



HAWAIIAN GOOSE RESEARCH AND MANAGEMENT- WHERE DO WE GO FROM HERE?

by C.P. Stone¹, R.L. Walker², J.M. Scott³, and P.C. Banko¹

Hawaiian Geese or Nene (*Nesochen sandvicensis*) were originally present in lowland areas on the islands of Hawaii, Molokai, and Kauai (Olson and James 1982). They may also have inhabited Oahu prior to Polynesian settlement but became extinct on all islands except Hawaii (and possibly Maui), both of which have subalpine zones. Prior to the arrival of Captain Cook in 1778, perhaps as many as 25,000 birds existed on Hawaii, and although there is no definite proof that they inhabited Maui then, probably they were present (Baldwin 1945). A slow decline may have begun as early as the late 1700's, accelerated in 1850, and slowed after 1900. From the 1920's until the 1940's, there may have been only 50 birds or so in the Hawaii population, with few or none on Maui (Baldwin 1945).

The State of Hawaii's Nene propagation project began in 1949 and has been well summarized by Walker (1982a). Hawaii releases totaled 1319 and Maui releases 489 from the Nene restoration project through 1982. A Nene propagation and release program was begun at Hawaii Volcanoes National Park (HAVO) on Hawaii and in Haleakala National Park (HALE) on Maui in 1972. Fifty-seven fledglings were produced inside HAVO pens and 19 in HALE pens through 1981 in this program (Banko and Manuwal 1982). The Nene population on Hawaii was estimated to be 650 in 1975 and less than 300 in 1980 (Devick 1981a). On Maui, there were an estimated 275 ± 54 birds in 1977, and 125 ± 20 in 1980 (Devick 1981b).

Responsibility for management of and research on the Nene rests with the Hawaii Department of Land and Natural Resources (DLNR), the U.S. Fish and Wildlife Service (FWS), and the National Park Service (NPS). All three agencies have been involved in various phases of Nene management and research for decades. The ultimate goal has been, and still is, to restore self-sustaining populations of the species to Hawaiian ecosystems. The problem is that these ecosystems are much modified (especially at lower elevations) from those in which Nene evolved. Today Nene are found largely at high elevations (4000 to 7000 ft.) in limited areas on the island of Hawaii and on Maui (as a high altitude reintroduced population). Recent efforts by the DLNR (Devick 1981a, b) have demonstrated that population declines in the wild are likely if stocking of captively propagated birds in current habit is not continual.

In an effort to further coordinate research and management efforts among the three responsible agencies, a Recovery Plan has been prepared and was approved February 18, 1983 by the Director, as required by the Federal Endangered

Species Act. In addition, the State Wildlife Plan and Resource Management Plans for Haleakala National Park (HALE) and Hawaii Volcanoes National Park (HAVO) also detail agency management goals. A Nene Workshop held in HAVO, June 1982, resulted in useful interchange among agency personnel, especially concerning recent findings and directions. This outline of specific assumptions, management recommendations, and suggested research was prepared by the authors partly as a result of that interchange. What follows does not represent the official policy of any of the agencies we represent, but we do hope it will serve as guidelines for the agencies involved and prove useful to the public. It represents our best effort to consolidate current thinking about Nene research and management.

ASSUMPTIONS

The following statements are assumed to be true, even though some are not directly testable and many require more supporting data.

1. Lowland (< 800m) habitat was important to historic and prehistoric Nene populations on Hawaii and Maui (see Olson and James 1982, Henshaw 1902, Perkins 1903) and may still be important for self-sustaining populations.



Hawaiian Goose or Nene.

Photo courtesy of DLNR.

Comments: Fossil records on several islands suggest that Nene were found at or near sea level (Olson and James 1982). Historic observations at or near the turn of the century suggest altitudinal migrations with at least some breeding in lowlands and some summering in uplands (Henshaw 1902, Perkins 1903). Lowlands especially are much modified as a result of early Hawaiian and modern man. Lack of lowland Nene populations today, and lack of self-sustaining upland populations, provide circumstantial evidence that a lowland segment of habitat may have been critical to long-term survival of Nene populations. (It is also possible, of course, that current limiting factors [e.g. food quality, predation, poaching, genetics] simply prevent upland populations from maintaining themselves.)

2. Upland (>800m) habitat on Hawaii and Maui will not continuously support Nene populations without stocking (see Devick 1981a, b; Banko 1982; Stone et al. 1982) and intensive management.

