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PARASITES OF THE PACIFIC GOLDEN PLOVER AND THEIR USE AS BIOLOGICAL MARKERS By Ben Okamoto

A study of the Pacific Golden Plover (<u>Pluvialis dominica</u>) was conducted by the author as a research project for a Master's degree in Animal Science. The objective of the research project was to conduct a parasitological survey of Pacific Golden Plovers collected from selected sites within the State of Hawaii. Also, efforts were made to determine if parasites found could be used as biological markers indicating intraisland and/or interisland movement of the Golden Plover during its winter residency in Hawaii. Additional observations and data of ecological and physiological significance were recorded.

Plovers were collected from 6 different sites on 3 of the main Hawaiian Islands during 1972-73, and from 5 of the same sites during 1973-74. Collections were made during 3 periods (early, middle, and late season) of the plover's winter residency.

Of the external parasites identified, 2 families are new reportings for the Pacific Golden Plover in Hawaii (Family Cheyletidae and Family Trombiculidae).

Five types of intestinal parasites were identified: Acanthocephala (<u>Plagiorhynchus</u> <u>charadrii</u> and <u>Mediorhynchus orientalis</u>), cecal worm (<u>Subulura skrjabinensis</u>), roundworm (<u>Porrocaecum semiteres</u> and <u>Porrocaecum ensicaudatum</u>), flukes (Family Heterophyidae), and tapeworms (unidentified species). Identification of the gizzard contents indicated that the Golden Plover in Hawaii is omnivorous. Intermediate hosts for the intestinal helminths were not positively identified.

The occurrences of intestinal parasites at the different collection sites were analyzed with the chi-square test using proportions of infected birds. The high incidence of Acanthocephala infected plovers at Bellows Air Force Base and Kahuku proved these two sites to be significantly different from the others. Similarly, analysis of infection of plovers by the other intestinal parasites suggested that birds from different areas are distinct.

Study of mesostignatid mites in the digestive system indicated that the proportion of plovers found consuming these mites were statistically significantly different among sites. The possibility was discussed that plovers from different sites have different feeding habits, ingest different types and numbers of intermediate hosts, and thus have different parasites. The parasitic infections were thus used as biological markers and suggested that the populations of Golden Plovers at the various collection sites constituted different populations, and that there was no great intermixing of these populations within an island or between islands during the winter residency.

Fecal flotation tests were done in an effort to recover parasite ova; however, the results were negative for helminth ova, except for a few instances when trematode ova were seen.

Haematologic studies conducted proved negative for blood parasites and serologic studies were negative for Avian Influenza.

Analyses of physical measurements and behavioral data are still incomplete and were not presented in the thesis.

Included in the review of literature were the following: history of the Pacific Golden Plover; studies of physiology and ecology (diet, reproduction, plumage, age, bioenergetics, physical parameters, ethology); studies of migration; parasites of the Pacific Golden Plover; parasites as biological tags.

Acknowledgement: The author wishes to express his appreciation to the Hawaii Audubon Society for the grant presented to him in the summer of 1974. That grant was the only financial support given to the project and was very helpful in the completion of the project.

Note: For complete details, a copy of the thesis will be available at the University of Hawaii Sinclair Library.

Letter to Mr. Alfred Preis, State Foundation on Culture and the Arts from H. Douglas Pratt, 16 July 1975: Enclosed you will find my proposal for a series of portraits of Hawaiian birds that you suggested I prepare when we met last month in your office. It should be self-explanatory. I am most grateful for any consideration you or your board can give to it. I have also included for reference four color slides of some of my work. The Po'o uli portrait is an example of the type of thing I hope to do in the series. The Nene painting, as well as that of nine forest birds against a background, will be published this fall by Defenders of Wildlife, a national conservation organization, in their journal.

I have also taken the liberty of including a letter to you from Dr. Wayne Gagne, president of the Hawaii Audubon Society. It was he and other Society members who first encouraged me to approach your agency with this proposal. ...

Wayne Gagne's letter, 16 July 1975: The Board of Directors of the Hawaii Audubon Society has discussed at some length a possible project with Mr. H. Douglas Pratt involving the production of a portrait series on Hawaiian birds. ...

The Hawaii Audubon Society has been in the business of environmental education since its founding in 1939. Our field guide, first published in its present form in 1967, has sold more than 50,000 copies. Our monthly journal, THE ELEPAIO, is distributed widely in Hawaii, on the Mainland, and in a number of other countries. We have long recognized the regrettable lack of nature education materials appropriate to the Islands. A widespread awareness of Hawaii's unique natural heritage is a goal that can only be achieved through the combined efforts of many individuals and organizations to make suitable materials available to the schools and to the public at large. Our society, unfortunately, is limited severely by funds, although our book sales have gone a long way in the production of educational tools and in the support of productive environmental research. Currently we are producing a slide and sound presentation for the Bicentennial called "Rediscovery of our Natural Heritage," in cooperation with a local educational film company called Ahuimanu Productions. The show will tell the story of Hawaii's natural world and man's changing relationship with the environment. Very limited funding will reduce the scope and long-range possibilities of this project, but we expect the results to be a valuable addition.

The interests and activities of the Society extend throughout the natural world, but our first love is birds. Hawaii's birds have attracted a great deal of scientific attention for their unique evolutionary history, and considerable recent concern because of their rapid rate of extinction since the arrival of European man to these Islands. Yet, we have been hindered in our attempts to illustrate this story by the lack of adequate visual materials. Photographs of all but the most common native birds are terribly difficult to obtain. For some of the most critically endangered species, months and even years may pass between sightings. Inconsistency in quality of available visual materials on Hawaii's birds has discouraged us from ambitious long range educational projects in the past, with the exception of our very popular field guide. Now, with the assistance of Mr. Pratt, we see tremendous opportunity for realization of some of our long term goals.

In his proposal to your organization, Mr. Pratt alluded to the long range educational potential of the proposed portraits. To us, the possibilities seem very great. Once produced, these paintings can serve as the foundation for educational filmstrips, soundslide school packages, text materials, flash cards, posters, and environmental publications of all kinds. An equally valuable educational contribution can be made directly in the public sector with poster and print sales, slide packages, calendars, place mats, post cards...the possibilities are endless.

I think you will agree that our educational system in this state needs a spark from the outside to bolster its environmental programs, and this project would go a long way towards achieving that objective. ...

