replaced under the goose for incubation.

These eggs are incubated for ten days, then candled. Only those eggs with viable germs are replaced under the goose for incubation. During this incubation period the eggs and nests are sprinkled with water twice a week. This added water compensates for the lack of moisture at Pohakuloa as compared to natural conditions at the Keauhou Sanctuary and other areas where wild Nene nest.

When the eggs hatch, the goslings are removed from the nest and placed in the indoor brooder. This procedure is the practice for all first clutches. Eggs which begin to pip in the afternoon are not placed in an incubator until the next morning.

The Nene usually reneest and lay a second clutch. The eggs of the second clutch are incubated by the goose and are also candled every ten days. As with the eggs from the first clutch, each egg is marked in indelible ink with the number of the goose and the egg number. Dates of first eggs for each season from 1953 to 1971 are shown in Table 5.

All of the eggs that fail to hatch are examined, and any failing to hatch is recorded in our permanent records. An effort is made to age the dead embryo.

During the 1968-1969 and 1969-1970 seasons a sample of 32 first clutches of eggs was selected for the study of moisture loss during incubation and the relative size of eggs in relation to position in the clutch. The eggs were weighed upon being laid. The maximum and minimum weights of these eggs as well as the average weights of the eggs in relation to the position in the clutch are shown in Table 6. The goslings and then egg shells were weighed upon hatching. Tables 7 and 8 when viewed together show that the weight loss for eggs that hatched ranged from 33 grams to 33.8 and averaged 32.4 grams.

Productivity of Geese: Table 9 presents a tabulation of the number of eggs laid by geese of various ages and for the Shipman strain and the wild strain.

The production of eggs per goose appears to be less in the sample of wild strain geese because they were permitted to lay only 1 or 2 clutches. The Shipman strain geese were made to lay three and four clutches because the fertility of these eggs was considerably lower than the wild strain geese. Only by increasing the total number of eggs laid could the productivity of the Shipman strain geese be made to approach that of wild strain geese.

Health: The Nene have been remarkably disease free. Records of sick birds are limited to those reared in captivity. One bird succumbed to bacterial enteritis. There have been several instances of a "shaky" condition diagnosed as a severe vitamin deficiency despite vitamin supplements in the diet. This condition is not normally fatal, but the victim usually does not recover full control of its motor nerves. No wild Nene have been found suffering from either condition.

Although not a disease, it should be noted that a wild goose was found dead at Kahuku Ranch with an egg stuck in her oviduct. The egg was apparently too large to pass through the cloaca.

Renesting of Nene in Captivity: As noted previously, artificial incubation and incubation by chickens and ducks proved less effective than geese. During the 1966-1967 season seven geese were permitted to hatch their first clutch of eggs. The goslings were removed and the geese reneested and laid second clutches.

Goose	First Clutch	Hatch/ Date	Second Clutch	Hatch	Days Between Clutches
206*	10/4 - 8	0 - 1*	11/24 - 28	0	35
153	10/19 - 27	1 - 11/28	12/24 - 29	4	26
110	10/24 - 27	3 - 11/30	1/8 - 13	3	39
215	10/31 - 11/6	3 - 12/8	1/6 - 12	3	28
224	11/1 - 7	2 - 12/7	1/6 - 13	4	30
227	11/15 - 22	4 - 12/23	1/22 - 28	5	30
280	12/25 - 30	3 - 1/30	3/8 - 15	4	37

*Goose 206 performed as expected under the circumstances. Her first clutch was candled after 10 days of incubation and were found to be infertile. This nest was destroyed and she renested 35 days later.

Renesting occurred on an average of 31.8 days after the first clutch was successfully hatched and varied from 26 days to 39 days. These results encouraged us to utilize this technique on the entire breeding flock during the 1967-1968 season. There were 27 producing pairs during that season. A total of 27 first clutches, 18 second clutches, and 2 third clutches was laid. The disparity between the number of first and second clutches can be explained. Nine geese were permitted to lay only one clutch of eggs due to age, lateness of egg laying, and problems with vicious ganders.