Comments: It is currently unknown why this is the case. The causes may be (1) *behavioral* (lack of social stimulation as a result of low population levels; lack of proper socialization by captive-reared birds; nonadaptive breeding and nesting and summering habits as a result of modified habitat); (2) *nutritional* (reduced quantity and/or quality of proper foods during nesting, post-nesting, or summering periods); (3) *predation* (largely mongooses [*Herpestes auropunctatus*] on eggs, and to lesser extent on broods; other animals such as pigs [*Sus scrofa*], cats, and dogs of lesser importance); (4) *genetic* (inbreeding coefficients are presently unknown, but the present captive stock is derived from very few birds); (5) *habitat modification and fragmentation* (although Nene evolved in volcanic areas, it is possible that without the lowlands, colonization/extinction equilibria in the uplands are unfavorable as a result of modifications and the small, scattered nature of upland breeding sites—as indicated, upland habitat may have always been marginal); (6) *direct human-caused disturbance and mortality* such as poaching for food and predation by hunting dogs; (7) *weather patterns* such as a series of dry or wet years that inhibit survival of small populations through reduced breeding or increased mortality; (8) *volcanic eruptions* may occasionally depress nesting attempts.

3. Birds produced through captive propagation can survive and breed normally in the wild (see Devick 1981a and Banko 1982).

Comments: The nesting success of propagated and wild birds seems similar, but this could use more study (Devick 1982). Do propagated birds breed as frequently, as soon, and produce as many young as wild birds?

4. In areas where protected lowlands exist near upland populations, changing current traditions of upland birds to encourage them to use protected lowlands may result in better survival and recruitment and may be more readily accomplished than widespread habitat improvement and predator control.

Comments: Temple (1978) has argued this for endangered bird management in general. The approach seems particularly applicable to HAVO, where chances of linking summit to sea populations in an ahupua'a land unit under one government jurisdiction and policy (Walker 1982) are greatest. Such areas are uncommon, however.

5. Habitat modification through mongoose control, artificial feeding and watering stations, planting of favored Nene foods, and protection from poaching and other human disturbances may increase Nene use, recruitment, and perhaps survival.

Comments: Recent preliminary works by N. Santos and R. Bachman of the DLNR suggest that intensive management can increase production and use in small sanctuary areas, partly by attracting Nene to these areas. NPS will also have to decide, in keeping with the agency mission, what measures are worthwhile, for how long, and over how large an area, if NPS lands (especially those designated "wilderness") are to be more intensively managed for Nene.

6. There is sufficient genetic variability in the Nene gene pool to allow adequate adjustment to environmental changes and current modified habitat.

Comments: This seems less certain than some other assumptions. Nevertheless, Nene do nest in a wide variety of habitats (see Banko 1982, Santos and Ueoka 1981) and apparently take a wide variety of foods, including exotics. They use artificial sources of water and areas such as golf courses and ranches (Stone et al. 1982) that were not available until recent times. Effects of past genetic bottlenecks, presently low breeding efforts, inbreeding, colonization/extinction equilibria in small and localized breeding populations, and stochastic population events are largely unknown.

7. Additional training of and experimentation with captive-reared Nene may result in more adaptive responses of released birds in the wild.

Comments: Ellis et al. (1978) have shown that training (to accept foster parents; to avoid predators) of Masked Bobwhite (*Colinus virginianus ridgwayi*) increased survival. Nene released by NPS and DLNR often fly from release pens without the benefit of being with adult wild birds. They are on their own at once in the wild, although most quickly join flocks and eventually form pairs. Perhaps some additional efforts such as those used in the Masked Bobwhite program would increase adaptiveness in socialization, breeding, or survival of captive-reared birds released in the wild.

8. Given the present status of Nene in the wild, larger numbers of grouped releases are essential to increase chances of perpetuating populations in different areas.

Comments: Nene ties to breeding areas are strong and "pioneering" into new areas seems insufficient to establish new populations at present. Birds do not breed for 2-3 years after release, many do not seem to breed every year after breeding age is reached, the number of young produced is few, and survival is low (Santos and Ueoka 1981, Banko 1982, Stone et al. 1983). Females generally breed close to natal sites and this must always be considered in propagation and release programs. Normal stochastic or chance variations and population processes work against survival of presently small populations. Currently released numbers are low for DLNR and average about seven per year for HAVO. Larger numbers are needed to overcome chance variation for longer periods, and one way to accomplish this is joint State/Federal effort.

9. Cooperative planning, management, and research efforts by DLNR, FWS, and NPS are in the best interest of wild Nene populations, especially in times of fiscal and manpower constraints, and higher priorities for other things.

Comments: DLNR has no research capability at present and will depend on FWS, NPS, and universities for this (see Hawaii Department of Land and Natural Resources 1982). Much of the best remaining Nene habitat is controlled by NPS on the island of Hawaii. FWS has responsibility for coordinating recovery of the species under the Endangered Species Act. Managers and researchers from all three agencies need to function more as a team to accomplish common goals.

RECOMMENDATIONS FOR MANAGEMENT

The following management recommendations are made on the basis of the previous assumptions, experiences from past program efforts, and knowledge of management approaches that have been effective for other species. These actions should be accomplished by DLNR and NPS and FWS at the same time in an effective program and are not prioritized.