PORTRAITS OF HAWATIAN BIRDS: A PROPOSAL

Hawaii's native birds hold a special place in the history of the islands. Not only were their feathers valued by the ancients, but birds make up almost the entire vertebrate fauna indigenous to the archipelago. Their interest to scientists the world over stems from the fact that most of them comprise species found nowhere else, and from the great variety of adaptation they exhibit. Despite this variety, the forest birds belong to only four avian families, one of which is uniquely Hawaiian. These "Hawaiian honeycreepers" are the foremost example of a phenomenon known to scientists as adaptive radiation---the evolution of many different species from one original colonizer. Add to these considerations the unquestioned aesthetic appeal of the native forest birds, and one may readily understand the inestimable value of this natural treasure.

But Hawaii's birds also illustrate one of the tragedies of modern civilization. More bird species have become extinct in recent times in Hawaii than in any comparable area in the world. Over half of the species listed as endangered in the United States occur only in the fiftieth state. This deplorable situation is testimony to the lack of interest in or concern for native birds on the part of newcomers to these islands, as well as to the the loss of the traditional respect for birds of the native Hawaiians. In part, this attitude has developed because of the great decline in numbers of native species brought on by loss of habitat, exotic bird diseases, and other unknown factors. Most inhabitants of this state will never see a native forest bird. Many assume that native birds are all gone forever. But the person willing to look for them can still see an impressive array of endemic species clinging to existence in remote upland areas even of Oahu. Public awareness that such unspoiled areas do still exist could go far toward fostering sentiment favorable to preserving them. The remaining native forest birds will survive only so long as such areas remain available to them.

I am but a visitor to these islands. My fascination with native Hawaiian birds began when I first became aware of them from the pages of Roger Tory Peterson's Field Guide to Western Birds in 1962. His brief treatment and one color plate showing some of these rare denizens sparked my imagination, and I determined then and there to some day try to see these birds alive. My dream finally was realized in 1974 when on a month's visit I became acquainted firsthand with many of these amazing creatures. I realized that one visit would only be the beginning of a lasting interest, and I vowed to do what I could to further the preservation of Hawaiian birds. I persuaded my major professor in the Department of Zoology at Louisiana State University to let me begin a dissertation study on the classification of Hawaiian birds, a research project which will take several years to complete. But I am, in addition to being an ornithologist, a professional wildlife artist. My painting have appeared in such publications as Encyclopaedia Britannica, Wildlife in North Carolina, Louisiana Conservationist, Birding, and in George H. Lowery's Mammals of Louisiana and Its Adjacent Waters which received the Louisiana Library Association's Book of the Year award in 1974. So it seemed to me that art provided the best avenue for me to make a contribution to conservation in Hawaii.

With two other ornithologists as co-authors, Delwyn G. Berrett and Philip L. Bruner of Laie, I began the illustrations for a guidebook to Pacific birds that will include Hawaii. This project is proceeding, but several years will be required before it is completed. The book will show all the native birds, but they will of necessity be grouped in pages without backgrounds. I painted two such composite plates of exotic species for the Hawaii Audubon Society's guidebook <u>Hawaii's Birds</u> currently being revised. That revision will also have my portrait of the Po'o uli, a newly discovered species of honeycreeper from Maui. It was that painting that prompted several Audubon members to urge me to make the present proposal for a series of such paintings.

None of the currently available illustrations approach the type of art work I believe will go furthest in fostering interest in the birds. I believe that a series of life-size portraits of native birds in life-like attitudes in their natural environments should be commissioned by the State of Hawaii. Such a series could be put to a variety of uses from display in public buildings to reproduction as slides for educational purposes. Not since the Rothschild engravings of the 1890's has anyone attempted to depict Hawaiian birds in this manner, and none have ever been produced by an artist with firsthand knowledge of the birds in the field. Based on my own research, the paintings would be both scientifically accurate and aesthetically pleasing.

Several thematic approaches might be employed, with the number of paintings to

complete a representative series varying with the theme chosen. One possibility would be to show all the forms that have become extinct, requiring at least 10 paintings. But probably better would be a series showing the currently endangered or threatened forest birds. Such a series would require between 15 and 20 portraits. Another approach would be to select a cross-section of typical forest birds, which would require at least 12 paintings but could have any number. I am restricting my suggestions here to the forest birds for several reasons. They are the least known and least often observed species as far as the public is concerned. Also, forest birds are much more difficult to photograph than water birds, so few photographs of them have ever been published. I sincerely believe that good paintings can serve the same function as good photographs--that of bringing the birds to life for the viewer.

At my present rate of production, I can produce about one major painting per month. Thus the project I suggest would require between one and two years to complete. Since my income is derived solely from such work, I would suggest that the paintings be purchased individually as they are completed. Currently the prices of my paintings vary from \$300 to \$1,200 depending on size, subject matter, and style of treatment. I would expect the portraits of Hawaiian birds to be of medium size with full backgrounds, with an average price of \$500. At that price, I would expect to retain the copyright on the paintings, although the state would, of course, be free to reproduce them for educational purposes. If the state wished to retain the copyright, the prices of the paintings would have to be raised considerably.

I hope that what I have suggested here will become a reality. I know from my experience on the mainland that wildlife art can play a prominent role in preservation of endangered species. Hopefully, with some financial support from the state, such a result can occur in Hawaii.

Letter to Chairman Christopher Cobb, Department of Land and Natural Resources, from President Wayne C. Gagne, 2 July 1975: Last year, the Hawaii Audubon Society was pleased to receive a copy of the Division of Water and Land Developments report on the engineering design for the Kahului Flood Control Study dated March 1973. This dealt with alternative alignments for two drainage channels around Kanaha Pond for removing floodwaters from the nearby section of Hana Highway and an urbanizing district.

The purpose of this letter is to ask the status of this project and the time for public comment. Has an environmental statement been prepared yet? The report gave considerable attention to avoiding adverse effects on the pond so that it can remain the State's most important waterbird refuge. The Hawaiian Stilt and Hawaiian Coot are the two remaining endangered birds, while contrary to the reports statement on page four, the Gallinule is not extinct on Maui and the Night Heron is not classified as endangered.

We agree that alternate 6A is preferable to 6, but better yet and cheaper would be a 6B in which the channel is routed east of the airport's oxidation reservoir by widening an existing ditch. The alternate No. 12 unnecessarily cuts through the western edge of the Pond, but it should be placed 200-300 feet farther west to provide a buffer zone and leave the Pond intact. ...

Reply, 14 July 1975: ... Funds for the project design were appropriated under Act 218, SLH 1974 and Act 195, SLH 1975 and we will be requesting funds for the preparation of an environmental impact statement shortly.