Distribution of Nene Reared at Pohakuloa: Table 23 indicates that since 1949 a total of 1,062 Nene have been produced by the project. Most of these birds have been released into the wild; however, live Nene have been distributed to various zoos and avicultures as shown in the following list:

Released on Hawaii	712	Hilo Zoo, Hilo	4
Released on Maui	93	Wildfowl Trust, Slimbridge, England	4
Returned to Mr. H. Shipman	4	Dr. Dillon Ripley, Litchfield, Conn.	2
Honolulu Zoo, Honolulu	22	Patuxent Research Center /Laurel, Md./	4
National Zoo, Washington, D.C. .	4	Haleakala National Park /Maui/	6
Portland Zoo, Portland, Oregon .	2		857

In addition to the distribution of live Nene, dead specimens have been sent to various museums and for public display at Division of Fish and Game offices and offices of the National Parks and Bureau of Sport Fisheries and Wildlife.

To be continued

Citrus Swallowtail

By Wayne C. Gagne

Entomology Department, Bishop Museum

A few months ago the Editor of THE ELEPAIO requested that a popular article be prepared on the recently established immigrant butterfly known as the citrus swallowtail (Papilio xuthus), an insect native to Asia. Personnel of the State Department of Agriculture first found this insect in the Salt Lake area of Oahu in April 1971 (1). It spread to Kauai by June 1972 (2). It has not reached other neighbour islands yet.

As the common name suggests, the larvae feed on the leaves of citrus species. In the early stages, they closely resemble bird droppings, an apparently protective coloration to avoid bird predation. The adult is a striking yellow and black insect about the size of the more familiar Monarch butterfly (Danaus plexipus), with which it now shares urban haunts.

In anticipation of it reaching pest proportions, the State Department of Agriculture is now attempting its biological control primarily utilizing a parasitic tachinid fly (Exorista sorbillans) from South East Asia. This fly apparently has not successfully established (3). However, the eggs are heavily parasitized by previously established Trichogramma species (4) and it still remains fairly innocuous. There is no large scale citrus industry here yet, and if such were started, citrus swallowtail population could explode.

Some are apprehensive that P. xuthus will attack Hawaii's numerous endemic trees and shrubs in the citrus family--the Rutaceae. There are here about 100 species in 3 genera (Pelea, Platydesma and Fagara), including, among others the island "flower" of Kauai, the Mokihana (Pelea anisata). To date the only reports of feeding on these hosts has been

made by Mr. John Obata (pers. comm.) of Honolulu. He has been growing native flora for ornamental purposes at his home near Salt Lake. He reports that several of his seedling Pelea have been attacked. These larvae were reared and they were P. xuthus (5).

The citrus swallowtail is just one species in the yearly average of over 20 reported new, accidentally immigrant insects to the State. To this must be added an unknown number of inconspicuous arthropods that remain unrecognized, usually because of their small size or close superficial resemblance to resident species, both native and exotic. Stir into this pot the limited number of already overburdened insect identification specialists who are declining in number because of budgetary restrictions and the makings of yearly "enrichment" of unknown insect guests is readily apparent.

For better or worse, established insects such as P. xuthus are usually permanent additions to our fauna, as long as there is an abundant food supply. In urban Oahu alone there are a tremendous number of derelict citrus trees that will continue to meet its needs.

References

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- (2) Sugawa, D.T. & K. Kawamura. 1972. Haw. Coop. Econ. Insect Rpt. for the week ending June 30, 1972.
- (3) Kajiwar, J.T. et al. 1972. Ibid for the week ending June 9, 1972.
- (4) Kawamura, K. 1972-3. Ibid for the weeks ending June 30, Sept. 10 & 24, and Oct. 1, 1972; Feb. 2, May 4, July 27, and Oct. 1, 1973.
- (5) Gagne, W.C. 1974. Notes and Exhibitions: Papilio xuthus L. Proc. Haw. Ent. Soc. 22(1): In press.

