HAWAIIAN BIRDS 1972*

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More kinds (species and subspecies) of birds have become extinct in Hawaii than on all continents of the world combined. These endemic Hawaiian birds have become extinct since 1840, and most of them have succumbed since the 1890s. Table 1 lists the endemic Hawaiian birds which are presumed to be extinct.

Moreover, Hawaiian birds account for nearly one-half of the birds in the U. S. Bureau of Sport Fisheries and Wildlife's Red Book of rare and endangered species. The following list contains 16 of the rare and endangered Hawaiian birds: Newell's Manx Shearwater (*Puffinus puffinus newelli*), Hawaiian Dark-rumped Petrel (*Pterodroma phaeopygia sandwichensis*), Harcourt's Storm Petrel (*Oceanodroma castro cryptoleucura*), Nene or Hawaiian Goose (*Branta sandvicensis*), Koloa or Hawaiian Duck (*Anas wyvilliana*), Laysan Duck (*Anas laysanensis*), Hawaiian Hawk (*Buteo solitarius*), Hawaiian Gallinule (*Gallinula chloropus sandvicensis*), Hawaiian Coot (*Fulica americana alai*), Hawaiian Black-necked Stilt (*Himantopus himantopus knudseni*), Hawaiian Crow (*Corvus tropicus*), Large Kauai Thrush (*Phaeornis obscurus myadestina*), Molokai Thrush (*Phaeornis o. rutha*), Small Kauai Thrush (*Phaeornis palmeri*), Nihoa Millerbird (*Acrocephalus familiaris kingi*), and the Kauai Oo (*Moho braccatus*). To this list may be added the non-migratory Hawaiian population of the Black-crowned Night Heron (*Nycticorax n. hoactli*).

But, there are even more endangered Hawaiian birds! Because of their special interest to ornithologists, I include a second table (Table 2) to cover Hawaii's only endemic bird family, the Hawaiian honeycreepers or Drepanididae. What this table means in terms of the 22 species and 24 subspecies of honeycreepers that were delineated by Amadon (1950) is that there is not a single species, whose range once included more than one of the Main islands, that does not have populations that either are already extinct or have endangered populations on one or more islands!

The honeycreepers that currently are considered non-endangered are found primarily on the islands of Kauai, Maui, or Hawaii, although the Amakihi and Apapane on Oahu are not classified as endangered. The Anianiau (*Loxops parva*) is endemic to Kauai only. Only the Kauai race of the Akepa (*Loxops coccinea caeruleirostris*), and only the Kauai (*Loxops maculata bairdi*) and Maui (*L. m. newtoni*) races of the Creeper are thought not to be endangered. The Apapane, Amakihi, and Iiwi are still common in suitable habitat on Kauai, Maui, and Hawaii. This is a pitiful remnant of a family of birds that demonstrated the results of adaptive radiation to a far more striking degree than even the Galápagos Finches.

In view of this depauperization of Hawaii's unique avifauna, what can one say about the prospects for preserving the dwindling populations that exist in 1972? Unfortunately, one must say that the prospects are poor, indeed. Unfortunately, too, this essay probably will serve only two functions: to document what has been, and still is, happening, and to give me a writing exercise. I am but one in a long series of people who have decried the rape of the Hawaiian biota.

Scott Wilson, an English ornithologist, called attention to some of the problems as

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* The Conservation Committee of the Wilson Ornithological Society, recognizing that bird conservation problems in the Pacific islands have unusual urgency, decided to concentrate its efforts for 1971–72 upon them. This report by Dr. Berger is the first portion of the Committee's report for the year. *Gustav A. Swanson, Chairman.*