We appreciate your suggestion for widening the existing ditch easterly of the airport's oxidation pond. This alternative will be considered at the time the environmental impact statement is prepared. At that time you will have the opportunity to comment on the project. Final design of the drainage channels will not begin before the completion and approval of the environmental impact statement.

Regarding the alternate shown on plate 12 of the report, Alexander & Baldwin will soon begin construction of the channel along their property line. The original alignment crossed conservation lands and a conservation district use permit was granted by the Department of Land and Natural Resources in 1972. Subsequently, A&B withdrew the conservation use permit because the channel will now be built within A&B property and will not cross the conservation lands.

We appreciate your comments and every opportunity will be afforded your organization to comment on the drainage channels.

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Letter to Mr. Joseph M. Souza, Jr., State Parks Administrator, from Kojima, 5 Sep. 1975: On 9 August I visited Na La'au Hawaii Arboretum to see the xerophytic plants at the "living museum", Ke Kua'aina, but no museum! What happened?

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Ke Kua'aina was started by Mr. George C. Munro and the Hawaii Audubon is very much interested in knowing your plans for the museum. ... It's too tragic to let the "living museum" die forever without knowing why! ...

Reply, 18 September 1975: We have also been saddened by the loss of Ke Kua'aina, the "living museum" of xerophytic plants on the slopes of Diamond Head. At the time the late George C. Munro established this collection, we had a maintenance crew of only three people for all the State Park areas on O'ahu, and Mr. Munro's nephew, Hector Munro, maintained these plantings as a labor of love, with help from the Garden Club of Honolulu. Funds contributed by the Garden Club provided a watering system and a tool storage box, and we provided water from operating funds.

Funds for annually requested maintenance help were not forthcoming from the State, so Hector Munro gave up his valiant efforts after several years. Though we now have a much larger operating staff, our O'ahu responsibilities have increased in even greater proportion. Of particular significance to the subject area, our Division has never been allowed a naturalist's position or any other significant expertise in the area of natural history interpretation, though we have been making budgetary requests for more than 15 years. We have, therefore, been able to provide the area with a limited amount of caretaker services only, and even the watering system has now been shut off to reduce vandalism problems.

We certainly appreciate your concern about Ke Kua'aina, but it appears that at this last date little can be done to revive it except, after first assuring that there will be a means to maintain and manage it, to replant the area anew. ...

Excerpts from "That Is the Way It Is on the Mountain" by Ruby Catherine Munro, THE ELEPAIO, January 1967, Vol.27, No.7, pp.61-63: The native Wiliwili trees are blooming on Diamond Head...Work on the mountain is not without its disappointments. Many plants have been lost, they are attacked by parasites and beetles, and there is a certain amount of destruction by vandals...The various phases of growth are an interesting study. The mountain will be dry and brown and one will despair that there will ever be growth again when the native Wiliwili will start to bloom - the birds will raise their young. And then the rains will come and the mountain will come to life and turn from brown to a verdant green. This is not a cultivated aboretum as such but plants and trees growing in a wild state. That is the way it is on the mountain.

May this project started by my father continue to grow!...It was Father's wish and we know that it is the wish of many others, that this majestic mountain never be marred by the encroachment of houses on her slopes and instead be dedicated to the native plants and birds of Hawaii Nei and established as one of the very lovely parks of our Islands. Former Governor Quinn established Diamond Head as a State Monument so Father's wish was granted. May she be protected always.

Editor's note: George C. Munro's dream became a reality when on March 6, 1958, Governor William Quinn in an executive order set aside 9.474 acres of land on the west side of Diamond Head for Na La'au Hawaii Arboretum. Na La'au Hawaii means plants belonging to Hawaii. This arboretum includes the small area at the northwest corner of the state park where Mr. Munro laid the foundations for a "living museum" of the xerophytic or dryland plants of these islands to save from extinction as many of our endemic dryland plants as possible, and in order to keep it as a separate project from the arboretum, he named the "living museum" Ke Kua'aina which means literally "the back land", as it is really the back land of the park.

Is it a "dead museum"? The answer depends on us. It's a "living museum" as long as we are doing our best to make this a better world. It may take 100 years before the small spark of life becomes a flame, but let's try! Please send in comments and suggestions to Kojima, 725-A 8th Avenue, Honolulu, Hawaii 96816. The following 30 September 1975 U.S. Fish and Wildlife Service Region One News Release on "American Crocodile, Five Other Animals Added to Endangered List" was received by Mae Mull from Representative Patsy T. Mink with a note, "I thought you would be interested in this."

Six American and Mexican animals, including the American crocodile, the rarest reptile in the United States, have been added to the Endangered Species List, Keith M. Schreiner, Associate Director of Interior's U.S. Fish and Wildlife Service, announced today.

The final rulemaking published recently in the Federal Register also lists the Cedros Island mule deer, the peninsular pronghorn antelope, the Hawaii creeper, the Scioto madtom, and the po'o uli as endangered. The bayou darter and the Newell's Manx shearwater are listed as threatened species (in trouble, but not believed in danger of imminent extinction). These listings were originally proposed in the Federal Register on April 21, 1975, and public comments were accepted until July 21.

The additions bring the number of U.S. endangered species to 112 and the number of threatened species to nine.

<u>The American crocodile</u>—Once a common species in southern Florida, it is now the rarest reptile in the United States with only 10 to 20 breeding females known to exist. Intensive human development eliminated much habitat, and excessive killing by hide hunters caused the decline. Raccoons also prey heavily on the eggs and young of crocodiles. The possibility of a hurricane or other natural disaster is a real threat to this small, isolated population. The listing of the American crocodile comes at a time when its relative, the alligator, is being taken off the list in some areas.

<u>Cedros Island mule deer</u>-This deer is known only from Cedros Island off the western coast of Baja California in Mexico. Currently only a few, perhaps less than a dozen, are thought to survive in restricted areas of the island. Poaching and predation by packs of feral dogs are thought to be major factors in their decline.

<u>Peninsular pronghorn antelope</u>-This animal once inhabited most of Baja California but has been greatly reduced in range because of excessive hunting and competition from domestic livestock for forage. Currently only two or three remnant groups survive.

Hawaii creeper-This bird was endemic to the Island of Hawaii and was quite common in the 1890's. The subsequent habitat alternation, predation by rats, and diseases carried by introduced birds and mosquitoes severely hurt populations. Their range is now restricted to a small area of forest between the 5,000 and 6,000 feet elevation where they are rare and extremely vulnerable to further environmental disruption.