1. Nene should be released from captivity in the HAVO-Keauhou Sanctuary ahupua'a (summit to sea) and in other such areas if possible. Two separate release techniques should be tested.

Comments: Future initial releases of DLNR birds should be made in the Keauhou Sanctuary. HAVO release pens located at Kukalau'ula, lower Ainahou Ranch, and the Kilauea-Ka'u Desert area should be used to raise and release subsequent DLNR and HAVO birds. DLNR has the best resources for propagation (Pohakuloa Breeding Facility) and should supply the bulk of the releases, while NPS and DLNR should monitor released birds for survival and eventual reproductive attempts.

2. At least 20 birds should be released as soon as possible in the Keauhou Sanctuary, and at least seven birds from the State Pohakuloa facility should be released in each of two or three HAVO locations as soon as feasible, thereafter.

Comments: When goslings are 3-4 weeks old they should be placed in HAVO release pens with foster parents. Unproductive captive pairs or wild-caught birds will suffice for this phase of the captive-rearing process. Birds should be deliberately conditioned to avoid dogs and humans at this stage, to increase the probability of survival after release. A maximum of three release pens in HAVO should be used in a given year, although not necessarily the same ones each year. DLNR releases should be made in gang release pens as in the past. Release techniques should be further evaluated after success or failure of these approaches is monitored for a few years.

3. One or two birds from HAVO production each year should be held back temporarily as potential breeders, and the Pohakuloa breeding flock should be increased.

Comments: Only 2-3 consistently breeding captive pairs remain in the HAVO flock. Size and variability of the breeding flock should be temporarily increased. Perhaps addition of HALE goslings is an alternative, since most die anyway. Trading of

birds among flocks should be considered, and pairing of close relatives should be avoided whenever possible. Eventually, HAVO birds should be given to DLNR or released. The DLNR breeding flock should be increased to at least 10 pairs. DLNR should eventually supply all released birds to HAVO and HALE and State sanctuaries, to increase efficiency as long as stocking is needed.

4. A few State and HAVO-produced birds should be radio-tracked each year to determine breeding success, survival, and habitat use (especially in molting and nesting periods when birds are difficult to find).

Comments: Telemetry is very time consuming and expensive if done intensively. However, the basic questions about habitat requirements and survival patterns must be answered by monitoring birds over many years. Year to year variability will be better understood this way than if birds are located frequently for a shorter period. A minimum sample size of a few birds in each area studied each year is, of course, necessary. Fixed-wing planes should be used to locate birds periodically in remote areas, if funds allow. NPS should be responsible for most of this monitoring effort, with support from DLNR and FWS.

5. Establishment of areas for predator reduction tests and artificial feeding in HAVO lowlands should be accomplished. DLNR efforts in managing breeding areas on sanctuaries with emphasis at Keauhou and in small kipukas should be continued and evaluated for success and costs.

Comments: Although management-intensive, increasing the survival and recruitment of Nene through habitat improvement, especially at established nesting areas, may be a very viable management option. Attempts to experimentally control mongooses with zinc phosphide or an anticoagulant such as diphacinone should be started in cooperation with the Hawaii Department of Agriculture and FWS. Chemical toxicants seem the most promising technique for population reduction of mongooses, especially in lowland areas where they are very abundant. DLNR or FWS should provide funding for this, and, since DLNR has no research arm at present, FWS, NPS, or the University of Hawaii should do the research (Hawaii Department of Land and Natural Resources 1982).

6. Banding of DLNR and HAVO-released birds should be on the same system and include aluminum FWS bands.

Comments: Band loss by DLNR and NPS-banded birds is an increasing problem as birds age. Colorcoding by release area with numbered plastic or metal bands (with larger routed numbers than on FWS bands) might be better than placing several unnumbered colored bands on each bird. The system used on Aleutian Canada geese by FWS seems promising. Some HAVO releases have been fitted by NPS with these bands plus FWS aluminum bands, to determine desirability of using this system. Plastic collars are another method for marking birds (D.G. Raveling, Professor, U. California Davis, personal communication).

7. Summer Nene flocking areas should be monitored as often as possible, to determine habitat use, population trends, movements, pair fidelity, and recruitment trends each year.

Comments: Monitoring of post-breeding flocks provides considerable information for little effort, once concentration areas are located. It may provide the best long-term trend information for Nene populations. Monitoring of key breeding areas for active nests or nesting pairs can, of course, supplement this information. Use of closely supervised volunteer groups (such as Earthwatch) to search for nests may be one way of covering the vast areas involved.