TABLE 1
EXTINCT HAWAIIAN BIRDS

Full Species	Subspecies
Laysan Rail, *Porzanula palmeri*	Laysan Millerbird, *Acrocephalus f. familiaris*
Hawaiian Rail, *Pennula sandwichensis*	Laysan Honeycreeper, *Himatione sanguinea freethii*
Oahu Oo, *Moho apicalis*	Oahu Thrush, *Phaeornis obscurus oahensis*
Molokai Oo, *Moho bishopi*	Oahu Akepa, *Loxops coccinea rufa*
Black Mamo, *Drepanis funerea* (Molokai)	Oahu Nukupuu, *Hemignathus l. lucidus*
Kioea, *Chaetoptila angustipluma* (Hawaii)	Lanai Thrush, *Phaeornis obscurus lanaiensis*
Hawaii Oo, *Moho nobilis*	Lanai Creeper, *Loxops maculata montana*
Greater Amakihi, *Loxops sagittirostris* (Hawaii)	
Greater Koa Finch, *Psittirostra palmeri* (Hawaii)	
Lesser Koa Finch, *Psittirostra flaviceps* (Hawaii)	
Grosbeak Finch, *Psittirostra kona* (Hawaii)	
Ula-Ai-Hawane, *Ciridops anna* (Hawaii)	
Mamo, *Drepanis pacifica* (Hawaii)	
Akialoa, *Hemignathus obscurus* (all three subspecies are extinct: Oahu, Lanai, and Hawaii)	

Extinct Populations of Surviving Species
Iiwi, *Vestiaria coccinea*, on Lanai
Ou, *Psittirostra psittacea*, on Oahu, Molokai, and Lanai
Crested Honeycreeper, *Palmeria dolei*, on Molokai

TABLE 2
RARE AND ENDANGERED HONEYCREEPERS

Kauai Nukupuu, *Hemignathus lucidus hanepepe*	Maui Crested Honeycreeper, *Palmeria dolei*
Kauai Akialoa, *Hemignathus procerus*	Maui Parrotbill, *Pseudonestor xanthophrys*
[1]Kauai Ou, *Psittirostra psittacea*	[2]Maui Ou, *Psittirostra psittacea*
Oahu Creeper, *Loxops m. maculata*	Hawaii Ou, *Psittirostra psittacea*
Oahu Iiwi, *Vestiaria coccinea*	Hawaii Creeper, *Loxops maculata mana*
[2]Molokai Creeper, *Loxops maculata flammea*	Hawaii Akepa, *Loxops c. coccinea*
Molokai Iiwi, *Vestiaria coccinea*	Akiapolaau, *Hemignathus wilsoni*
Lanai Apapane, *Himatione s. sanguinea*	Palila, *Psittirostra bailleui*
Lanai Amakihi, *Loxops virens wilsoni*	Laysan Finch, *Psittirostra c. cantans*
Maui Akepa, *Loxops coccinea ochracea*	Nihoa Finch, *Psittirostra c. ultima*
Maui Nukupuu, *Hemignathus lucidus affinis*	

[1] A single species once inhabited Kauai, Oahu, Molokai, Lanai, Maui, and Hawaii; all populations are either extinct or endangered.
[2] May be extinct.

long ago as 1890; H. W. Henshaw and R. C. L. Perkins wrote of others in 1902 and 1903; William A. Bryan, J. F. Rock, George C. Munro, Harvey I. Fisher, Frank Richardson, Richard E. Warner, and others made pleas for protection of the birds and their habitat during the long period between 1912 and 1964. All wrote in vain.

One has a choice, of course: to remain silent and be liked, or to speak out and be disliked. Obviously, I agree with Hawaiian environmentalist Tony Hodges, who remarked that "the people in the ecology movement are in it to survive, not to make friends."

Unless there is, in the immediate future, a drastic change in the attitudes of State and Federal officials toward the native Hawaiian ecosystems, Scott Wilson's prediction of 1890 surely will come true—"it would not be rash to say that ere another century has elapsed but few native species will remain."

In Hawaii, as elsewhere, the greed and bureaucratic policies of men lie at the root of the problem. Following are the major subjects that need immediate attention.

I. INTRODUCED HERBIVORES

Cattle, horses, goats, sheep, and English pigs were first given their freedom on the Hawaiian Islands between 1778 and 1803. Game mammals were introduced later: axis deer, 1868; mouflon sheep, 1954; pronghorn, 1959; mule or blacktail deer, 1961. Feral horses apparently were exterminated in the 1930s, but all of the other grazing and rooting mammals continue to devastate the vegetation today. What is being done to correct the problem?