<u>Scioto madtom</u>—This fish is known only from one locality in the lower portion of Big Darby Creek, tributary to the Scioto River in Ohio. The fish has been taken in a riffle area of the creek with moderate to fast current where the bottom consists of gravel, sand, silt, and boulders. It is endangered because of pollution, siltation of its habitat, and by two proposed impoundments on Big Darby Creek.

<u>Po'o uli</u>—This newly discovered species of bird is restricted to a small area of forest on the northeastern slope of Haleakala volcano on the Island of Maui, Hawaii. Its past history is unknown but presumably its decline was caused in part by habitat alteration and competition of other non-native bird species introduced on the Island.

The bayou darter--A tiny, silvery fish, this darter exists only in the Bayou Pierre drainage, a small river tributary to the Mississippi River in west Mississippi. It inhabits clean, silt-free, gravel riffle areas, but in recent years gravel-pit operations and poor agricultural practices have damaged its habitat and reduced its numbers. The Soil Conservation Service has proposed a watershed project which would further affect the bayou darter's habitat by adversely altering the water chemistry and contributing additional silt to the stream. This would pose a serious threat to the continued existence of the species, according to the Fish and Wildlife Service. However, since the U.S. Army Corps of Engineers is currently engaged in a determination of the impact of the proposed watershed project, it would be premature to list the fish as an endangered species at this time.

<u>Newell's Manx shearwater</u>—This medium-sized, black and white seabird once bred on all of the main Hawaiian Islands. Now its breeding activity is restricted to an isolated part of Kauai. This fish and squid-eating bird is thought to have been exterminated from most of its range by the introduction of predatory mongooses, dogs, pigs, and rats. The bird's attraction to lights also increases its mortality as it is killed by collisions with cars and lighted towers. Nonetheless, it is thought to number in the low thousands, and does not appear to be in immediate danger of extinction. Harry Whitten's column on page A-11, HONOLULU STAR-BULLETIN, 11 October 1975, titled Endangered Birds gives an account of this news release.

MAHALO NUI LOA to both Patsy Mink and Harry Whitten for their keen interest and generous KOKUA to alert the public of the necessity of vigilance to preserve our unique and fragile Hawaiian ecosystem.

The following two interesting articles on the whooping crane were contributed by Ethel M. Matheson: <u>THE NATIONAL OBSERVER</u>, 24 May 1975, Struggling to Save the Whooping Crane:

The good news is that the U.S. Fish and Wildlife Service officials have revealed plans to try to establish a second flock of whooping cranes in the wild in Idaho after years of careful research. The bad news is that the world's only existing wild whooping cranes--49 at last count--are threatened by avian cholera, a disease usually fatal to waterfowl. The following story tells how that happened by Tom Allan from Odessa, Nebraska:

To wildlife officials here at the Sacramento-Wilcox Game Management Area in southcentral Nebraska, the news was all bad. ...Cholera was killing thousands and thousands of migrating waterfowl in the management area, it was migrating time for the rare whooping cranes, and this refuge lay within the normal migratory path of those majestic birds. ...

"It was just an outside chance they'd come this way," says Ed Bosak, Omaha-based special agent of the U.S. Fish and Wildlife Service. "Only six were spotted in Nebraska last year."

The wildlife men's worst fears were soon fulfilled. On the night of April 17, there was talk in an Axtell, Nebraska, bowling alley that somebody had seen huge white birds landing at Funk Lagoon, nine miles north of the state refuge. The lagoon was known to be infected with cholera. Next morning, an area farmer saw the birds at the lagoon as a driving snowstorm began. Wildlife experts soon confirmed the birds were whooping cranes. There were nine, a large group; the cranes generally travel two or three together. Large too, because only 49 whooping cranes are known to exist in the wild.

"But who would have believed," Bosak says, "that the biggest bunch ever would have picked such a little spot, the worst spot, in all the space to land?" ...

Apparently the cranes, in their annual migration from Aransas National Wildlife Refuge on the Gulf of Mexico in Texas to nesting grounds in northern Canada, had been forced down by the storm. ...The storm kept aircraft grounded for much of the day. Then just before nightfall a small plane succeeded in herding seven cranes to a safe area nine miles away on the Platte River. The remaining two birds reluctantly relocated about three miles northeastward--but still in the infected area. Wildlife officers kept a night-long vigil on the two. At daybreak on April 19, the airplane was again employed to try to scare the endangered two birds to safety. But the two suddenly took off back toward Funk Lagoon, landing in a green wheat field to forage. The aircraft got them going again, this time maneuvering the cranes to the Platte River with the others. By noon all the cranes had spiraled high in the sky, streaking north and out of the danger zone. The weary conservation officials whooped with joy.

Their relief was shortlived. That night five more whooping cranes landed on the Platte River, near but not in the infected area. Again some wildlife men watched all night. The newcomers took off the next morning.

Some of the first group of nine cranes were exposed to avian cholera for about 36 hours. Nobody is sure whether they will succumb to the disease later. The incubation period in ducks is 24 to 48 hours. Avian cholera is highly contagious. Presumably whooping cranes are susceptible even though they are not waterfowl. If sickened birds do not die they become carriers of this disease. Can the nine exposed cranes spread the disease to the other 40? No one knows. ...

By Mid-May, all the flock's mature cranes--47--had arrived safely at their breeding grounds in Wood National Buffalo Park in northern Canada. Two juvenile cranes, counted in a winter census, have not appeared, but these young birds often spend summers elsewhere. ...If the world's only known wild flock were wiped out by disease, there are perhaps two dozen in captivity, most at a Federal research center near Washington. ...

<u>ALBUQUERQUE JOURNAL</u>, 28 September 1975, page E-10, 6 Special Guests to Flock to Bosque Wildlife Refuge by Carol Cohea: Officials at the Bosque del Apache Wildlife Refuge near Socorro...are doing some minor adjusting of tour routes to accommodate the arrival of the whooping cranes.

The six whooping cranes, which are expected to fly down here with their foster parent

sandhill cranes, are part of a unique experiment which U.S. Fish and Wildlife officials are touting as the most significant thing in wildlife management today.

The six birds are currently on the Grays Lake National Wildlife Refuge in Idaho where they were hatched by greater sandhill cranes, who raised the chicks as their own young. ...