RECOVERIES

Banded and recovered location: Midway

Recovered by H.I. Fisher, South Illinois University

Condition at recovery: Alive, released

<u>Band No.</u>	<u>Date Banded</u>	<u>Date Recovered</u>	<u>Age at Banding</u>	<u>Approx. Age at Recovery*</u>	<u>No. of Recovery</u>	<u>Bander</u>
Banded under G.C. Munro's Permit No. 5738						
Species: Black-footed Albatross						
40-721648	6-12-45	11-25-72	Juvenile	27½ yrs	3	G.Morgan
Species: Laysan Albatross						
40-720959	7-1-47	11-28-72	Adult	25½ +	1	Woods
960	7-1-47	11-30-72	Adult	25½ +	1	Woods
40-721857	6-0-45	11-21-72	Juvenile	27½	4	G.Morgan
864	6-0-45	12-28-72	Juvenile	27½	1	G.Morgan
911	6-0-46	12-6-72	Adult	26½ +	1	G.Rowe
41-724437	6-0-46	12-22-72	Adult	26½ +	1	G.Rowe
453	6-0-46	11-24-72	Juvenile	26½	2	G.Rowe
Banded under Grenville Hatch's Permit No. 6520						
Species: Laysan Albatross						
40-735724	7-10-48	12-22-72	Immature	24½	2	E.&W.Sawyer
791	6-19-49	12-25-72	Immature	23½	2	"
795	6-15-49	11-30-72	Immature	23½	2	"
860	7-3-49	11-30-72	Juvenile	23½	3	"
44-725238	7-3-49	11-24-72	Adult	23½ +	2	"
287	7-3-49	11-30-72	Juvenile	23½	2	"
327	11-20-49	11-30-72	Adult	23 +	2	"
382	1-28-51	11-23-72	Adult	21½ +	3	W.E.Hewitt
52-700010	6-17-51	11-28-72	Unknown	21½	2	"
39	6-17-51	12-15-72	Unknown	21½	1	"

*Adult bird's age is difficult to determine.

Hawaiian Hummingbirds by George-Ann Davis, 13 March 1974

Recently, many people, especially those living in the Pearlridge area have reported seeing hummingbirds. The sightings have usually been in the early evening in gardens; the "birds" behaving much like hummingbirds on the Mainland. They are a few inches long,

brownish color, make a buzzing sound with whirring wings and have a long "bill".

These are sphinx moths, an insect that has been introduced to the islands. The long bill is an extended proboscis. They may be seen during the day, too.

As far as is known, hummingbirds have never been introduced to Hawaii.

Nesting Site for Mynahs by Carroll Wilson, 2 March 1974

While walking under the Lunalilo Freeway on Piikoi Street sometime in mid-February, I saw a Mynah drop from the ceiling level of the freeway over my head, apparently from one of the ventilation holes. The bird flew away, and I thought little of the event until a few days later when I saw it repeated. A Mynah emerged from a vent in the concrete over my head. I watched the bird for about ten minutes and during that time it made three trips into the vent, carrying what appeared to me to be nest-building material. On March 2, 1974, my wife and I walked under the length of the elevated section of Lunalilo Freeway between Kewalo and Pensacola Streets and noticed at least four pairs of Mynahs which seemed to be nesting in the space above the freeway vents.

I estimate the vents to be approximately four inches in diameter and six inches deep. They are short sections of concrete pipe flush with the ceiling of the elevated freeway and lead into an open space beneath the pavement of the freeway itself. In order to enter the space through one of the vents the Mynah flies straight up into the vent pipe, folding its wings as it enters, having to pass the length of the pipe on the strength of momentum developed before folding its wings. As far as I am able to tell there are no footholds to facilitate entry.

Plover Watching: From Sigrid B. Southworth, Librarian, Kamehameha High School Division, Honolulu, 1 April 1974

...We have a number of resident plovers here on the campus at Kamehameha, and as I live on campus, I watch them rather closely. One has completely changed into its new plumage, one is just beginning to be a little mottled, and I have noticed no change yet on the others. Will try to note departure dates and send them to you.