A. In an attempt to pave the way for increasing substantially the size of Volcanoes National Park, the National Park Service published in 1970 a glossy, multicolor brochure entitled "The Island of Hawaii." Among the totally misleading statements that belie the Service's past performance, we find that enlargement of the Park will make it possible to "preserve the resources," that is, to "reestablish native ecosystems where practical; control, and where possible, eliminate nonnative species to protect the native biota."

In 1971 Park rangers estimated the goat population in Volcanoes National Park to number 14,000 animals! The Park Service announced that an effort finally would be made to exterminate the goats. However, the very small, but vociferous, group of local goat hunters appealed to their Congressional representatives, after which instructions to "lay off the goats" reached Hawaii from Mr. George B. Hartzog, Jr., Director of the National Park Service. Details of this story were discussed by Mr. Anthony Wayne Smith in the June, August, and November 1971 issues of *The National Parks and Conservation Magazine.*

The Hawaii Chapter of The Wildlife Society, the Hawaii Audubon Society, and other conservation groups have published "position papers" calling for the eradication of feral goats from Volcanoes National Park and Haleakala National Park on Maui. The Park Service, however, has taken only token measures to reduce the number of goats.

No meaningful action has been taken by the National Park Service to reduce the feral pigs in either of the parks, although the superintendents have given wide publicity to their plans to declare the newly acquired Kipahulu Valley segment of Haleakala National Park a "wilderness area." They propose to maintain Kipahulu Valley in a wilderness state, not by reducing or eliminating the pigs, goats, and exotic plants, but by making it virtually impossible for scientists and hikers to enter the area—because they might carry some weed seeds in their pant cuffs!

I propose that NATAPROBU (the National Association of Professional Bureaucrats) award the 1972 "Order of the Bird" to Mr. Hartzog and the National Park Service.

B. The only remaining, extensive mamani (*Sophora chrysophylla*) and naio (*Myoporum sandwicense*) ecosystem is found on Mauna Kea on the island of Hawaii. This endemic ecosystem provides the only known habitat for the endangered Palila, and it is the only habitat in which the even rarer Akiapolaau has been seen fairly regularly in recent years.

The mamani-naio forest is part of some 82,000 acres on Mauna Kea that are owned by the State of Hawaii. Of the total acreage, only about 30,000 acres are now forested, however; scattered tropical subalpine and alpine plants are found above the tree line, but the highest part of the mountain consists primarily of barren lava and cinder. Classified as a forest reserve for about 50 years, this land was turned over to the Division of Fish and Game in the early 1950s and was redesignated the Mauna Kea Forest Reserve and Game Management Area. Late in 1971, the Division of Forestry erected a large sign, announcing anew that this was the Mauna Kea Forest Reserve; it still is a game management area, as well. What actual value has been placed on this unique ecosystem by the Divisions of Forestry and Fish and Game?

1. The Division of Forestry has never conducted any significant research on either mamani or naio. Mamani seeds form a large part of the diet of the Palila.

2. Tree line of this dying forest once extended to about 10,000 feet. It now is found much lower, and continues to recede because of the overpopulation of both sheep and pigs. Except within exclosures, regeneration of mamani is virtually nonexistent because the seedlings are eaten by the sheep and rooted out by the pigs. Hunters in Hawaii have so much political power, however, that on several occasions they have forced the Division of Fish and Game to close or shorten the sheep-hunting season in order to allow the population to increase even more (Kramer, 1968). Consequently, no effort is being made to eradicate the feral sheep or even to reduce the herd to a reasonable size—carrying capacity of the range is a concept not considered in Hawaii. At the same time, great pressures are constantly being exerted to introduce the axis deer to this habitat. The influence of hunters upon these decisions seems remarkable in view of their small number, only 10,134 licensed hunters in Hawaii in 1970, according to a recent report by the Wildlife Management Institute.

3. The Kaohe Game Management Area (contiguous with the Mauna Kea Game Management Area) is open for archery hunting only, even though it contains a great overpopulation of both pigs and sheep. State personnel estimate that a fluctuating population between 500 and 1,000 sheep occupy this fenced area of approximately 6,500 acres. One would have to search far, indeed, to find more stark examples of "browse lines" than on trees in this dying forest. Moreover, more than 150,000 acres are open only to archery hunters on the island of Hawaii.