Based on the theory of imprinting--that the birds will become attached to the first living thing they encounter in the first hours after hatching--the young whooper chicks will think the sandhill cranes are their parents and migrate with them from Idaho, with a stop at Monte Vista, Colorado, to the Rio Grande Valley to winter.

The idea behind the experiment is to get the Service's whooping crane eggs out of the one wild basket that they're now in and start a second flock. Only 49 whooping cranes are left in the wild. They winter at one spot on the Texas Gulf Coast and summer in the Canadian Northwest Territories.

"We're concerned that natural disasters or man-made ones might wipe out the entire flock," Smylie said. One example occurred when a hurricane struck a resident flock in Louisiana, apparently wiping it out. ...

While the first flock will continue to use the Mississippi Flyway, summering in the Canadian Territories and wintering on the Gulf Coast, the second flock will use the Central Flyway, wintering at the Bosque and summer nesting in Idaho. ...

The Canadian Wildlife Service supervised the egg taking at the Wood Buffalo National Park where 14 eggs were picked up for the foster parent program. Of the 14, nine hatched at Grays Lake and six survived.

Admittedly, there are also a number of unanswered questions.

"Part of the experimental flock may migrate further than the Bosque," Smylie conceded, noting that the cranes usually fly some 2500 miles to winter. The distance from Idaho is only about 800 miles. He observed that part of the idea behind locating another flock of whooping cranes at the Bosque is to cutdown on their long migration, thereby reducing the hazards the birds could encounter.

Another potential problem is that the whooper chicks will imprint to the sandhills to the point that they try to breed with the sandhills instead of their own kind.

"We don't want to create a hybrid. We know it is possible to artificially inseminate the birds, but they don't do it naturally." ...

The most recent news on the whooping crane is on page H-2, HONOLULU STAR-BULLETIN, 17 October 1975, bannered "These Birds Have Something to Whoop About": Alamosa,Colo.(AP)---Three or four sandy-colored young whooping cranes were airborne yesterday somewhere over the American West on an instinctive mission that biologists hope will save their species.

The whoopers, hatched by sandhill cranes in an experiment in Idaho, were flying to join their foster parents for several days' feeding and relaxation at the Monte Vista National Wildlife Refuge near Alamosa Airport before completing their winter migration southward. ... The new whooper program was conceived and is being conducted by Dr. Rod Drewien, a research biologist and crane expert at the University of Idaho. ...

One whooper already is at Monte Vista, standing as tall as adult sandhills among the smaller, battleship gray sandhill chicks. Drewien said the others should arrive at any time. ...Experts are excited over the experiment, but it will be two to three years before its success or failure will be known. ...The whoopers in the new experiment seem to be in somewhat of a quandary about their heritage. ...Also, whoopers exist almost exclusively on aquatic animals. The sandhills and the whoopers in the mixed families grew up on barley.

The following information from THE CONDOR, Vol.76, No.4, Winter 1974, pp.476-478, Body Temperature of the Nesting Red-footed Booby (<u>Sula sula</u>) by R.J. Shallenberger, G.C. Whittow, and R.H. Smith may help you understand some of the many interesting behaviors of the red-footed booby and make your next visit to the booby colony very exciting: The birds were able to keep their body temperature below 40°C during exposure to

The birds were able to keep their body temperature below 40°C during exposure to direct sunlight by gular fluttering and behavioral adjustments. Its wings were held away from the body, the scapular feathers were elevated, and the bird tended to orientate its body so that the bill pointed away from the sun. In addition, the bird sometimes adopted a characteristic posture in which the body was tilted, head down, so that the entire head was in the shade of the bird's body...In this posture, the bird appeared to be asleep and it did not gular flutter. The highest body temperature was recorded after the birds returned to the nest, presumably after flying over the ocean for many hours.

Another article of interest in the same issue on pages 464 and 465 is by Roger B. Clapp on Albinism in the Black Noddy (Anous tenuirostris).

He says, "On 17 March 1968, while on Laysan Island...I observed a strikingly marked albinistic Black Noddy.... Unlike other recently fledged noddies present, this bird flew weakly and was captured with a hand-net the following day. The specimen (USNM 543336), an immature female.... Albinism in which pigment is reduced or diluted in the plumage, eyes, or soft parts has been termed imperfect albinism or leucism and has been shown experimentally to be related to diet.... The marked symmetry in the leucism and the emaciated condition, of the aberrant noddy, suggest that in this instance, too, albinism may have arisen from dietary deficiencies. Tens of thousands of adult and immature Black Noddies were observed during the course of the Pacific Ocean Biological Survey Program but only this individual showed such marked albinism. ...Imperfect albinism or leucism is not particularly uncommon in immature Black Noddies nor is partial albinism uncommon in adult Black Noddies...."

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Charles van Riper reports an albinistic 'Elepaio in THE AUK, Vol.91, No.4, 9 Oct 1974, page 841: ...On the afternoon of 23 July 1973 I observed an albinistic 'Elepaio (<u>Chasiempis sandwichensis</u>) on the northwestern slope of Mauna Kea at an elevation of 6,950<u>+</u> feet. The bird seemed to be recently fledged as it was in the company of what appeared to be its parents. The plumage of the bird seemed entirely white. The bill was light colored, but the feet were not the pale pinkish color of a true albino. I was unable to record the eye color. The 'Elepaio appeared to have fully grown wing and tail feathers. One unusual aspect was the abnormal length of the rectrices; they seemed to be almost one-fifth again as long as those of the presumed parent birds. ...

REVIEWS by Wayne C. Gagne

Anon. 1975. Is the nene really saved? Oryx 12(1):2-3 (Questions whether wild population of nene on Maui and Hawaii are viable without continued human assistance.)

Berger, A.J. 1975. Book review of "Functional anatomy and adaptive evolution of the feeding apparatus in the Hawaiian honeycreeper genus Loxops (Drepanididae)" by L.P.Richards and W.J. Bock. <u>Wilson Bulletin</u> 86(4):489-491.

Fisher, H.I. 1975. The relationship between deferred breeding and mortality in the Laysan albatross. <u>Auk</u> 92(3):433-441. (Found that the Laysan albatross delayed breeding and incurred mortality in the following manner: (1) Young birds didn't breed in significant numbers until 8-9 years old, (2) Young nested later than experienced breeders in the first 2-3 years, (3) Greater chick mortality from late laid eggs, and (4) Young pairs fledged few chicks in the first two years.)

Hunt, Jim. 1975. LORAN duty: a reminiscence. <u>Oceans</u> 8(2):58-65 (Mar-Apr issue) (Natural history observations on Kure Atoll, with emphasis on the avifauna.)