RESEARCH RECOMMENDATIONS

Research and management are both essential in planning for Nene population recovery. Despite long involvement with the Hawaiian goose, important questions remain unanswered, and management strategies are still unclear. Although this is discouraging, it does not necessarily mean that considerable time and/or money have been wasted. It appears that the complexities of the problem were underestimated and some of the important questions were not emphasized for one reason or another. Long- and short-term research, rigorously designed to answer specific questions, should be considered an investment for the future.

Immediate Short-Term Projects (in order of priority)

1. *Techniques of control of Nene predators* — Development of chemical formulations and techniques to reduce mongoose (and cat) populations in the field has been little emphasized in the past. Some information on laboratory toxicity is now available for several promising compounds (e.g. zinc phosphide, PAPP, and diphacinone), and new anti-emetics also show promise (D.P. Fellows, 1982, Wildlife Research Biologist, FWS, personal communication). Laboratory and field tests and development of permits and labels with the State Board of Agriculture and the Federal government should be emphasized in the near future. FWS-NPS-DLNR should cooperatively pursue this.

2. *Analysis of food habits of Nene from fecal material* — Samples collected from P.C. Banko in upland and lowland breeding areas and breeding and non-breeding seasons await analysis. Although time-consuming and somewhat biased toward more persistent food items, analysis of the 350+ samples would give us information not currently available about use and food values of native and exotic foods in current Nene habitat at different elevations, including lowlands. This should be undertaken by the NPS, but support is currently unavailable.

3. *Preparation of a genetics model* — Products of this research would be: a) calculations of inbreeding coefficients, etc. from Pohakuloa, HALE and HAVO Nene lineage information and comparisons with other literature for other species; b) a plan for propagation management in the future; c) an indication that wild populations might/might not need further genetics information analysis. FWS-NPS-DLNR cooperation could produce this through use of existing data and a program such as SAS Institute's INBREED procedure.

4. *Preparation of a realistic Nene population model* — Products of this research would be: a) estimate of stocking rate needed to produce stable Nene populations by stocking over a given period; b) advice as to what is most limiting recruitment and most affecting mortality on a population level; c) an indication of what increase in production and/or decrease in mortality is necessary for self-sustaining populations. FWS-NPS-DLNR should cooperatively pursue this through use of existing data and a population dynamics model such as that developed by Shaffer (1978).

5. *Continuation of nesting and post-nesting study in Ka'u Desert and HAVO lowlands* — This area is currently the most important breeding ground for Nene in HAVO. One year of telemetry data have provided new understandings of brood habitat requirements, movements during molting, and post-breeding requirements. Some interesting information on mortality has also been produced. One additional year of study is minimal to evaluate conclusions from the initial data. NPS could continue research beyond 1983, but other priorities are higher.

Long-Term Studies

Some research requires more than a year or two of data to increase the likelihood that recommendations to managers will be correct. Among these projects are:

1. Determination of sources of gosling mortality in different locations.
2. Determination of reasons for non-breeding by breeding age pairs.
3. Determination of resource use, productivity, and limiting factors on Mauna Kea, HAVO, and HALE in different years.
4. Determination of which limiting factors are more important to survival of Nene populations over short term and long term (intensive field work and modeling will be needed).

In conclusion, we hope that this paper will provide better insight into the complexities of managing an endangered species in a much modified environment. One important lesson to be learned from the Nene situation is that, despite the setting aside of areas in which a species is "protected" (Nene sanctuaries and HAVO), population declines can continue. The survival of the Hawaiian goose is assured for now, if we continue to produce birds in captivity and release them. However, if we are once again to have self-sustaining wild populations of Nene in Hawaii, adequate research and management must continue. It is likely that the need for some management measures will be continual. We recommend that the responsible agencies increase efforts to pool their resources on behalf of our endangered State bird.

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PALILA AND MOUFLON: AN UPDATE AND CALL

FOR A VOLUNTEER

When the Palila case was litigated in 1979, (Palila v. Hawaii Department of Land and Natural Resources), it was decided that "Defendants are violating the Endangered Species Act by maintaining feral sheep and goats in the Palila's critical habitat on the slopes of Mauna Kea on the Island of Hawaii".

The case addressed only the effects of feral sheep and goats on the critical habitat, and did not address the effects of the mouflon sheep which also occupies this critical habitat, since at that time little information was available on the mouflon. When the state's study of the mouflon was completed, Michael R. Sherwood, attorney for the plaintiffs (including the Hawaii Audubon Society), sent the following letter to Edwin P. Watson, Deputy Attorney General, State of Hawaii, on August 19, 1982:

Dear Ed:

As you know, the case of Palila v. Hawaii DLNR, 471 F. SUPP. 985 (D.Haw. 1979), aff'd 639 F.2d 495 (9th Cir. 1981), which you and I litigated, involved only the removal of feral

sheep and feral goats from the palila's critical habitat on Mauna Kea. It did not address the question of whether mouflon sheep also pose a threat to the critical habitat, and therefore to the bird, because the state's study on mouflon sheep had not yet been completed.