Richard E. Warner (1960) called attention to some of these problems more than a decade ago.

II. IF YOU HAVE SEEN ONE ENDEMIC TREE, YOU'VE SEEN THEM ALL!

The ohia (*Metrosideros collina* ssp. *polymorpha*) is the dominant tree in most of the Hawaiian rain forests, and tree ferns (*Cibotium* spp.) are the most conspicuous element in the understory. The ohia-tree fern ecosystem is the most important habitat for the majority of the surviving endemic forest birds. Koa (*Acacia koa*), a valuable endemic tree, was important for certain species of honeycreepers in the past, but there are few, if any, virgin koa ecosystems remaining. Sandalwood (*Santalum* spp.) was once a valuable native tree, but the commercial supply became exhausted in the 1830s.

The importance to certain endemic birds of the unique mamani-naio ecosystem was mentioned earlier.

How do State and Federal employees view these endemic ecosystems?

A. C. S. Judd, then the Superintendent of Forestry for the Territory of Hawaii, wrote in 1918 that "the destruction of the Hawaiian forest in the past was deplorable, but that it should continue in the present ... seems inexcusable." He added that the prime value of Hawaiian forests was "in their ability to serve as a protection to watersheds," and, therefore, that foresters should be "chiefly concerned with forest protection." In 1927 he wrote that it was time to conduct research on "some of the ecological problems" in Hawaii. Unfortunately, Mr. Judd's successors did not follow his recommendations.

In 1957 the State Division of Forestry initiated a cooperative agreement with the U. S. Forestry Service to conduct a forest survey and the necessary research aimed at developing a timber industry in Hawaii. Since that time, the Institute of Pacific Islands Forestry, Pacific Southwest Forest and Range Experiment Station, Forest Service, U.S.D.A., in Honolulu has given guidance to the State foresters. The board-feet-oriented Federal foresters repeatedly refer to the endemic Hawaiian ecosystems as "decadent forests" and as consisting of "unproductive forest land," and they have developed an "effective and efficient technique for eliminating cull" ohia trees—by "injecting undiluted herbicides into tree trunks."

More than 46,000 acres have been cleared and planted with exotic trees, most of which do not have even a potential commercial value. More importantly, much of the planting effort has been concentrated on already-forested land. This has caused the utter destruction of near-virgin native forests: for example, along the Kulani Prison road on Hawaii. More than 1,500 acres were "reforested" within so-called forest reserves during fiscal year 1969–1970.

U. S. Forestry personnel in Hawaii finally decided in late 1970 that some research on koa should be considered, and in 1971, they voiced concern about ohia. There can be little doubt but that this belated interest in some of the endemic trees resulted partly because of the constant prodding of conservationists in Hawaii, although another event undoubtedly was important. On 13 May 1970, Norman Carlson, the highly respected manager of the Bernice P. Bishop Estate agricultural and forest lands, addressed a forestry conference on Maui. Carlson recommended that the foresters de-emphasize exotic tree species and concentrate on the endemic koa and ohia. He said: "I know now that I should have studied koa when I first got involved in forest management. It is a native tree, adapted to our soils, and valuable as wood. So is ohia. ... We had basic data on exotics—growth rates, survival, soil types and tests [on wood properties] by Madison [Wisconsin]. From these we thought we knew the answer to our forest renewal [in Hawaii]. ... Koa is a beautiful wood, distinctive and native to Hawaii. ... It has evolved over the years and should be better adapted to Hawaii than any of the exotics. Ohia is another native we have casually dismissed, and someday we will rue this. ... Now that we are beginning to value koa, we must work toward the problems of koa forest management." He then gave a list of questions about koa for which the State and Federal foresters did not have answers.

Nevertheless, the 1972–1976, 5-year Forest Planting Plan of the State Division of Forestry does not mention koa, ohia, mamani, naio, sandalwood, or tree fern, but calls for the planting of 6,092 acres of public lands with 17 species of exotic trees at a cost of 1.3 millions of dollars. This despite Carlson's recommendations and despite the fact that

there is not a viable timber industry in Hawaii, and some scientists believe that there never will be, nor should be.