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From Erika Wilson, 13 March 1974: Warm, humid, overcast; grassy area at the Fort Shafter Interchange of H-1 Freeway. One individual was seen having a large part of its breast in the black plumage of breeding, although there remained splotches of the winter plumage. No evidence of the strong white markings was seen, nor was the black in evidence on the throat or head.

5 April 1974, 4:40 p.m.: Clouds, sunny, cool, light wind; Kaahumanu School, Beretania and Piikoi Streets. Today I had the pleasure of seeing a Golden Plover in full breeding plumage! What a magnificent sight; the bird is in its new jet black waistcoat edged with pure white, the golden flecks on its back taking on a new brilliance as the bird ran lightly across the grass in the sun. It watched me admiring its new outfit, stooped to feed, and then moved off across the lawn.

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On 4 April two plovers were completely in their handsome breeding plumage and three others were still showing spotted breast, but on 8 April all five were gone. A disappointment! Oh, how I was hoping they would linger a while longer, so that all five would be completely changed, but nature called and off they headed for the breeding grounds. As I go by the Palm Circle at Fort Shafter, it is not the same without the plovers, but I am thankful that it is not a permanent void and hope that sometime in August or September I'll be fortunate enough to welcome them back. Please send in your observations to Kojima, 725-A 8th Avenue, Honolulu, Hawaii 96816.

Field Notes from Erika Wilson: Birding in Na Laau Arboretum

On February 17, 1974 George-Ann Davis and I went for a walk in the Na Laau Arboretum on the ewa side of Diamond Head in the morning. It was a clear, warm day; the sun was just reaching the tops of the kiawe trees. During the walk we saw the following species: Rock Dove, Spotted Dove, Barred Dove, Mockingbird, Common Mynah, Japanese White-eye, Ricebird, House Sparrow, Cardinal, Red-crested Cardinal, House Finch, Orange-cheeked Waxbill, Red-eared Waxbill, and Lavender Finch.

We also saw an unknown finch-like bird--its bill was orange-red like a Waxbill and its head had a deep chestnut crown marked with black edging stripes above the eye. The underparts were beige and its back and wings were mixed black, brown, and buff streaks. Jack Throp, Director of the Honolulu Zoo, identified it from our description as a male Pin-tailed Whydah in eclipse plumage.

We walked back through Kapiolani Park and added the Java Sparrow and the Golden Plover to our list. Of the sixteen species seen, only one--the Golden Plover--is an indigenous species.

Field Trip to Ulupau Head by Erika Wilson

A group of 21 enthusiastic bird watchers met March 10, 1974 at the Main Gate of the Kaneohe Marine Base in the morning. We were escorted to the Red-footed Booby colony at Ulupau Head by a Marine Sergeant who warned us about the hazards in the area. The colony was quite active--over one thousand birds wheeling overhead, sitting on nests, or standing on kiawe branches. We walked through the colony on a trail--the boobies watched us, usually without moving. Bob Shallenberger did some filming, and others happily snapped close-ups of the obliging boobies.

We saw only a few eggs as it is early in the breeding season. Several birds were bringing nesting materials to the area. High overhead there were Great Frigatebirds, and occasionally some Sooty Terns flew over. From the top of Ulupau Head we had a clear view of Moku Manu and we could hear the cries of thousands of birds over the rumble of the ocean below. I could distinguish Sooty Terns, Noddy Terns, Great Frigatebirds, and Red-footed Boobies. Some of the members saw a Red-tailed Tropicbird flying along the face of the cliff.

We sighted a whale in the water around Moku Manu, and some people saw a sea turtle. Four of us went down to a rocky tide pool area where we saw pink coral, sea cucumbers, crabs, fish, and several types of sea urchins.

Later in the morning we stopped at the Fish Pond area on the Marine Base where we saw 4-5 Hawaiian Stilt, an immature Black-crowned Night Heron, Golden Plover, and 10-15 Black Noddys, some of whom were flying low over the pond in graceful sweeps. Other members went to the Cattle Egret heronry in another part of the Fish Pond area; they saw a few Hawaiian Stilt young.