Kear, J. 1975. Returning the Hawaiian Goose to the Wild. In R.D. Martin (ed) Breeding endangered species in captivity. Academic Press, London, NY, San Francisco. 450 pp (\$33.75)

King, Warren B. (ed). 1974. Pelagic Studies of Seabirds in the Central and Eastern Pacific Ocean. <u>Smithsonian contribution</u>. <u>Zoology</u>, No.158((Contributions on sooty tern, black-footed and Laysan albatrosses, storm petrels (Hydrobatidae) and red-tailed tropicbird))

Laycock, G. 1974. The birdman of Kauai. Exploring Magazine (Nov) 46-49. (Federal biologist John Sincock's work with Kauai avifauna)

Raikow, R.J. 1974. Species-specific foraging behavior in some Hawaiian honeycreepers (Loxops). <u>Wilson Bulletin</u> 86(4):471-474. (Examines four congeneric species of Drepanididae in 'ohi'a forests on Kauai, comparing the major foraging substate of three--'amakihi, 'anianiau, creeper--in a laboratory)

Udvardy, M.D.F. 1972. Laysan albatross as a carrier of floating debris to land. Atoll Res. Bull. No.162:497 (Observations on Laysan in 1959 and 1961)

Zinmerman, David R. 1974. <u>To Save a Bird in Peril</u>, Coward, McCann & Geoghegan, Inc., N.Y., 286 pp. (Tells the story of conservationists working intensively to sustain bird species threatened with extinction. Chapter 5 is entitled "Reintroducing the Nene Goose. Part of Chapter 10 entitled "Island Hopping" discusses the transfer of Laysan finches from Laysan to French Frigate Shoals and presents evidence from the National Archives found by Roger Clapp that the Laysan duck may have dwindled to one gravid female in 1930.) State of Hawaii, Dept. of Land & Natural Resources, Division of Fish and Game. 1974.

Environmental assessment: Impact of the Hawaii statewide Pittman-Robertson Program, 1974-1975 on endangered species of wildlife and their habitates, 80 pp, mimeograph.

State of Hawaii, Dept. of Land & Natural Resources. 1975. Mauna Kea planning study: Preliminary draft. 33 pp mimeograph. (Analyzed conflicting uses of natural resources of Mauna Kea Forest Reserve and Game Management Area to "define areas within the Mauna Kea area which are best capable of supporting land use and set up guidelines for the proper implementation of each land use while safe guarding the natural environment.")

Field Trip 13 September 1975 by Lawrence K. Katahira: Hawaii Volcanoes Nationa Park

It was a clear, brisk morning as we met at the Volcanoes National Park Visitor Center. While waiting there, 'Apapane, 'Amakihi and an 'Oma'o were heard singing in the surrounging 'ohi'a-tree-ferm forest.

Our entourage of 10 drove to Thurston Lava Tube, where we were immediately greeted by the melodious sounds of at least 4 'Oma'o and numerous 'Apapane and 'Amakihi. We walked about 25 yards down the Kilauea Iki Trail, where Bill Mull pointed out some of the endemic plants and unique insects, including the predacious Hawaiian caterpillar, <u>Eupithecia</u> <u>orichloris</u>, which was perched on the native sedge, 'uki. During this time, 2 'Elepaio were above us probing for insects and curiously checking the group out.

We hiked further down the trail and continuously saw and heard 'Apapane, 'Amakihi and Japanese White-eyes. Near the first switchback we observed an 'I'iwi who had posted a "kapu" on a full-bloom 'ohi'a tree. How tempting the blossoms were to the 'Apapane, mostly immatures--but they never got their share as the 'I'iwi aggressively chased them away!

We returned to the Thurston parking area and hiked south along the Crater Rim Trail (Escape Road). Again we saw more 'Apapane, 'Amakihi andheard 2 more 'Oma'o.

We drove to Ainahou Ranch, now Park land, where Paul Banko led us to one of the fenced Nene enclosures, about one acre in size. Paul, who has projects with the Nene and 'Alala (Hawaiian Crow), discussed the goals and methods of the propagation program to restore the Nene in lower elevations in its former nesting range. In this enclosure were four juveniles hatched in early January of this year and the two adults with clipped primaries. The juveniles, although free-flying and as large as adults, stayed close to their watchful parents as some of us approached to within 10 feet of them. It is expected that the early imprinting of the females will lead them back to the area of their birth for nesting sites, with the males following as pair bonds are formed. In all, four Nene enclosures are in use on Park land and a fifth is nearing completion at about 600' elevation. At Ainahou Ranch, we also observed House Finches, Common Mynahs, numerous 'Amakihi and a couple of 'Apapane.

Before going up the Mauna Loa Road, we stopped at the U.S. Fish and Wildlife Service Research Station in the Park. Here we got to watch closely the 3 Hawaiian Crows reared from fledglings and doing well in captivity with excellent appetites and glossy, smooth plumages. As we watched them in close social interaction, making calls and short flights in the spacious cage, Paul Banko talked to us about 'Alala behavior, food preferences and the dismal prospects for survival of the species in the wild. Although very little is known of the life history of the Hawaiian Crow, biologists had hoped these individuals had reached maturity this spring, with a chance for reproduction even though the sex of the birds is unknown. Two of them exhibited behavior that could have been incipient courtship and they were separated from the third bird. Nothing further developed though, so the biologists look for complete maturity next spring with the hope that both sexes are represented. Lunch was at Bird Park (Kipuka Puaulu) picnic area, where 3 more species were sighted --- Golden Plover, Ricebird and House Sparrow. We continued up Mauna Loa Road passing through the devastated area that was recently burned. The fire that started on August 13 on the Keauhou Ranch and quickly spread to the Park destroyed approximately 1,460 acres of a recuperating native koa forestabove Kipuka Ki. The area where the rare 'Akiapola'au was reported seen in mid-July this year next to the road in the koa belt was now scorched. We stopped for a few minutes at a favorite birding kipuka adjacent to the burned area, a few hundred yards above Power Line Road, but were disappointed when only a single 'Amakihi was heard.

At the 5500' level we saw 2 'I'iwi, 2 'Elepaio, 4 California Quail and numerous

'Apapane and 'Amakihi. Interesting to note is the plumage difference of the brightly colored 'Amakihi here, as compared to the duller ones at lower elevations at Thurston Lava Tube and Ainahou Ranch.