George B. Harpole stated in his "Opportunities for Marketing Hawaii Timber Products" that "the introduction of plywood production, and the expansion of lumber production in Hawaii are presently technically and logistically feasible. Fiberboard or particleboard production could also be started. Mill residues may not provide a sufficient supply of wood chips, but additional volumes of raw materials could be developed from non-commercial stands of Hawaii's present timber supply, and from the State's other agricultural resources."

Harpole included maps of eight of the Hawaiian Islands to show the "major forest types in Hawaii." *The areas classified as suitable for commercial forestry include virtually all of the remaining ohia-koa-tree fern forests on the windward slopes of both Mauna Kea and Mauna Loa and on the Kona slope of Mauna Loa.* This view of the native ecosystems presumably is justified because "native forests in Hawaii are essentially static in terms of annual increases. In the unmanaged native forests, trees must fall from the damage of termites or rot, be blown over, or be harvested before new growth can appear."

Harpole's study was published in 1970 as U.S.D.A. Forest Service Research Paper PSW-61. This is an excellent example of the kind of "leadership" given by Federal foresters in Hawaii, and it demonstrates why conservationists have such a difficult time in their efforts to preserve what little remains of the endemic ecosystems.

Despite Harpole's statement about plywood production, "a plywood plant with a 5 million square foot capacity sits idle on the Big Island. Locally-produced craftwood is less and less able to compete with imports. More Christmas trees may soon be produced in Hawaii than can be sold. [In fact, this happened in December 1971, when high-priced locally grown trees did not sell well.] We must determine the standards which Hawaii's products must meet to compete in the marketplace, locally or as exports to Pacific Basin outlets. And the market potential of several timber species now being planted should be evaluated before they reach merchantable size" ("Forest Conservation Research Plan for the Seventies," Department of Land and Natural Resources, Honolulu, 1971).

According to the "Honolulu Advertiser" of 2 April 1971, Senator Hiram L. Fong reported that he and R. Keith Arnold, deputy chief of research of the U. S. Forest Service, would request the U. S. Congress to allocate $250,000 to Hawaii in order to start a southern pine timber industry. Congress was sympathetic, and actually allocated $414,000 to State and Federal foresters in Hawaii. To be sure, not all of these monies will be used for planting pine trees, nor, we have been assured locally, for destroying native ecosystems.

One of the "nice" things about Federal funds is that they are "free" to the states! It seems a little late in history, however, for one branch of the Federal Government to provide monies to destroy native ecosystems while at the same time another branch is providing funds for the acquisition of lands to preserve flora and fauna and to conduct research on rare and endangered species. Two Federal biologists of the rare and endangered species program are assigned to full-time study in Hawaii.

B. The Division of Forestry is not making any concerted effort to eradicate any of several introduced plant weed-species, some of which present a real threat to near-virgin forest areas, including the Alakai Swamp region of Kauai, which is the habitat for more endemic forest birds than can be found on any other island.

To be sure, the Division finally has become concerned about the serious infestation of

banana poka (*Passiflora mixta*) on the Hamakua Coast of Hawaii. The Division's present solutions, however, appear to be either to cut down the forest or to open it to cattle grazing!

C. Conservationists in Hawaii were elated when the Governor finally appointed the Commissioners for a newly created Natural Areas Reserve System. During its first year, however, the State Division of Forestry effectively blocked all significant action by the Commission.

D. During 1969 and 1970, the Division of Fish and Game bulldozed (or, as they say, "selectively treated") some 400 acres of prime mamani-naio forest in order to "open it up" in the hopes that it would serve as better habitat for exotic pheasants. Further "habitat improvement" is planned for the future.

E. The State Department of Land and Natural Resources has established a very high standard for coining euphemisms. The Department announced in 1971 that it had "approved the experimental harvesting of ohia and koa trees on 500 acres zoned for conservation at Laupahoehoe on the Big Island." When translated, this means that the Department agreed to let a private individual destroy 500 acres of the Laupahoehoe Forest Reserve in order to get more wood to make bowls and other souvenirs for tourists! Actually, it was time by 1971 to approve this "experimental harvest": the wood-carving company began bulldozing the road through the forest reserve to the harvest area in 1969!