Environmental Coalition by George-Ann Davis, 13 February 1974

The Hawaii Audubon Society has joined five other local community groups (Citizens for Hawaii, Conservation Council for Hawaii, Sierra Club Hawaii Chapter, Life of the Land, and Zero Population Growth) to form the Environmental Coalition. The Coalition will perform a valuable service by assembling and directing information on pending environmental legislation to the groups named above. The Coalition will also assist Hawaii's legislators by providing them with data and the advice of experts when legislators are formulating laws and resolutions concerning the environment.

In addition, the Environmental Coalition urges that individuals directly participate in the law-making process by presenting testimony, visiting or phoning legislators, and writing letters to legislators.

The Coalition feels that the following regarding a proposed Environmental Policy Act should be general requirements for good and effective environmental legislation enacted this year: (1) that such legislation be in bill form; (2) that the legislature pass a Statewide Environmental Policy Act containing a section on Environmental Impact Statements as the implementation arm of that act; (3) that the legislature pass a bill giving Citizen Standing to Sue; this last provision would give citizens and agencies recourse to the courts and help to ensure the integrity of Environmental Impact Statements.

The office of the Environmental Coalition is at 205 Merchant Street, Room 18, Honolulu 96813. There are two staff members: Caroleen Toyama and Connie DeMartino, who are available at 538-6539 to answer questions and to provide information on legislation.

Testimony on Proposed Revision of Regulation 4: A Regulation of the Department of Land and Natural Resources, State of Hawaii, Governing Lands within the Conservation District at a public hearing, 13 December 1973 by Acting President Wayne C. Gagne

General Comments: The proposed regulation puts excessive powers in the hands of the Chairman of the Board of Land and Natural Resources, particularly with regard to the need

for public hearings on conditional uses in the subzones. Public hearings should be required for all conditional uses in at least the "P", "R", and "L" subzones. We need to take a long hard look at the other subzones in this respect also. Too much here is left to the discretion of the Chairman.

Recent State law concerning the repeal of the public hearing requirement for the placement of public utilities in the Conservation District should be overturned in the next legislative session. Then, the application for a utility placement in the Conservation District under the new Regulation would be viewed as a Commercial use subject to the stipulations outlined on pages 29 and 30.

Specific Comments: ... /too detailed and are not listed here/

Natural Areas: The remainder of our testimony details the criteria for the treatment of natural area reserves for native terrestrial and freshwater ecosystems as well as specific geological formations. These require more attention than has been devoted to them in the present draft of Regulation 4. ...

HONOLULU ADVERTISER, 13 December 1973, page D-9: Pesticide Hearings Slated Next Week

The State Department of Agriculture will hold public hearings next week on its proposed new regulations to control the use of pesticides in Hawaii. The regulations will implement the Hawaii pesticide law passed this year by the State Legislature.

Among the provisions of the regulations are the establishment of two classes of pesticides--restricted and nonrestricted. Nonrestricted pesticides are those that can be bought in any garden-supply store. Restricted ones will be limited to use by "certified pesticides applicators."

Frederick Erskine, Chairman of the Agriculture Department, said restrictions depend on the danger of the pesticides to people or to the environment. Those hazardous to humans will be classified either as "highly toxic"--meaning an immediate hazard--or as a long-term hazard, depending on concentrations and accumulation of the chemicals in the body. Others will be classified according to their danger to the environment--either in general or to particular species of plants. Some chemicals, such as Spectracide, will still be available over the counter, but only in a more dilute form. More potent concentrations will be available only to certified pesticide applicators.

The State will set up a program for certifying persons who are required to use pesticides--such as termite exterminators and farmers. The law setting up the program also allows the State a "right of entry" to investigate the use of pesticides on farms and other areas. ...

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Testimony on Proposed Regulation 1 of the Division of Plant Industry Relating to Pesticides --to Implement Provisions of the Hawaii Pesticides Law at the public hearing, 20 December 1973 by Acting President Wayne C. Gagne.

The Society supports the proposed regulation which is a vast improvement over those now on the books. We have the following suggestions which we think will improve the regulation.