That study now has been completed. Entitled Final Report: Ecology of the Mouflon Sheep on Mauna Kea (Pittman-Robertson, Project No. W-17-R, Study No. R-III, 1975-1979), it is an official State of Hawaii, Department of Land and Natural Resources document authored by Jon G. Giffin. You will recall that Mr. Giffin was also the author of the State's similar study on feral sheep which was cited extensively by the district court in reaching its conclusion that feral sheep were destroying the palila's critical habitat and that that destruction constituted an illegal "taking" of the palila under Section 9 of the Endangered Species Act. See Palila v. Hawaii DLNR, supra, at 471 F. Supp. 989-990.

The new study on mouflon sheep demonstrates, as did the prior study with respect to feral sheep, that mouflon sheep with their browsing of mamane tree components are irreparably damaging the remaining palila critical habitat. The study states, for example, in its summary that

"Range studies showed the effects of browsing on the environment by comparing plant cover inside and outside big game exclosures. Results indicated extensive over-utilization of range vegetation at tree line. The plant species most affected by sheep were mamane, . . ."

Mouflon Sheep Study, p. i.

The study also observes that

"Browsing behavior of the mouflon sheep is much like that of feral sheep. Mouflon often stand on their hind legs to reach the leaves and stems on mamane trees. Seedlings and basal shoots are also cropped,"

id. at 21, and notes that

"The substantial decrease in total ground cover and suppression of mamane at tree line was probably the most striking aspect of the data gathered. Results show convincing proof of range over-utilization in this upper region. Re-establishment of vegetative cover is paramount or the wild-

life carrying capacity of the mountain will continue to decline." (emphasis supplied)

Id. at 25. The study estimates the present population of mouflon sheep to be 525 animals, with an upward population trend since 1975. Id. p. 12.

The state study concludes by making the following management recommendations:

"Management practices. A direct relationship exists between the level of sheep abundance and range conditions. Mouflon numbers on the GMA have increased to a point where key forage plants are being excessively utilized, especially at tree line. This problem can best be solved by thinning out the herd. . . . A density of 15 sheep per square mile is suggested for the mamane forest zone. This figure is about half the current density in the best habitat.

. . .

Habitat management. . . . Native vegetation is being severely damaged at current levels of sheep abundance. The single most important management practice needed is a reduction in animal numbers. This one act, more than anything else, will substantially improve range conditions. . . .

Man-made barriers offer the best choice for protecting high elevation mamane forests from wild sheep. Woven wire fences 72 inches high will effectively exclude mouflon in areas sustaining heavily browsing pressure. Biodegradable polyethylene mesh tubes can also be placed over individual seedlings in unfenced areas where sheep concentrate. . . .

Significant amounts of native forest have been destroyed by exotic herbivores. Opportunities exist for restoring vegetation and providing additional habitat for endangered wildlife. Treeless areas formerly forested with mamane should be delineated and replanting projects initiated. . . ." (emphasis supplied)

Id. at pp. 28 and 30.

Under the theory and ruling of the federal courts in Palila v. Hawaii DLNR, supra, it now is clear that the continued maintenance by the DLNR of mouflon sheep at their present population levels in the palila's critical

habitat constitutes a taking of the palila, in violation of Section 9 of the Endangered Species Act, 16 U.S.C. 1538. In order to remedy this violation, the State must immediately and at a minimum take the steps recommended in its own mouflon sheep study.

Please advise me at your earliest convenience as to the State's specific intentions in this matter.

This letter is to be considered my clients' written notice of violation of the Endangered Species Act, as required by 16 U.S.C 1540(g) (2).

Very truly yours,

MICHAEL R. SHERWOOD

Mr. Watson replied on October 12, 1982:

Dear Mike:

This is in further response to your letter dated August 19, 1982, concerning the above matter.

Pursuant to the findings and recommendations of the Department of Land and Natural Resources, the Land Department is presently taking steps to minimize any adverse effects of mouflon on the mamane-naio ecosystem on Mauna Kea. Although the task is rendered difficult due to the mouflon sheep constantly moving in and out of the public lands along the boundary of Parker Ranch, the herd is being manipulated and reduced in numbers through public hunting.

The hunting season has been changed from "rams only" to either sex (rams or ewes) and extended from one month to three months. As a result, during the month of August, 84 mouflon (50 males and 34 females) were harvested through public hunting. It is anticipated that before the hunting season is over in October, approximately half the herd present on Mauna Kea at the start of the season will be removed—a substantial thinning of the flock.

Additionally, maintenance of mouflon-proof fencing around important native plant colonies has been and continues to be a high priority project on Mauna Kea.