The Laupahoehoe Forest Reserve consists of some of the finest near-virgin ohia-koa-tree fern forests on the island of Hawaii, and there are very few such forests remaining in Hawaii. Such continuing rape and destruction of the little that remains of Hawaii's unique ecosystems demonstrate clearly the true value placed on those ecosystems by State and Federal personnel who manage the Hawaiian biota.

F. During 1971, the Bernice P. Bishop Estate applied for permission to harvest tree ferns from 3,000 acres of the Kilauea Forest Reserve, which is not only a conservation district but also is equal to the Laupahoehoe Forest Reserve as a remnant of this rain forest ecosystem. The tree fern logs, or hapuu, are harvested by bulldozers, which completely destroy the understory and, eventually, the forest. Nursery owners need hapuu logs as the substrate for growing orchids and other flowers! Perhaps some day, the Division of Forestry will investigate the feasibility of growing tree ferns in nurseries, rather than destroying endemic ecosystems to obtain the ferns.

III. STATE QUARANTINE LAWS

Rabies does not exist in Hawaii, and justified strict regulations are designed to prevent that fatal disease from reaching the islands. Similarly, every conceivable effort is made to prevent the introduction of any insect or bird species that might harm sugar or pineapple. Beyond these precautions, however, Hawaii's quarantine laws are a farce.

Except for psittacine and gallinaceous birds from foreign countries, pet store birds are not subjected to any quarantine regulations at all. More than 20 species of cage birds (primarily weaverfinches) have been released accidentally or intentionally in the Honolulu area since 1965. What new parasites or diseases these birds may have carried is unknown.

In 1970, a doctoral student at the University of Hawaii reported the first diagnosis for the Hawaiian Islands of a *Leucocytozoon* infestation of pigeons and two species of introduced doves, as well as four previously unreported species of *Plasmodium*, the protozoan parasite that produces bird malaria.

Excluding the Jungle Fowl, at least 78 kinds (species and subspecies) of potential

game birds had been released in Hawaii as of 1967 (Walker, 1967). No thorough follow-up study by State personnel has been conducted on any of these. Lewin and Holmes (1971), however, reported that 13 of 33 game bird species that had been introduced on the Puuwaawaa Ranch on Hawaii had become established as breeding birds. Among 115 birds examined, the authors found 11 different species of worm parasites; they reported 13 new host records for these parasites and four species of parasites were recorded for the first time in Hawaii.

It must be admitted that we do not know what effect these parasites have on the birds, even though the early introduction of bird diseases to the Hawaiian Islands provided a "most logical" explanation for the extinction of so many endemic species and for the great reduction in numbers of others. However, as of 1972, there are no *reliable*, published data to substantiate this oft-repeated assertion. No careful, intensive studies have ever been conducted! Nevertheless, the accidental introduction of new ectoparasites and blood and other internal parasites would seem to be ample reason for initiating thorough studies of bird diseases, as well as for improving the quarantine laws. The State has taken no action in either direction. In fact, before passing "A Bill for an Act Relating to the Protection of Indigenous Fish, Bird, Animal, and Vegetable Life" in Hawaii, a legislative conference committee wrote on 28 April 1970 that the "conference committee would like to also allay the fears of pet shop owners by making it perfectly clear that this bill only applies to animals, birds, etc., introduced by the State and does not intend to affect pet shop owners who bring pets in for sale to the public." Moreover, the final bill was completely emasculated.

IV. A QUESTION OF PRIORITIES

During the past decade, the State Department of Land and Natural Resources spent millions of dollars (State and Federal monies) to destroy native forests and to import exotic plants and animals, but only a negligible amount was expended on endemic plants and animals.

A. The Coot, Gallinule, Stilt, and Black-crowned Night Heron are considered to be endangered species in Hawaii. The drastic reduction in population size of these birds is presumed to be due to the destruction of essential wetland habitat during the past 30 years. Despite this, no research has been conducted by personnel of the State Division of Fish and Game or of the U. S. Bureau of Sport Fisheries and Wildlife into the breeding biology, parasites, predator relationships, or food habits of any of these species. Nor has any study been made of potential chemical poisoning of the few wetland areas still extant, even though the Chairman of the State Department of Agriculture stated in a public lecture in 1969 (Forty-fifth annual meeting of the Hawaiian Academy of Science, 11 December 1969) that Hawaiian agriculturists apply 10 times the amount per square mile of chemical pesticides and herbicides than is used on the Mainland U.S.A., and that "local exterminators use 500 to 1000 times the amount of poison used in Mainland applications."