General Comments: There is no vehicle for self review. The Pesticide Advisory Committee would seem to be the logical choice. Such self review of the Board of Agriculture would probably have avoided the recent controversy surrounding proposed aerial spraying of pine plantations with Diazinon near Olinda, Maui, for the Eurasian pine aphid.

Specific Comments: Labelling--Page 8, subsection 4.4(b)--Some insecticides are sold in double containers and usually the actual container does not even contain a label. The regulation should stipulate that the inside container bear the same labels as the outside container, even if this labelling has to be greatly reduced to fit the former, for example, for cockroach bait traps and no-pest strips impregnated with vapona (DDVP).

Acceptable and unacceptable pesticide use--Page 13, section 6.10--There does not appear to be any procedure for determining the specific acceptable and unacceptable uses for pesticides in Hawaii. This regulation might follow the Federal Regulations, and the Pesticides Advisory Committee should review the problems peculiar to Hawaii. The regulation should specify that uses not explicitly mentioned on the label are prohibited.

Pesticides in finished goods--Page 14, subsection 7.4--Many cardboard containers, fabrics and clothing contain insecticides, moth-proofers and mildew retardants. In addition to their toxicity to humans, direct prolonged contact with the skin undoubtedly cause

allergies and dermatitis. The subsection should include some provision for suitably labelling these finished products. This way, those with diagnosed allergies can avoid contact with these products. Also, the task of the dermatologist is simplified when confronted with a perplexing allergy, asthmatic condition, etc.

Emergency conditions--Page 19, subsection 12.2, paragraph b--A Federal or a State Agency are exempted from the regulation under what are termed "emergency conditions." It would seem that there should be some vehicle to quickly assemble and review a particular situation to determine if there is indeed an emergency, and continue review of the subsequent control procedure. Otherwise, there is room for nullification and abuse of the regulation here; witness the Mirex fiasco in the Southern U.S. for eradication of the fire ant, with its attendant, longlasting environmental problems. The powers of emergency declaration should not lie in the hands of one person, but rather with an emergency review board.

Commercial applicators--Pages 36 & 37--To the sections on forest, aquatic and right-of-way pest control should be added a statement that the applicator demonstrate a knowledge of the island distribution and zonation of Hawaiian ecosystems and of the locations of State Natural Area Reserves and Federal, State, and County Parks containing native biota. One mistaken application of a herbicide, for example, could cause the extinction of any of several hundred narrowly distributed Hawaiian plant species and its dependent biota. Hazards to the native biota from this sector of pesticide application should be minimized.

This concludes our testimony.

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HONOLULU STAR-BULLETIN, 12 January 1974, Page A-12: A Move to Lift the DDT Ban by Harry Whitten

A virtual ban on the domestic use of the insecticide DDT went into effect a year ago this month but the controversy over DDT continues. In the meantime, the world has become more aware of a shortage of resources, including food and lumber, production of which is damaged by insects. On one side, increased emphasis has been given to biological control of insects, to new planting and crop rotation techniques, and to insecticides that do not persist in the environment the way DDT does. On the other side, an infestation of tussock moths has defoliated 560,000 acres of forest in the Northwest and spurred a strong movement to lift the ban on DDT. ...The tussock moth damage has resulted in a move in Congress to pass a bill giving the Secretary of Agriculture authority to approve use of DDT in an emergency, although it would still be banned from general use. The EPA rejected a request by the states of Oregon and Washington last spring for emergency use of DDT against the moth but will hold hearings this month on a possible emergency exception. ...

Many scientists have questioned adequacy of the research that resulted in banning DDT and have said that starvation and malaria are greater threats than DDT's environmental damage. ...DDT has not been used for several years in Hawaii. ...

One result of the ban on DDT has been greater use of the insecticide pyrethrin, made from a member of the chrysanthemum family named pyrethrum and synthetic pyrethroids. ... Pyrethrin has a long record of safe use and is readily biodegradable. ...It is the most common household insecticide used here in aerosol bombs, according to Wallace C. Mitchell, chairman of the entomology department of the University of Hawaii's College of Tropical Agriculture.