With respect to re-planting, in recent years the Division of Forestry and Wildlife,

Department of Land and Natural Resources, has planted over 4,000 mamane trees and 1,000 native shrubs within the critical habitat of the palila and this is an on-going project.

In summary, we believe that the State of Hawaii is presently undertaking a viable and realistic program for the management of the mouflon on Mauna Kea and the protection of the mamane-naio ecosystem.

Very truly yours,

Edwin P. Watson
Deputy Attorney General

The Board of Directors of HAS believes that the hunting solution proposed by the State does not provide adequate safeguards for the critical habitat of the Palila, and would like to reopen the Palila case in order to pursue complete removal of the mouflon from Mauna Kea, accompanied by fencing of Palila habitat. However, before we can make a commitment to again become a plaintiff, we need a responsible individual who would be willing to act as a volunteer to assemble pertinent information and assist the attorneys for the plaintiff in numerous other ways. (The best term to describe the duties of such a volunteer assistant is "gofer"). If someone of our readers would be willing to undertake all, or part of, this task, involving reading lots of files, duplicating appropriate material, digging out information, telephoning, etc., etc., please call Bob Pyle at 262-4046 or Charlie Lamoureux at 988-2255. We really need help on this one, and urge you to volunteer.

The HAS Board of Directors thanks you.
More importantly, the Palila thanks you.

Charles Lamoureux
Conservation Committee
Chairman

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WILDLIFE REFUGE PLAN TO BE DEVELOPED

The U. S. Fish and Wildlife Service has begun preparation of a master plan for the Hawaiian Islands National Wildlife Refuge. The Refuge, established by Executive Order in 1909, includes numerous islands and atolls in the Northwestern Hawaiian Islands. Principal wildlife in the refuge includes 18 breeding species of seabirds, four endangered land bird species, the Hawaiian monk seal and green sea turtle. The Refuge is also a designated Research Natural Area.

Refuge master planning is an effort by the Service to insure incorporation of national policy direction into the management of the 413 refuges in the National Wildlife Refuge System. Master planning provides a systematic process for making and documenting decisions concerning management, development and use of National Wildlife Refuges. It also provides an opportunity for public and agency involvement at each important decision-making step. When completed in September, 1984, the master plan for the Hawaiian Islands National Wildlife Refuge will set forth long-term objectives for resource management and public use. The planning process will include a data inventory and resource mapping phase and an analysis of the suitability of refuge lands and waters to support existing and potential uses. This will lead into an evaluation of alternative ways to manage refuge lands and waters in a manner consistent with the overall objectives of the National Wildlife Refuge System and the purposes for which this refuge was established. A draft and final Environmental Impact Statement will be developed for the Hawaiian Islands National Wildlife Refuge Master Plan.

The public is encouraged to become involved in this decision-making process. Public involvement will help ensure that the environmental and social impacts of any decisions are fully considered and that the public is fully informed about actions which significantly affect or interest them. Newsletters will be distributed which explain the master planning process and provide an opportunity for interested parties to respond with their own ideas regarding issues to be addressed in planning. Anyone who wishes to be on the newsletter mailing list should write to: Refuge Manager, Hawaiian Islands National Wildlife Refuge, P. O. Box 50167, Honolulu, Hawaii 96850 or phone (808) 546-5608.

MANANA TRAIL FIELD TRIP REPORT

APRIL 1983

Our field trip for 11 April 1983 was a hike up Manana Trail. The trail starts at the end of Komo Mai Drive above Pearl City and follows Manana Ridge all the way to the Koolau Ridgeline. The trail is 6 miles long and climbs 1700 ft. We did not attempt to hike the entire distance.

At 7:50 a.m. the sky was cloudy, and occasional, light rainshowers fell as we started up the trail. Fourteen of us began the hike, but this number dwindled during the day. Since the hike was along the same route up and back, it was easy for people to retrace their steps when they decided they had gone far enough.

The first half mile of the trail passes through exotic forest dominated by guava and eucalyptus. Several large eucalyptus trees near the trail had been blown over by Hurricane Iwa. We heard, and occasionally saw, Shamas, Japanese White-eyes, Northern Cardinals, and House Finches.

The next mile-and-a-half of the trail passes through an area which was burned by a forest fire in 1972. Thickets of naupaka and small koa, sandalwood, and eucalyptus trees are beginning to replace the broomsedge grass as the dominant vegetation. Yellow-faced Grassquits seem to favor this habitat. We heard several and managed to see one of these small, elusive birds. Small flocks of Nutmeg Mannikins and a few Red-vented Bulbuls were also seen in this area. Japanese Bush-Warblers were heard calling below the trail but none were seen. There was no sign of any Gray Swiftlets.

Sunshine along the beginning of Manana Trail often changes to showers farther up the ridge. On our hike, however, showers at the beginning of the trail yielded to sunshine later on. When the clouds dissolved, we had a panoramic view of Pearl Harbor to the south, the Waianae Mountains to the west, and the green forests of the Koolau Mountains to the north and east.