B. No intensive field study of introduced game birds has been conducted since Charles and Elizabeth Schwartz worked in Hawaii during 1946 and 1947 (a project that was financed by the Federal Aid to Wildlife program). Nevertheless, the State Division of Fish and Game requested $20,000 for the period 1971–1973 for "brush thinning" (that is, bulldozing the mamani-naio forest) on Mauna Kea in order to increase the "productivity of this area for providing game birds," and they requested an additional $5,000 to construct water tanks for game birds.

C. The Nene was considered close to extinction in 1949 (Schwartz and Schwartz, 1949).

The State Division of Fish and Game has carried on a very successful artificial rearing program at Pohakuloa on the island of Hawaii in recent years, and the Nene has been named the State bird. This work, however, has been supported almost exclusively by Federal funds ($15,000 per year from 1958 through 1967, and $25,000 per year since that time).

The role of Mr. H. C. Shipman of Hilo, Hawaii, and of the Wildfowl Trust in Slimbridge, England in the rearing of Nene in captivity deserves recognition, because their efforts contributed much toward saving the species from extinction, even though it is true that a large proportion of the several hundred Nene alive today are in captivity, or semi-captivity. As a private hobby Mr. Shipman had for years reared Nene in semi-captivity on his ranch on Hawaii so he was able to contribute two pairs of the birds to the State of Hawaii in 1949 for its artificial propagation efforts.

Then in the spring of 1950 Peter Scott, Director of the Wildfowl Trust, arranged for Mr. John Yealland, curator of the Trust and an acknowledged expert among experts in the rearing of waterfowl, to spend several weeks in Hawaii assisting the State in its propagation efforts. When Mr. Yealland returned to England, Mr. Shipman sent with him two female Nene, thought to be a pair, and later in the year shipped to the Trust a gander; from this breeding start of 3 birds the Wildfowl Trust has, through 1970, successfully reared more than 300 birds, of which 198 have been returned to Hawaii to be released in the wild by the State in its efforts to reestablish the species; the remainder have been placed in several collections of living waterfowl in England and on the Continent, to encourage the species' prospects of survival. These efforts at artificial propagation of the Nene are described by Smith (1952), and in the Annual Reports of the Wildfowl Trust from 1951–1952 (the Fifth) through 1971 (the 22nd). Beginning with the report numbered 19, appearing in 1968, the publication carries the title simply "Wildfowl." Nene also have been raised by S. Dillon Ripley II in Connecticut.

Almost 500 pen-reared Nene were released in the native habitat on Hawaii between 1960 and 1969. Unfortunately, very little has been learned about the annual cycle of the Nene in the wild. *The State Division of Fish and Game has admitted that it does not have any competently trained people assigned to the job!* Consequently, little more is known about the biology and status of wild populations than was known in 1958, and that was virtually nothing (Elder and Woodside, 1958).

Although it is uncertain that the Nene was ever a breeding species on the island of Maui (Baldwin 1945), 242 pen-reared birds were released in Haleakala Crater between 1962 and 1969. More than half of these birds were raised in England and Connecticut. Nesting is known to have occurred, but not a single young bird was known to have been raised to independence as of 1970; three "near-mature goslings" were observed in 1971, but their ultimate fate was not determined. No thorough study of the Maui population has ever been conducted.

Extramural funds are not limited to the $25,000 received annually for the Nene propagation program by the Division of Fish and Game. For example, there is an annual appropriation (on a 3:1 matching basis) of Pittman-Robertson Aid in Wildlife Restoration funds from the Federal Government. This varies from about $130,000 to $170,000 per annum. The Division uses this money to support "all wildlife development projects," and these include bulldozing the mamani-naio forest on Mauna Kea in the hopes that more pheasants will inhabit the area. Some of these funds are used for Koloa propagation, but the State also has received additional monies from the World Wildlife Fund for this program. (In addition to the funds received for wildlife, the Division of Fish

and Game also is a beneficiary of the Federal Aid in Sport Fish Restoration Act, the Dingell-Johnson Act.)