A number of other insecticides are used on crops here, he said, including malathion, chlordane, diazinon, dibrom, and others. Most are phosphates. The choice of insecticide depends on crops and conditions. ...

Hawaii's Legislature has passed Act 150, to go into effect this year, and which will regulate use of pesticides. Hearings have been held and an advisory commission is at work on rules. Mitchell predicts that the law will be difficult to enforce.

Two insecticides, dieldrin and aldrin, have been widely used on the Mainland as substitutes for DDT and have been criticized as posing a cancer peril. They are not used in Hawaii, according to the State Agriculture Department.

Hawaii's sugar industry does not use insecticides but does use weed control chemicals (herbicides), fungicides, and rodenticides (for rats). The industry says that without herbicides, weeds would flourish and might reduce sugarcane production by as much as 70 per cent.

HSPA Experiment Station entomologists have introduced many beneficial insect species to control harmful insects.

HONOLULU STAR-BULLETIN, 16 February 1974, Page A-12: A Film on Rabbit Island by Harry Whitten

Manana Island, one mile off the shore of Oahu opposite Sea Life Park, looks brown and barren but it teems with life. More than 200,000 birds nest there every year and there are also a few of the bunnies that give the 361-foot-high tuff cone its common name of Rabbit Island.

Two Island scientists, Walter J. Arnell and Robert J. Shallenberger, have produced a 25-minute color and sound film called "Manana, Island of Birds." The first public showing of the film will be at...the general meeting of the Hawaii Audubon Society.../18 Feb 1974/

A second natural history film, "Guided by the Nene", will also be shown. This film, describing the efforts over several years to save from extinction the goose that is Hawaii's State bird, was produced by Fred and Ginny Trumbull of Los Altos, California.

Manana is one of several islands offshore from Oahu that have large bird populations. "These offshore islands are unique natural areas," according to Arnell and Shallenberger. "Nowhere else can you find such massive populations of birds nesting so closely to human beings. The islands should be strictly protected and studied."

The film on Manana has a conservation message, about the problems of human trespassers and possible damage to birds, especially during nesting seasons. Both Manana and Moku Manu, off Mokapu Point, are State sanctuaries, with visitation allowed by permit only from the State Fish and Game Division. The film relates an entire nesting season of the wedge-tailed shearwaters, noddy terns and sooty terns on Manana. It also tells something about the island's geology, its vegetation, which consists of a few palm trees, grasses and tobacco plants, and its rabbits. The rabbits, which were introduced around the turn of the century, now consist of a small, fluctuating population, worth a biological study, Shallenberger says.

Shallenberger lived on Manana during parts of three summers while doing research on the wedge-tailed shearwater for his doctor of philosophy degree in biology, which he received from the University of California at Los Angeles last March. He has written for scientific publications on Hawaiian birds, fishes and marine mammals, has done field work in the Western United States, Alaska, Mexico and Africa, and is a certified pilot and SCUBA diver.

Arnell, who has his doctor's degree in engineering from the University of London, has been academic dean at California State University at Long Beach, project manager of the Hawaii Environmental Simulation Laboratory, and researcher at the University of Hawaii. He has produced two films on Africa, one on Antarctica, and also one on geothermal power in Hawaii.

Arnell and Shallenberger have formed a company, Ahuimanu Productions, to produce other educational, scientific or natural history films on Hawaiian subjects for showing in schools, on television, and before interested groups here and elsewhere in the world.

They have started work on two new projects. They do the entire production, research, script, filming and editing. They funded the production of the Manana film themselves but they hope to attract funding for future films.

They say much research still needs to be done on Hawaiian ecology. They invite volunteer information on unusual concentrations of Hawaiian wildlife, abnormal animal behavior, or accessible nesting areas or natural areas. Their address is Ahuimanu Productions, P.O. Box 1166, Kailua, Hawaii 96734.

More Insects: An interesting statistic on the changes in Hawaii's environment caused by fast modern transportation was given recently in a talk by Wayne Gagne, Bishop Museum entomologist. Before man arrived in the Hawaiian Islands, the rate of colonization by new species of insect was about one every 200,000 years. Today, despite the efforts of quarantine inspectors, about two dozen new insects arrive each year. Some, but not all of them, become bad pests.