After hiking about two miles, we passed out of the burned area into native forest. Manana Trail is usually very muddy through the native forest, but four months of drought had left the trail dry and firm. We saw Japanese White-eyes all along the trail and encountered a few small flocks of Nutmeg Mannikins. Native birds were quite scarce. We heard only a few 'Apapane and 'Amakihi, and saw only one of each. One large, dark bird (wingspan over three feet) flew across the ridge several hundred yards in

front of us. The bird was visible for only a few seconds before it disappeared from view. Great Frigatebirds sometimes fly over the ridges but this did not look like one. Perhaps it was an owl or a Night-Heron. We couldn't say for sure what it was, but any bird that size is unusual high in the Koolau's.

Some of the best native rain forest on Oahu can be found along the upper part of Manana Ridge. Koa and 'ohi'a are the dominant trees. Maile, naupaka, 'ie'ie, 'ohelo, ti, olapa, hoawa, kopiko, ohi'a-ha, hapu'u, uluhe, kanawao, and lobeliads are other native plants common along the trail. We also saw a native orchid and a native gardenia--these plants are rarely seen in the Koolau's. The rain forest was exceptionally dry and there were few blossoms on the 'ohi'a and kanawao.

The fine weather and excellent trail conditions encouraged us to hike about four miles up the trail before we stopped for lunch. By that point, our group had dwindled to five people. Although the Koolau Ridgeline seemed well within reach, we headed back down the trail after lunch. The weather remained sunny and the temperature climbed as we descended. When we reached our cars at 3:30 p.m., we were all happy to drive off for something cold to drink!

Peter V. Donaldson

EVERYTHING YOU ALWAYS

WANTED TO KNOW ABOUT SEA TURTLES

A new book now available from the Smithsonian Institution Press is entitled Biology and Conservation of Sea Turtles: Proceedings of the World Conference on Sea Turtle Conservation. It contains 63 papers by authorities from more than 20 countries. Presented at the World Conference on Sea Turtle Conservation in Washington, D.C., in November 1979, the papers review current information on the ecology, reproduction, physiology, and demography of marine turtles. A thorough description of the status of sea turtle populations around the world is presented. Coverage of the theory and techniques of sea turtle conservation, and the laws bearing on it, constitutes a major contribution to the field.

For more information, write to: Smithsonian Institution Press, P.O. Box 1579, Washington, D.C. 20013.

AMERICAN ENVIRONMENT UNDER ATTACK

A summary report entitled "The American Environment Under Attack: What Next?" was released during March 1983. It was prepared by a consortium of leading, respectable environmental organizations, including National Audubon.

This report summarizes some of the Reagan Administration's serious ongoing attacks on the federal agencies which are mandated by law to manage and protect the environment.

The following excerpts from the report discusses attacks on only one of these federal agencies, the U.S. Fish and Wildlife Service.

"The primary impact of the Reagan Administration on the Fish and Wildlife Service has been through major budgetary reductions in Service programs on endangered species, environmental research and monitoring, habitat protection and a redirection of the Service's predator control policies.

Endangered Species

For almost three years the Administration has used every administrative means to delay or impede the new listing of endangered species. The Administration has cut the historical (1981) funding levels for listing by 50 percent, effectively preventing the necessary scientific and review work necessary to support listing. The Carter Administration listed almost 350 species in four years. To date Secretary Watt has listed 18 species, several under threat of suit.

The Administration has attempted to reduce the level of law enforcement protection for endangered species by 20 percent each year; Congress has repeatedly restored these monies.

The Administration each year has refused to fund the state grant program for endangered species recovery. This represents an actual reduction of 28 percent of the federal recovery effort for endangered species.

Most importantly, the Administration has requested practically zero funds (zero FY82, \$1.5 million in FY83 and zero in FY84) for land acquisition from the Land and Water Conservation Fund to protect endangered species. As a result, such critically endangered species as the masked bobwhite, California condor,

leatherback sea turtle and ocelot may vanish for loss of habitat."

Copies of the entire report may be ordered for only \$1.00 from: Jane Daniels, National Audubon Society, 950 Third Avenue, N.Y., N.Y. 10022.

HAWAII'S BIRDS

TIME FOR REVISION

Believe it or not, our supply of the third edition of Hawaii's Birds is running low so it's time again to start the revision process. This is a chance to make your pitch for changing or (perish the thought) correcting text or photographs. We'll be incorporating some AOU name changes and we'd particularly like to update information on individual birds where we now have new data on habits and distribution. A major change in photos is not planned, but we are anxious to incorporate high quality photos where they improve substantially on what we now have. It would be particularly nice to replace some of the older paintings of forest birds with quality photos. We are also looking for new cover photos, so dust off your cameras and get to work! I'd love to have your suggestions for text and format changes by September 1, and any photos for possible use as soon after that as possible. This is your chance to speak up or hold your tongue for another three years. Send your ideas and photos to Rob Shallenberger, 169 Kuulei Road, Kailua, Hawaii 96734.