The picture is clear, therefore: Nene and Koloa will be reared in captivity as long as non-State funds are available, but no meaningful effort will be made to study the biology of any endemic species in the native habitat, particularly with State funds. In fact, a grand total of $16,508 of State general funds was expended for "Wildlife Research and Management" for fiscal 1968–1969. Apparently none of this money was actually used for wildlife research or management (it was used for a non-game bird biologist position), but the phrase "wildlife research and management" looks better in official reports.

State money is available for other purposes, however. In 1971, the Division of Fish and Game awarded a contract for $45,000 to a California consultant to prepare "a comprehensive long-range fish and wildlife plan to serve as a guide for the orderly and rational development of its fish and wildlife resources to meet the future recreational, economic, scientific, aesthetic and educational demands that will be made on these resources." Nowhere in the resolution of the House of Representatives (dated 20 May 1969), which requested this study, nor in the contract for the consultant services is there mention of any endemic species of animal. The entire emphasis is on "recreational fishing and game hunting."

My critics may assert that the function of a State Division of Fish and Game is to provide fish and game for the citizens of that state, and, in general, I would agree. I do not agree, however, that that should be the sole function in the island State of Hawaii, in part because only about one per cent of the citizens purchase hunting licenses (1969–1970 Report to the Governor, Department of Land and Natural Resources, Honolulu, January 1971). I assert that the unique Hawaiian forests and their animal life belong to all of the people, not only of Hawaii but also of the entire United States, and, indeed, of the world.

D. A revealing document is the "Forest Conservation Research Plan for the Seventies," which was published by the Department of Land and Natural Resources in 1971. This potpourri contains overt and veiled reference to nearly all of the criticisms leveled at the Department during the past 10 or 15 years. It even uses such words and phrases as "ecology," "unique ecosystem," and "plant interactions and distribution dynamics." It is obvious to anyone knowledgeable about the Hawaii Department of Land and Natural Resources, however, that the Department has little or no intention of changing past policies of destroying native ecosystems, planting exotic tree species, and introducing more game animals.

Although all state positions are "frozen," the glossy publication recommends a "research program for the 70's equivalent to nearly 74 scientist-man-years of annual effort," even though "after 10 years [the 1960s] research devoted to forest conservation problems [which, in fact, meant, bulldozing endemic forests and planting exotics] totals about 40 scientists per year." Moreover, the elaborate table that compares the ostensible scientist-man-years per year expended during the 1960s and the recommended figure for the 1970s does not actually contain a single reference to any endemic ecosystem.

At the same time, I was interested to read the items listed in the recommended research projects on "Wildlife and Fish Habitat," partly because it includes the title of my research program ("Life history and functional anatomy of the Hawaiian honeycreepers"), which was funded originally by the National Science Foundation in 1966! At least 16 other research projects in the brochure were taken directly from Technical Report No. 1 (December 1970) of the Hawaii Island Ecosystems Stability and Evolution Subprogram of the United States International Biological Program.

The Division of Fish and Game also intends, during the 1970s, "to determine the effect of forest clearing on endemic birds." In other words, the Division of Forestry will destroy native ecosystems, after which the Division of Fish and Game can report that the endemic birds no longer inhabit those areas!

E. At the 1968 convention of the International Association of Game, Fish, and Conservation Commissioners, a committee presented a fine report on rare and endangered species, which included an appendix: "Suggested model state legislation for rare and endangered species." The committee stressed that "public awareness and support is a prerequisite to the success of the preservation program." The Chairman of the committee was the Director of the Hawaii Division of Fish and Game.

The Director of the Hawaii Division of Fish and Game has never presented the model law to the legislature; Hawaii is perhaps the only state in which the Division of Fish and Game has no budgeted funds for information and education of the public; and, except for propagation programs for the Nene and Koloa (conducted with non-State funds), there has been no effort to implement any of the philosophy expressed in the report of 1968.

The future of Hawaii's unique birds is bleak, indeed.

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