Excerpts from minutes of Hawaii Audubon Society general meeting, 21 January 1974

...HAWAII'S BIRDS needs to be reprinted, as there are only 8000 left. Wayne Gagne, Rob Shallenberger, Steve Montgomery and Tonnie Casey will be the working committee. The price will probably go up some.

...Kawainui Swamp: There is a meeting to be held January 24 at the Pali Golf Club-house regarding the proposed plans for shopping center and park. The swamp is a potential

water bird habitat, and it is hoped that a sanctuary in the middle of the park might be included.

...Alan Hart spoke about some interesting specimens seen at Kauai Surf Hotel Pond at Nawiliwili Harbor, three Hawaiian gallinules--friendly birds--unconcerned with commotion about them.

Society is looking into helping /Bishop/ Museum finance color plates of the new genus and species of bird found on the NE outer slopes of Haleakala. It is a honeycreeper; common name Po'o-uli (black head).

...Erika Wilson summarized the outstanding figures of the Christmas bird count.

...The meeting concluded with an informal slide show by Alan Hart and Wayne Gagne on the Alaka'i Swamp Area on Kauai.

18 February 1974

...Announcements: (1) Environmental impact statements on Volcanoes National Park Wilderness areas /by Wayne Gagne and Mae E. Mull/ (2) Environmental coalition which Audubon Society has joined (3) Rob Shallenberger reported at Kawanui meeting for Audubon position (4) Exotic birds effect on Hawaiian environment...

Two movies were shown: Guided by the Nene; and Manana, Island of Birds by Rob Shallenberger.

Patricia Bloedon

ALOHA to new members:

Junior: Thomas C. Damon, 835 Kealaolu Ave, Honolulu, Hawaii 96816

Regular: F.R. Ankers, 1635 Shangri La Drive, Reno, Nevada 89502

J.M. Bradley, Box 19, USNS Midway Island, FPO San Francisco 96614

Mrs. Sibyl N. Heide, 2049 Round Top Drive, Honolulu, Hawaii 96822

Baron A. McLean, 1002 Danbeck Ave, Santa Rosa, California 95404

Dorothy H. Miles, 2085 Ala Wai Blvd, Apt 22, Honolulu, Hawaii 96815

Dana Peterson, 1904 Vancouver Drive, Honolulu, Hawaii 96822

Mrs. John Turner, 46-365 Hololilo St, Kaneohe, Oahu 96744

Aquatic Research Institute, 21393 Curtis St, Hayward, California 94545

Division of Wildlife Research, P.O. Box 84, Lynham, A.C.T.2602, Australia

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Because of critical paper shortage the annual index for Volume 34 will be mailed to members only upon request, so if you are interested in receiving a copy, please send in your reservation before July to Kojima, 725-A 8th Avenue, Honolulu, Hawaii 96816.

HAWAII'S BIRDS, a field guide, is available for \$2.50 postpaid, Airmail 65¢ extra. Send in orders to: Book Order Committee, Hawaii Audubon Society, PO Box 5032, Hon., HI 96814

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MAY ACTIVITIES:

12 May - Field trip to see Reef Runway Replacement Habitat, West Loch, Pearl Harbor. 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: Steven Montgomery, telephone 941-4974.

13 May - Board meeting at McCully-Moiliili Library, 6:45 p.m. Members welcome.

20 May - General meeting at Waikiki Aquarium Auditorium at 7:30 p.m. Program: Recent Discoveries of a Fossil Hawaiian Avifauna by Dr. Alan C. Ziegler, Vertebrate Zoologist, Bishop Museum

HAWAII AUDUBON SOCIETY EXECUTIVE BOARD:

President: Wayne G. Gagne

Vice Presidents: H.Eddie Smith (program), George-Ann Davis (education)

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Treasurer: C. Florence Hendryc

Board Members: Steven L. Montgomery (conservation), Mae E. Mull (Big Island /

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