ENDANGERED BIRDS

RECOVERY PLANS APPROVED

The June 1983 issue of the "Endangered Species Technical Bulletin", (Vol. VIII, No. 6, published by the U.S. Fish and Wildlife Service Endangered Species Program), contains a pithy article about the Hawaiian Forest Birds and the Nene Recovery Plans.

Both plans were approved in February of 1983. Copies of these plans, and any other approved recovery plan, will be made available for purchase from the Fish and Wildlife Reference Service, Unit j, 3840 York Street, Denver, Colorado 80205-3536. A 4-to-6 month printing time must be allowed following the date a recovery plan is approved by the Director, before copies may be available. These two important plans for Hawaii should be available this August.

AUGUST FIELD TRIP:

KOKO HEAD

The Sunday, 14 August field trip will be to Koko Head on Oahu. The walk will feature non-native land birds, but some seabirds such as terns and boobies might also be seen at a distance.

The trail is fairly short, but steep in a few places; please wear appropriate footwear. Also, the area is generally hot and dry, so bring a hat, water, and sunscreen.

Meet at 7:00 a.m. on Punchbowl Street, Honolulu, next to the Hawaii State Library. Call the trip leader, Mike Ord (737-2535) for more information. Don't forget your binoculars!

AUGUST PROGRAM:

BULBULS ON OAHU

The guest speaker for the Monday, 15 August general meeting will be Rick Williams. He will present a narrated slide show entitled "Range Expansion and Population Growth of Bulbuls on Oahu".

Rick is a graduate student on Oahu who has been conducting field research on the non-native Red-vented and Red-whiskered Bulbuls for his dissertation.

Bulbuls are especially well-known among serious farmers and gardeners on Oahu because of their damaging habits.

The meeting will be held at McCully-Moiliili Library on 2211 S. King St. at 7:30 p.m.

HAWAIIAN PROVERBS

I wawa no ka noio, he i'a ko lalo.

When the *noio* make a *din*, there is fish below. (When people gossip, there is a cause.)

The Bishop Museum Press has announced the publication in October 1983 of 'Olelo No'eau: Hawaiian Proverbs and Poetical Sayings by Mary Kawena Pukui. This collection of nearly 3000 Hawaiian-language proverbs (with literal translations and explanations in English) represents over fifty years of collecting, translating, and research by Hawaii's foremost scholar in Hawaiian language and culture. Preserved through the generations by oral tradition, the sayings provide insight into the beliefs and practices of ancient and modern Hawaiians, as well as a view of the habits and habitats of Hawaii's native birds, fishes, and plants through the eyes of generations of native Hawaiians. For more information, contact Bishop Museum Press, at 847-3511, Ext. 135.

BACK ISSUES OF 'ELEPAIO

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

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

50¢ per issue, \$5.00 per volume

Vol. 1 through 40 (1939 to 1979):

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

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

\$350.00 for the complete set

IF NOT A MEMBER, PLEASE JOIN US

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| Dual Life (single payment)..... | 2000.00 |

Special rates for full-time students and Senior Citizens (65 years of age or older) are available. Please write for application form.

LOCAL MEMBERSHIP

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| Regular..... | \$ 6.00 |
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| Life..... | 150.00 |
| (payable in three equal annual installments) | |

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

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'ELEPAIO

| | |
|---------------------------|--|
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| Production Committee..... | Anne Conibear, Kathy Harrington, Audrey New- man, and Joel Simasko. |

VOLUNTEER NEEDED

Volunteers are needed to coordinate the design and production of "bird" teeshirts to be sold as a fund raiser for Hawaii Audubon. Call Suzan Harada at 845-6704.

HELP WITH 'ELEPAIO

The September issue of the 'Elepaio will be pasted-up 13 August (Sat.) at 1415 Victoria St. If you want to help, call Peter at 847-3511 ex.156 or Marie at 533-7530 for entry phone # and time. No experience necessary!

CALENDAR OF EVENTS

- Aug. 8 (Mon.) Board meeting at the home of Marie Morin, 1415 Victoria St. #1515, Honolulu, entry phone #198 at 7 p.m. (533-7530).
- Aug. 14 (Sun.) Field trip to Koko Head, Oahu. See page 20 for information. Leader Mike Ord (737-2535).
- Aug. 15 (Mon.) General meeting featuring "Bulbuls on Oahu", with Rick Williams. McCully-Moiliili Library, 2211 S. King St., Honolulu, at 7:30 p.m.

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By-laws available by request.

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