As we continued our drive up the mountain, we saw a male Blue Pheasant and a couple of unidentified female pheasants. A heavy fog blanketed the area as we approached the 6700' level. Here we heard a few 'Apapane, 'Amakihi, 'I'iwi and pheasants but decided to abbreviate our birding day as rain started and visibility declined.

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Field Trip 14 September 1975 by Omer Bussen: Kanehoa Ridge

Eighteen members and guests climbed Kanehoa ridge to the Waianae summit on a calm, dry day, with overcast skies in the afternoon. Little 'ohi'a was in bloom.

House finches were heard and white-eyes were numerous on the lower trail. Seven or eight 'elepaio were seen and more were heard. Two approached within three to five feet of several observers; one was an immature bird. Four or five 'amakihi were seen-one an immature bird with wing bars--and more were heard. Two white-tailed tropicbirds were seen at a great distance over Valanae Valley.

No bush warblers or 'apapane were in evidence, although the latter was seen at nearby Palikea on the same day by Walt Donaghho.

One feral pig was seen near the summit, and a feral cat was watched for some time on the summit ridge.

Field Notes from Walter R. Donaghho: Fairy Terns

<u>August 9, 1975</u>: Saw a pair of fairy terns flying over the beach in front of the Outrigger Hotel, and turning in over the lawn of the Royal Hawaiian, passing just mauka of the 30 story Sheraton tower.

One flew in to Fort DeRussy later (7 p.m.) and flew to the same tree where one was reared in 1970!

Noted three pairs of Java sparrows in Kapiolani Park. ...

<u>August 31</u>: Six fairy terns definitely taking up abode in the ironwoods of Kapiolani Park, just Diamond Head of the bandstand. They were flying in 2's and 3's, right over the crowd enjoying a Tahitian performance.

Since they have bred in the past in October, it is quite possible that they are getting ready to breed now.

Saw a pair of fairy terns off Diamond Head Road by Makalei Place, just makai of the junction, in a large lawn.

A walk at 3 p.m. along the Na La'au trail resulted in nothing but the usual birds: the two cardinals, linnet, ricebird, the two doves, mejiro, and mockingbird. No trace of any of the finches. Saw one female(?) pintailed whydah later feeding on the grass in Kapiolani Park.

September 14: Went on a hike from Mauna Kapu, above Palehua to the summit of Palikea. Flocks of white-eyes, passing through the 'ohi'a, foraging as they went for nectar and insects. Saw 'amakihi several times, but never close up. Also 3 'apapane, including one that flew over us as we lunched at the top. A family of three brown young 'elepaio and their mother came up to examine us as we descended the mountain.

I never heard the bush warbler once, but have no reason to believe it wasn't there; simply silent at this time of the year.

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Field Notes from Mary Roberts: Please Identify!

Today (9/21/75) for the first time I was able to get a good view with my binoculars of the illusive laughing-thrush /species unknown/ that takes its hurried tour through our gardens in the Makiki area in the morning. I was amazed that this apparently all black bird is streaked with fine grayish-white lines over its body; that it has five rows of scalloped white areas under its tail and, like the bulbuls, is red-vented. Its crest is very sparse, is raised only slightly, but lies flat most of the time. Its beak appears slender and a bit longish. Its call is very throaty. It is considerably larger than the bulbuls and I judge about the size of barred doves.

A swarm, or possibly a family, flew to my neighbor's lichee tree each morning while it bore fruit, then alighted briefly on my avocado trees and then flew away with loud calls in the Tantalus direction.

A friend has noticed a pair in the apartment area around Makua Alii (1541 Kalakaua)

where many monkeypod and shower trees are in full leaf.

... I was amazed when on 26 September a group of at least four alighted on my pear tree with loud clacking sounds I had never heard before, pierced by penetrating whistles. I assumed that the clacking sounds were alarm cries and this was a family with young.

By the time I had fetched my binoculars and run into my backyard they were flying separately from tree to tree. I focused on one and believe it was the specimen I had seen the first time as it had the rows of white under the tail. Another one close by had a very sparse tail indeed and only one row of white spots under it. Also I could see no crest. He raised short, stubbly feathers on the back and top of his head. I watched to see if he was a baby being fed by the fine specimen who was picking berries off the nightblooming jasmine tree, but suddenly the whole group from everywhere took wing and disappeared. ...

Does anyone know this bird? If you do, please write to Kojima, 725-A 8th Ave, Hon., HI 96816.

Hawaii 2000, Outdoor Education Center (OEC)

The Hawaii 2000 Outdoor Center is a new concept in recreation and education in Hawaii. Its main facility is located on 175 acres in an 'ohi'a forest. The abundance of native and exotic plants, animals and birds offers both residents and vacationers a look at Hawaiian wilderness. Labels along the Center's trails reveal some of the many intricate relationships which exist between plants and animals.

<u>History</u>: In early 1973 a citizens committee was formed which began the legal paperwork for the project and secured community support. This committee was an outgrowth of the Governors Conference on the Year 2000.

Groundbreaking began in May 1973, with the Navy Seabees providing the labor force. The entire project has been one of community support. Labor, equipment, material and funding have all been donated by the community at some point in the Centers development.

The Center is, at present, operated through funding from private foundations and through funds generated by our educational program. The land is publicly owned under long-term lease to the Center.

Educational program: Specific programs have been developed by the Director Richard Mortemore and his staff with the help of a six-member community advisory committee. Since the Center serves as a resource center, the programs have been designed to serve the needs of the community; to acquaint young people with the wonders and mysteries of nature; to give teenagers a chance to contribute to the Center and to explore nature; and to provide a facility for adult enjoyment.

The program consists of l)displays and exhibits--the museum encourages touching and feeling, 2)nature trails--two fully labeled, self-guiding trails, 3)field trips--two naturalist guided trips per day, Monday through Saturday, 4)nature lectures--at schools and clubs throughout the island, 5)classes & workshops--regularly conducted in co-operation with the University of Hawaii. In addition to students from Hawaii, classes are scheduled for Mainland students. 6(work-study projects, 7)public relations--through TV, radio, Checkers & Pogo magazine, and Nature Guide booklets published by OEC. (A set of six booklets: Animals That Live in the Sea, Books I & II, Hawaiian Birds, Introduced Birds, Insects, and Mammals; and some sample trail labels will be displayed at the Hawaii Audubon general meeting for your reference.) Illustrated programs on nature related subjects and naturalist guided nature walks through the Center's trails are available by appointment.

For further information or an appointment for a Naturalist's service, call 959-6244 or write to: Hawaii 2000, Outdoor Education Center, P.O. Box 1141, Hilo, Hawaii 96720.

Some Notes on Kalopa State Park*

Kalopa State Park is a tract of about 100 acres of native forest within the 615 acre Kalopa Section of the Hamakua Forest Reserve. Through the persistent work of the people of Hamakua District the Park was established in 1967.

We call Kalopa a native forest because it contains many native or endemic trees, shrubs, ferns and other plants, plants that were growing in Hawaii when the islands were first discovered by the Polynesians. Very few tracts of native trees survive in Hamakua and they should be preserved for their recreational, educational and scientific value.

The forest has an upper canopy of large tall ancient 'ohi'a <u>/Metrosideros collina</u>/ trees, and beneath is an understory of 'opiko <u>/Psychotria sp.</u>/, pilo <u>/Coprosma sp.</u>/, kolea <u>/Myrsine sp.</u>/, and olomea <u>/Perrottetia sandwicensis</u>/, and several other typical Hawaiian

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trees that are rare at this site. Tree fern or hapu'u /Cibotium spp./ is scattered in the forest but is no longer common. It may have been cut out or possibly it is scarce because cattle and pigs roamed free for a long time in the forest.

a long time in the forest. Lemon guava is the only non-native (exotic) tree and it came as an invader with the cattle. The forest has been under protection as a watershed area by the State Division of Forestry (and the Territorial Government) for about 40 years. What we can see happening now is as follows: 1)A vigorous and abundant stand of young 'opiko is forming a dominant new forest undergrowth. 2)Guava is aging and few new guava are coming in. It appears that the exotic guava will eventually be crowded out or shaded out by 'opiko. 3)The large 'ohi'a are very slow to replace themselves and there are few new trees. However, the old trees will last for many years and should continue to form the overstory of the forest for a long time. 4)Since cattle and pigs stopped trampling, eating and rooting, an almost continuous ground cover of ferns has developed. There are few tangles of brush or vines and one can walk easily almost anywhere in the forest. The most common ferns are pamoho /Sadleria sp./, palai /Thelypteris sp./, and ho'i'o /Athyrium sp./, common ferns are pamoho /Sadleria sp./, palai /Thelypteris sp./, and ho'i'o /Athyrium sp./, but at least a dozen species are present altogether.

There are few native birds at Kalopa but the 'elepaio /<u>Chasiempis s. sandwichensis</u>/ may be fairly common in some seasons and the 'io <u>/Buteo solitarius</u> is seen here from time to time. The exotic white-eye <u>Zosterops j. japonica</u> and <u>Chinese thrush</u> <u>Garrulax canorus</u> ...are perhaps the most abundant birds. The Hawaiian hoary bat <u>Lasiurus cinereus</u> flits about the open areas of the forest at dusk, most especially in summer and early winter.

Kalopa Park is yours to enjoy to learn about, and to care for. It is a very valuable asset to Hamakua District and all peoples of Hawaii.

*Plant Reference - "A Botanical Survey of Kalopa State Recreation Area" by Marcia L. Tomich, 17 pp., 5 figs., June 1972. (Hamakua District Development Council, Inc., Forest Parks Comm.) ****

ALOHA to new members: Dr. Charles K. Burrows, 1579 Ulupii St., Kailua, Oahu 96734 Lionel W. Carvalho, 394 Haili St., Hilo, Hawaii 96720 Garvin G. Clarke, 11 Machida Lane, Hilo, Hawaii 96720 Walter R. Donaghho, Armed Services IMCA, 250 S.Hotel St., Honolulu, HI 96813 (Reinstated) Arthur L. Edwards, 4265 Davis Way, Livermore, Calif. 94550 William B. Esselen, 55 Hills Road, Amherst, Mass. 01002 Terry K. Kahaleanu, USDA, Hawn Fruit Flies Lab., P.O.Box 1041, Lanai City, Lanai 96763 Shirley Jane Kelly, 15 Atalaya Terrace, San Francisco, Calif. 94117 Mrs. Connie Kitney, 6585 Culp St., Niagara Falls, Ontario, Canada L2G 2C3 Daniel B. Luten, 1097 Creston Road, Berkeley, Calif. 94708 Greta Nilsson, 642 S. Orange St., Media, Pa. 19063 Gary T. Nishimoto, 354 Anela St., Hilo, Hawaii 96720 Stobart & Son Ltd., 67/73 Worship Street, London, EC2A 2EL, England *****

Editorial Policy: Since the annual termination exceeds 60 members, and seldom if ever the termination notices are sent in, the grace period will be shortened a month to 28 February from 31 March. Members whose dues have not been paid by 28 February will be dropped from the membership roll and THE ELEPAIO mailing list. Approved 13 Oct.1975, HAS board meeting.

Christmas Bird Count on 21 December 1975; If you are interested in helping with the count, please call Dr. Sheila Conant, 988-6522 (evenings) or Dr. Robert Pyle, 262-4046.

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

Reprint permitted if credited as follows: from THE ELEPAIO, Journal of Hawaii Audubon Society. ****

NOVEMBER ACTIVITIES: Please Note Date *

8 November - Field trip to Mauna Kea endangered species habitats -- Pu'u La'au, Pu'u Nanaha, Pu'u Kole, sandalwood enclosure and feral sheep enclosures. Nanana, Fu'u Kole, sandalwood enclosure and leral sheep enclosures.
Meet at 6:00 a.m. at Mooheau bus terminal in Hilo. Bring lunch, water and binoculars. Reservations required for jeep road trip. Open to the public. Telephone trip leader: Larry Katahira, 967-7416.
10 November - Board meeting at Waikiki Aquarium Auditorium, 6:45 p.m. Members welcome.
*16 November - Field trip to study shorebirds. Meet at the State Library on Punchbowl at 8:00 a.m. Leaders: Omer Bussen, 262-5506 & Dr.Sheila Conant, 988-6522.
17 November - General meeting at Waikiki Aquarium Auditorium at 7:30 p.m. Program: Hawaii's Endangered Plants and Federal Law by Dr. Wayne C. Gagne.

HAWAII AUDUBON SOCIETY EXECUTIVE BOARD: President-Dr.Wayne C.Gagne; Vice-Presidents-Dr. Sheila Conant, William F.Burke; Secretary-Lani Stemmermann; Treasurer-Roxanne Sullivan Board Members-Hilde K.Cherry, Dr. Francis G.Howarth
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